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The Electric Company®
El Paso Electric

2024 CORPORATE SUSTAINABILITY REPORT

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Letter from our President and CEO

In 2024, El Paso Electric advanced our pursuit of a cleaner future while we simultaneously positioned our region for unprecedented growth. We understand that sustainability is an expansive term, encompassing our environment, our community and our economy. To that end, we deployed strategies to address sustainability within all three.

On the environmental front, we continued to invest in renewable resources and electrification. We began construction on Felina Solar, a 150 MW facility where 50 MW will be used for business solar. We also built additional community solar resources, allowing more of our Texas customers to participate in solar generation programs. To secure future resources, we issued an all-source RFP for 750 MW of new renewable resources and developed plans for an additional 200 MW of EPE-owned renewable generation. At the same time, we commissioned 228 MW Newman Unit 6, our cleanest, most efficient plant to support our goal to replace older, less efficient gas units.

In addition, we implemented electrification programs in both our Texas and New Mexico service territories. We partnered with schools to add electric school buses and educated our customers about electrification. In a similar vein, we held many public information sessions to talk about the impact of using power during our peak and how our newly delivered smart meters allow customers to understand their own usage. Although not immediately obvious, using energy during peak times is one of the major challenges to our environment.

To benefit our community, we invested $1.2M through our charitable foundation and almost $500,000 towards other community programs. Our employees dedicated approximately 13,500 hours of volunteer time and served on 60 community boards. We are particularly proud of our employee matching program, through which the company matched $400,000 in donations from 192 employees.

Perhaps our largest achievement was the investments we made to keep our community safe and our economy growing. Witnessing other communities suffer from reliability challenges, we fortified our commitment to taking prudent actions to help minimize the likelihood of such catastrophic events happening here. From continuing our efforts to upgrade to steel poles in key parts of our service territory, adding predictive technologies and building additional substations to reinforced infrastructure, we stand poised to respond to any event. We paid particular attention to investments that bolster our cybersecurity in recognition of the key role we play in national security. As a result, in 2024, we delivered the most reliable service we have on record.

Finally, responding to the significant, current and expected future energy demand growth, we made plans and took actions to position the region as the place to site new companies and grow current ones. With our regulatory, market structure, land, workforce and funding advantages, we marketed our region and are now ensuring all our customers benefit from the additions to our grid.

In summary, 2024 was the year where we cemented our foundation for the most transformational growth we have had in our company's history, since its inception in 1901. The growth and transition of our energy landscape will have a lasting impact, shaping future generations to come.

Sincerely,

Kelly A. Tomblin
President and Chief Executive Officer

Mission: We are transforming the Energy Landscape.

Vision: Together we are powering Economic Growth, Innovation and Prosperity in our region.

Values:

- **S** Sustainability
- **P** Partnership
- **A** Agility
- **R** Respect
- **K** Knowledge

Be a Trusted Partner

Maintain reliability and customer satisfaction.

Sustain affordability and increase value for customers.

Enhance stakeholder and community engagement.

Serve Growth

Deliver solutions to attract and grow large customers and improve customer mix.

Build and diversify generation portfolio.

Expand and innovate the grid.

Leverage Technology

Adopt and integrate enterprise and support systems to boost efficiency.

Advance digitalization of operations while bolstering cybersecurity.

Enable utilization of data and AI to optimize operations.

Advance a Cleaner Future

Deploy programs to increase adoption of electrification.

Mitigate peak impact through customer programs and technologies.

Achieve carbon reduction goals through integrated system planning.

Drive a Culture of Excellence

Elevate employee safety and wellness.

Implement operational performance KPIs and business process imporvements.

Build excitement with programs that enhance employee engagement, skills development and industry knowledge.

Company Overview

EPE began serving customers on August 30, 1901 as the EPE Railway Company with a 500 kW generating capacity. Today, EPE is a regional electric utility providing generation, transmission, and distribution service to retail and wholesale customers across southern New Mexico and west Texas.

- 10,000 square miles in west Texas and southern New Mexico
- Includes cities of El Paso, TX and Las Cruces, NM
- Part of the Western Electricity Coordinating Council ("WECC") transmission grid
- Interconnected with Mexico and the Southwest Power Pool (SPP)
- Vertically integrated utility engaged in the generation, transmission, and distribution of electricity

Service Territory

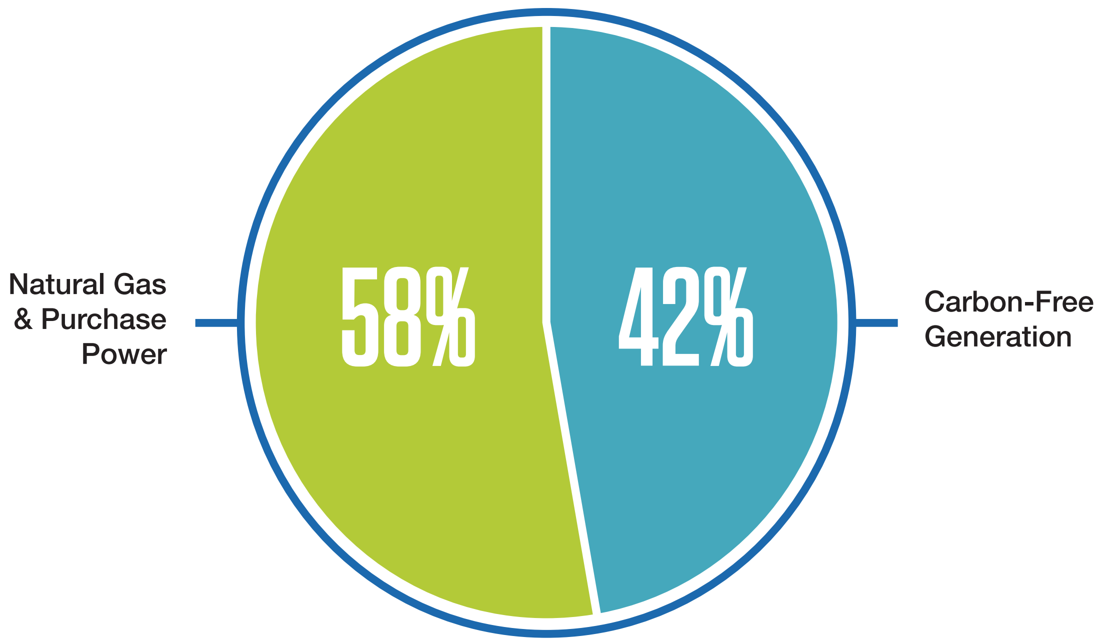
Resource Portfolio

Net Generation

Fuel Type			
	2022	2023	2024
Coal	NA	NA	NA
Natural Gas	4,485,493	5,362,373	5,791,330
Nuclear	5,045,366	4,981,410	5,117,322
Renewables (Solar)	20,017	18,279	16,081
Photovoltaic Purchased Power	272,594	501,218	635,520
Purchased Power (other)	1,503,523	2,151,690	2,229,881
Carbon-Free Generation	47.1%	42.3%	41.8%
Natural Gas & Purchase Power	52.9%	57.7%	58.2%

[1] Net Generation as reported in EPE's FERC Form 1.

2024 Carbon Generation Profile



2024 EPE Generation Nameplate Capacity

Rio Grande Power Station	399 MW
Newman Power Station	1,155 MW
Copper Power Sation	87 MW
Montana Power Station	527 MW
Palo Verde Nuclear Power Plant	665 MW
Renewable (Solar)*	238 MW*

*Renewable (Solar) includes 11 MW of EPE-owned solar facilities and 227 MW of Purchased Power Agreements (PPAs).

Renewable Energy Portfolio

Planned Resources

Resources	Resource Type	Nameplate Capacity (MW)	Location	Commercial Operation Date (COD)
DESRI Carne Hybrid Resource	Solar/Storage	130/65	NM	Feb 25
EDF Milagro Hybrid Resource	Solar/Storage	150/75	TX	Oct 25
Felina - Business Solar Power	Solar	50	TX	Aug 25
Felina - Texas Solar Source	Solar	100	TX	Aug 25
NM Community Solar	Solar	15	NM	Sep 25
NM Community Solar	Solar	15	NM	Mar 26
New Mexico Solar Resource	Solar	50	NM	Mar 26
Texas Hybrid Resource	Solar/Storage	100/150	TX	Mar 26
Texas Hybrid Resource	Solar/Storage	100/100	TX	Feb 27
Texas Hybrid Resource	Solar/Storage	100/100	TX	Sep 27
Texas Hybrid Resource	Solar/Storage	250/250	TX	Dec 27
Texas Battery Storage Resource	Storage	150	TX	Dec 28
Texas Hybrid Resource	Solar/Storage	150/75	TX	Dec 28

Distributed Generation

Across EPE's service area, the adoption of distributed generation by customers continues to be on the rise ever since EPE began connecting customer-owned systems in 2008. In 2024 alone, over 2,200 customers were interconnected, which raised the total capacity from 186 to 202 MW.

2024 Distributed Generation

2024	Number of Customers	Capacity (MW)
Texas	25,456	141
New Mexico	9,874	61
Total	**35,330**	**202**

Interconnected Distributed Generation

Year	2022	2023	2024
Interconnection Applications[1]	5,615	4,016	2,439
Total Interconnected Capacity (kW)	32,848	25,468	17,084

[1] Including battery storage.

Supplier Diversity

EPE's supply chain management aims to enhance contracting opportunities for historically underutilized businesses (HUBs) through our systematic procurement processes.

2024	In Texas[1]	Outside of Texas
Total non-fuel purchases	$249,082,629	$413,979,926
Non-fuel purchases from HUBs	$47,435,556	$37,184,879
% of non-fuel purchases from HUBs	19%	9%

2024 Statistics

RESIDENTIAL INDUSTRIAL **459,472 CUSTOMERS** PUBLIC AUTHORITY WHOLESALE CUSTOMERS

2,844 MW
OF OWNED GENERATION

13,790,135 MWh
NET GENERATION

41.8%
OF ENERGY SUPPLIED BY CARBON-FREE RESOURCE

2,316 MW
2024 PEAK LOAD

IN RELIABILITY AMONG TEXAS INVESTOR-OWNED UTILITIES

8,396 miles of
DISTRIBUTION LINES

1,862 miles of
TRANSMISSION LINES

137 SUBSTATIONS

Customer Satisfaction

At EPE, we're not just in the business of providing power; we're in the business of making a positive difference in the lives of our customers. Through proactive measures and a steadfast commitment to affordability, EPE provided customers with unprecedented savings and service–a testament to our unwavering dedication to delivering tangible benefits directly to our customers' pockets.

Overall Customer Satisfaction Scores

Year	Residential Average		Small Commercial Average	
	EPE Score	MSI National Score[1]	EPE Score	MSI National Score[2]
2024	78	77	72	80
2023	77	75	78	78
2022	74	77	78	80

[1] Benchmarking comparisons are based on surveys conducted with Residential customers of electric and electric-gas utilities included in Market Strategies' (MSIs) National Energy Utility Benchmarking Database.

[2] Benchmarking comparisons are based on surveys conducted with Small/Medium Commercial customers of electric and electric-gas utilities included in (MSIs) National Energy Utility Benchmarking Database.

Economic Profile

Financial Summary

Year[1]	2022	2023	2024
Operating Revenues[2]	$1,310,484	$1,204,247	$1,121,499
Operating Income[2]	$239,411	$270,717	$260,819
Net Income[2]	$112,356	$207,987	$171,418
Total Assets[1,2]	$4,625,137	$5,104,543	$5,646,635

[1] Numbers are for the calendar years except for Total Assets which are as of year-end.

[2] Numbers are in thousands.

About Our Employees

EPE's greatest assets are our employees who continue to drive the company towards a more sustainable future. We value their diverse talents, dedication and contributions by ensuring to foster growth through professional development and mentorship opportunities. By investing in our team, we equip them with the tools and support needed for excellence.

1148 EMPLOYEES

2024 WORKFORCE COMPOSITION

27% FEMALE | **73% MALE**

31% FEMALE | **69% MALE**
PROMOTIONS

10% FEMALE | **90% MALE**
IBEW LOCAL 960 UNION MEMBERSHIP

62% FEMALE | **38% MALE**
INTERNSHIPS

13,440 VOLUNTEER HOURS

$1.2 MILLION
DONATED TO ELECTRIC COMPANY CHARITABLE FOUNDATION

EMPLOYEE RESOURCE AND AFFINITY GROUPS

- PWR
- B.R.A.V.E.
- ROOTS
- PAC

UTEP & NMSU ALUMNI GROUP

2024 Employee Profile

Ethnicity	Male	Female
Hispanic or Latino[1]	711	255
White	96	36
Black or African American[1]	11	6
Native Hawaiian or Pacific Islander[1]	2	0
Asian[1]	2	1
American Indian or Alaskan Native[1]	3	2
Two or More Races	13	4
Unknown	4	2
Total Workforce	1,148	

[1] Minorities in Workforce.

Strategic Sustainability

EPE is dedicated to serving our customers with a focus on sustainability, ensuring we responsibly balance environmental, social and economic factors. As the energy landscape shifts, we embed sustainable practices into every aspect of our operations, guided by our strategic goals and initiatives.

Sustainability Governance

We are committed to fostering a culture of accountability by aligning individual performance goals with our strategic objectives to support transparency, reliability, and innovation. Through robust governance practices—ensuring clear processes and adherence to shared values—we prioritize customer satisfaction, carbon emissions reduction, grid reliability, cybersecurity, and safety. This approach enables us to serve our community responsibly, uphold environmental goals, and deliver solutions for a sustainable future.

EPE's Board of Directors consists of ten directors, all of who are:

- 63% independent;
- 38% reside in our service territory; and are
- 13% women

The Board of Directors has three subcommittees, each of which oversees different opportunities and risks related to corporate sustainability.

Corporate Governance and Nominating Committee

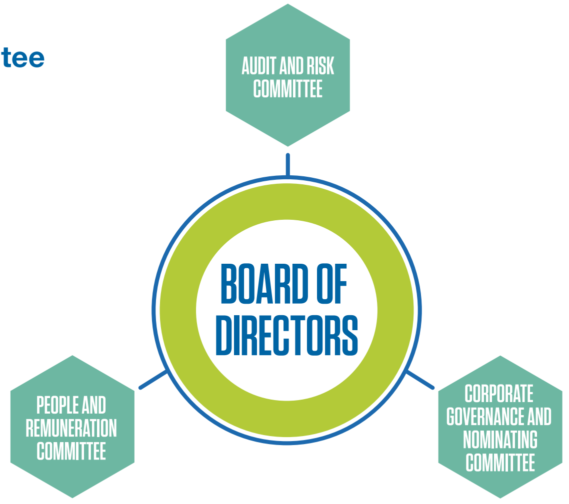
- Board performance, composition and diversity
- Environmental, social and governance reporting
- Corporate compliance obligations

People and Remuneration Committee

- Health and safety
- Culture and employee satisfaction
- Compensation and incentives

Audit and Risk Committee

- Financial reporting
- Risk management
- Cybersecurity



Sustainability Reporting

Edison Electric Institute

EPE continues to voluntarily report Environmental, Social, and Governance (ESG) sustainability metrics using Edison Electric Institute's (EEI) detailed reporting template. The template was created through EEI's industry-focused and investor-driven reporting practices. This allows member companies to provide standardized and reliable sustainability data to stakeholders across the electric utility industry.

EPE's Corporate Sustainability Report

This report includes an EEI quantitative section with a 3-year comparison that includes references where these metrics are located across EPE's reporting efforts. This level of detail is crucial as we aim to effectively communicate our sustainable efforts.

GRESB, A Global ESG Benchmark

Global Real Estate Sustainability Benchmark (GRESB) is an independent and validated benchmark of ESG performance on a global scale. EPE participates in the Infrastructure Asset Assessment which provides a basis for systematic reporting, objective scoring and peer benchmarking of ESG management and performance. EPE continues to score above the GRESB average. Although, a slight upset in score from the previous year, EPE continues to aim for sustaining performance at a high level for this reporting effort.

2024 GRESB Infrastructure Asset Benchmark Report

El Paso Electric Company

Resiliency and Reliability

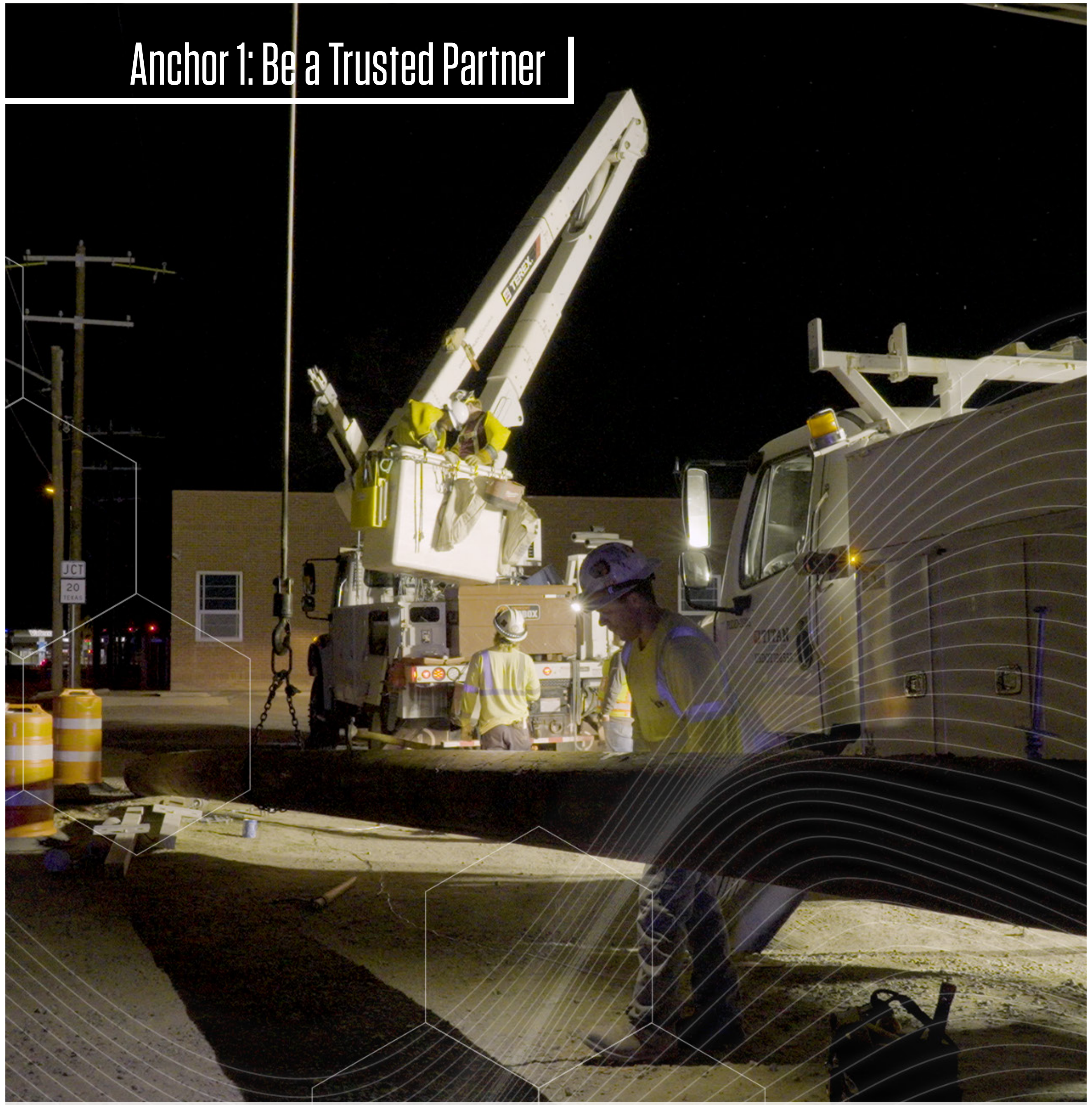
EPE's Enterprise Risk Management (ERM) strategy is designed to proactively address both physical vulnerabilities and the dynamic energy landscape while ensuring resilience and long-term reliability. Crucial physical risks consist of extreme weather events, temperature variation, water scarcity and infrastructure resilience. Transitional risks encompass evolving regulations, shifting customer preferences, technological advancements and market behavior. Through the integration of large-scale renewable generation, battery storage solutions, grid modernization and demand response programs, EPE is able to address these types of risks.

EEI ELECTRIC COMPANY /SUSTAINABILITY QUANTITATIVE INFORMATION

Parent Company:	Sun Jupiter Holdings LLC
Operating Company(s):	El Paso Electric Company
Business Type(s):	Vertically integrated
State(s) of Operation:	Texas and New Mexico
State(s) with RPS Programs:	New Mexico
Regulatory Environment:	Regulated
Report Date:	April 2025

Ref. No.	Refer to the 'EEI Definitions' Appendix for more information on each metric	2022	2023	2024	Comments, Links, Additional Information, and Notes
PORTFOLIO					
1	**Owned Nameplate Generation Capacity at end of year (MW)**				Maximum Generation Capacity under Ideal Conditions
1.1	Coal	NA	NA	NA	
1.2	Natural Gas	1,895	2,168	2,168	Source: FERC Form 1
1.3	Nuclear	665	665	665	Source: FERC Form 1, EPE owns 15.8% interest in Palo Verde Generating
1.4	Petroleum	NA	NA	NA	
1.5	Total Renewable Energy Resources	11	11	11	Source: FERC Form 1 Summation of Items 1.5.1-1.5.5
1.5.1	Biomass/Biogas	NA	NA	NA	
1.5.2	Geothermal	NA	NA	NA	
1.5.3	Hydroelectric	NA	NA	NA	
1.5.4	Solar	11	11	11	Source: FERC Form 1
1.5.5	Wind	NA	NA	NA	
1.6	Other	NA	NA	NA	
2	**Net Generation for the data year (MWh)**				
2.1	Coal	NA	NA	NA	
2.2	Natural Gas	4,485,493	5,362,373	5,791,330	Source: FERC Form 1
2.3	Nuclear	5,045,366	4,981,410	5,117,322	Source: FERC Form 1
2.4	Petroleum	NA	NA	NA	
2.5	Total Renewable Energy Resources	20,017	18,279	16,081	Source: FERC Form 1
2.5.1	Biomass/Biogas	NA	NA	NA	
2.5.2	Geothermal	NA	NA	NA	
2.5.3	Hydroelectric	NA	NA	NA	
2.5.4	Solar	20,017	18,279	16,081	Source: FERC Form 1
2.5.5	Wind	NA	NA	NA	
2.6	Total Purchased Power	1,776,117	2,652,908	2,865,401	Summation of items 2.6.1-2.6.2
2.6.1	Purchased Power (Other)	1,503,523	2,151,690	2,229,881	
2.6.2	Photovoltaic Purchased Power	272,594	501,218	635,520	
3	**Investing in the Future: Capital Expenditures, Energy Efficiency (EE), and Smart Meters**				
3.1	Total Annual Capital Expenditures (nominal dollars)	$353,018,000	$474,368,000	$682,418,000	
3.2	Incremental Annual Electricity Savings from EE Measures (MWh)	33,099	55,838	28,854	
3.3	Incremental Annual Investment in Electric EE Programs (nominal dollars)	$8,000,854	$10,098,747	$8,403,670	
4	**Retail Electric Customer Count (at end of year)**				
4.1	Commercial	51,466	51,223	52,082	Source: FERC Form 1
4.2	Industrial	49	51	54	Source: FERC Form 1
4.3	Residential	400,582	405,049	407,336	Source: FERC Form 1
EMISSIONS					
5	**GHG Emissions: Carbon Dioxide (CO2) and Carbon Dioxide Equivalent (CO2e)**				
5.1	**Owned Generation**				
5.1.1	Carbon Dioxide (CO2)				
5.1.1.1	Total Owned Generation CO2 Emissions (MT)	2,482,890	2,838,615	2,625,687	
5.1.1.2	Total Owned Generation CO2 Emissions Intensity (MT/Net MWh)	0.260	0.274	0.240	
5.1.2	Carbon Dioxide Equivalent (CO2e)				
5.1.2.1	Total Owned Generation CO2e Emissions (MT)	2,485,414	2,841,502	2,628,342	
5.1.2.2	Total Owned Generation CO2e Emissions Intensity (MT/Net MWh)	0.260	0.274	0.241	
5.2	**Purchased Power**				
5.2.1	Carbon Dioxide (CO2)				
5.2.1.1	Total Purchased Generation CO2 Emissions (MT)	24,519	29,408	24,337	
5.2.1.2	Total Purchased Generation CO2 Emissions Intensity (MT/Net MWh)	0.014	0.011	0.008	
5.2.2	Carbon Dioxide Equivalent (CO2e)				
5.2.2.1	Total Purchased Generation CO2e Emissions (MT)	24,619	29,530	24,440	
5.2.2.2	Total Purchased Generation CO2e Emissions Intensity (MT/Net MWh)	0.014	0.011	0.009	

Ref. No.	Refer to the 'EEI Definitions' Appendix for more information on each metric	2022	2023	2024	Comments, Links, Additional Information, and Notes
EMISSIONS (continued)					
5.3	**Owned Generation + Purchased Power**				
5.3.1	Carbon Dioxide (CO2)				
5.3.1.1	Total Owned + Purchased Generation CO2 Emissions (MT)	2,507,409	2,868,023	2,650,025	
5.3.1.2	Total Owned + Purchased Generation CO2 Emissions Intensity (MT/Net MWh)	0.221	0.220	0.192	
5.3.2	Carbon Dioxide Equivalent (CO2e)				
5.3.2.1	Total Owned + Purchased Generation CO2e Emissions (MT)	2,510,033	2,871,032	2,652,782	
5.3.2.2	Total Owned + Purchased Generation CO2e Emissions Intensity (MT/Net MWh)	0.222	0.221	0.192	
5.4	**Non-Generation CO2e Emissions of Sulfur Hexafluoride (SF6)**				
5.4.1	Total CO2e emissions of SF6 (lbs)	46,692	23,900	16,765	
5.4.2	Leak rate of CO2e emissions of SF6 (lbs/Net MWh)	0.00489	0.00231	0.00153	
6	**Nitrogen Oxide (NOx), Sulfur Dioxide (SO2), Mercury (Hg)**				
6.1	Generation basis for calculation	Total			
6.2	**Nitrogen Oxide (NOx)**				
6.2.1	Total NOx Emissions (MT)	2,152	2,576	2,414	
6.2.2	Total NOx Emissions Intensity (MT/Net MWh)	0.000225	0.000249	0.000221	
6.3	**Sulfur Dioxide (SO2)**				
6.3.1	Total SO2 Emissions (MT)	10	12	14	
6.3.2	Total SO2 Emissions Intensity (MT/Net MWh)	0.000001	0.000001	0.000001	
6.4	**Mercury (Hg)**				
6.4.1	Total Hg Emissions (kg)	NA	NA	NA	
6.4.2	Total Hg Emissions Intensity (kg/Net MWh)	NA	NA	NA	
RESOURCES					
7	**Human Resources**				
7.1	Total Number of Employees	1,128	1,107	1,148	
7.2	Percentage of Women in Total Workforce	27%	27%	27%	
7.3	Percentage of Minorities in Total Workforce	85%	87%	88%	
7.4	Total Number of Board of Directors/Trustees	10	10	8	
7.5	Percentage of Women on Board of Directors/Trustees	20%	20%	13%	
7.6	Percentage of Minorities on Board of Directors/Trustees	20%	20%	25%	
7.7	**Employee Safety Metrics**				
7.7.1	Recordable Incident Rate	1.24	1.40	2.26	
7.7.2	Lost-time Case Rate	0.44	0.44	0.72	
7.7.3	Days Away, Restricted, and Transfer (DART) Rate	0.53	0.44	0.91	
7.7.4	Work-related Fatalities	0	0	0	
8	**Fresh Water Resources used in Thermal Power Generation Activities**				
8.1	Water Withdrawals - Consumptive (Millions of Gallons)	5,030	5,536	5,209	
8.2	Water Withdrawals - Non-Consumptive (Millions of Gallons)	NA	NA	NA	
8.3	Water Withdrawals - Consumptive Rate (Gallons/Net MWh)	528	535	478	The units for this metric are different that the units recommended in the Appendix (Definitions Table)
8.4	Water Withdrawals - Non-Consumptive Rate (Millions of Gallons/Net MWh)	NA	NA	NA	
9	**Waste Products**				
9.1	Amount of Hazardous Waste Manifested for Disposal	69.87	4.95	3.52	2022 Hazardous Waste increase due to episodic events at Rio Grande and Newman
9.2	Percent of Coal Combustion Products Beneficially Used	NA	NA	NA	



Anchor 1: Be a Trusted Partner

Being a trusted partner is our first priority. To achieve that relationship, we will continue delivering the highest level of reliability our customers have come to expect. We will strengthen reliability through effective construction management, enhanced cybersecurity, and innovative technologies. Affordability will be supported by streamlining processes, adopting technology, and managing costs. We will work with our external partners to promote economic growth and drive constructive regulatory and legislative efforts in Texas and New Mexico for the benefit of employees and the community.

Supporting Power Restoration in New Mexico

Under the Western Region Mutual Assistance Agreement (WRMAA), EPE worked alongside Public Service Company of New Mexico (PNM) to restore power to two area communities in need. EPE crews first traveled to Ruidoso on June 25th, working side by side with PNM to overcome the challenges posed by the South Fork Fire. They later supported PNM in northern New Mexico after a severe snowstorm left over 50,000 customers without power. This unified effort demonstrated the strength of partnership and mutual support in tackling difficult situations through WRMAA, a collaborative network of utilities that provides assistance during emergencies.

Reliability

Providing safe and reliable electric service remains one of EPE's top priorities. For several years, we are proud to have led Texas investor-owned utilities in reliability as reported by the Public Utility Commission of Texas (PUCT). As of 2024, our System Average Interruption Duration Index (SAIDI) and our System Average Interruption Frequency Index (SAIFI) were nearly half less than the state average. These metrics highlight our commitment to minimizing the duration and frequency of power outages for our customers.

SAIDI (Minutes)

Year	2022	2023	2024
EPE SAIDI[1]	66.81	67.61	64.88
Texas IOU Average[2,3]	143.11	130.1	129.96
EPE Rank (in Texas)[3]	**1**	**2**	**1**

[1] Includes Texas and New Mexico.
[2] Texas Investor-Owned Utilities Average.
[3] Texas IOU Average and Ranking are calculated once annual service quality report is updated on the PUCT website. puc.texas.gov

SAIFI

Year	2022	2023	2024
EPE SAIFI[1]	0.622	0.639	0.583
Texas IOU Average[2,3]	1.19	1.1	1.129
EPE Rank (in Texas)[3]	**1**	**3**	**1**

[1] Includes Texas and New Mexico.
[2] Texas Investor-Owned Utilities Average.
[3] Texas IOU Average and Ranking are calculated once annual service quality report is updated on the PUCT website. puc.texas.gov

2024 System Reliability[1]

	EPE[1]	TX-IOU[2]
SAIDI (min)	64.88	129.96
SAIFI	0.583	1.129

[1] Includes Texas and New Mexico.
[2] Texas Investor-Owned Utilities Average.

Extreme Weather Response

EPE Supports Extreme Weather Task Force

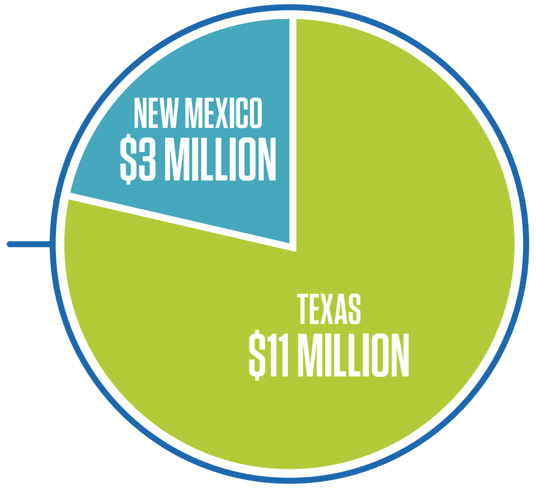
EPE partnered with the Extreme Weather Task Force to support vulnerable individuals and families during both the summer and winter seasons. In the summer, EPE donated $5,000 to provide fans to those in need and joined forces with community partners to raise awareness and encourage additional fan donations. As colder weather arrived, EPE contributed $5,000 worth of warm blankets, ensuring families could stay safe and comfortable during the winter months. These initiatives highlight EPE's dedication to protecting and caring for its community year-round.

WEIM and Western Markets

EPE joined the CAISO Energy Imbalance Market (EIM) in April 2023 to strengthen regional cooperation and enhance operational efficiencies in today's interconnected energy landscape. EPE completed its first full year of participation in 2024, solidifying its role in this innovative market.

The EIM enables real-time energy trading across a vast, integrated grid, improving grid reliability, reducing operating costs, and optimizing renewable energy utilization. Through the EIM, EPE has gained access to a broader pool of resources, reducing reliance on costly and inefficient reserves while enhancing its ability to meet peak demand during the summer heat. These advancements lower energy costs for consumers, foster collaboration among utilities, and support clean energy integration and carbon reduction goals.

THE TOTAL **CUSTOMER BENEFIT** FROM WEIM IN 2024 HAS BEEN AN AVERAGE OF **$14 MILLION** DOLLARS IN SAVINGS



Customers Saving Money and Energy

All Texas EPE customers received a fuel credit on their bills in November and December. The average residential customer received a credit of approximately $3.00, an estimated savings of 3.75%. Fuel is adjusted periodically in Texas to reflect the actual cost of generating electricity while fuel costs in New Mexico are adjusted monthly. EPE does not earn a profit on fuel costs.

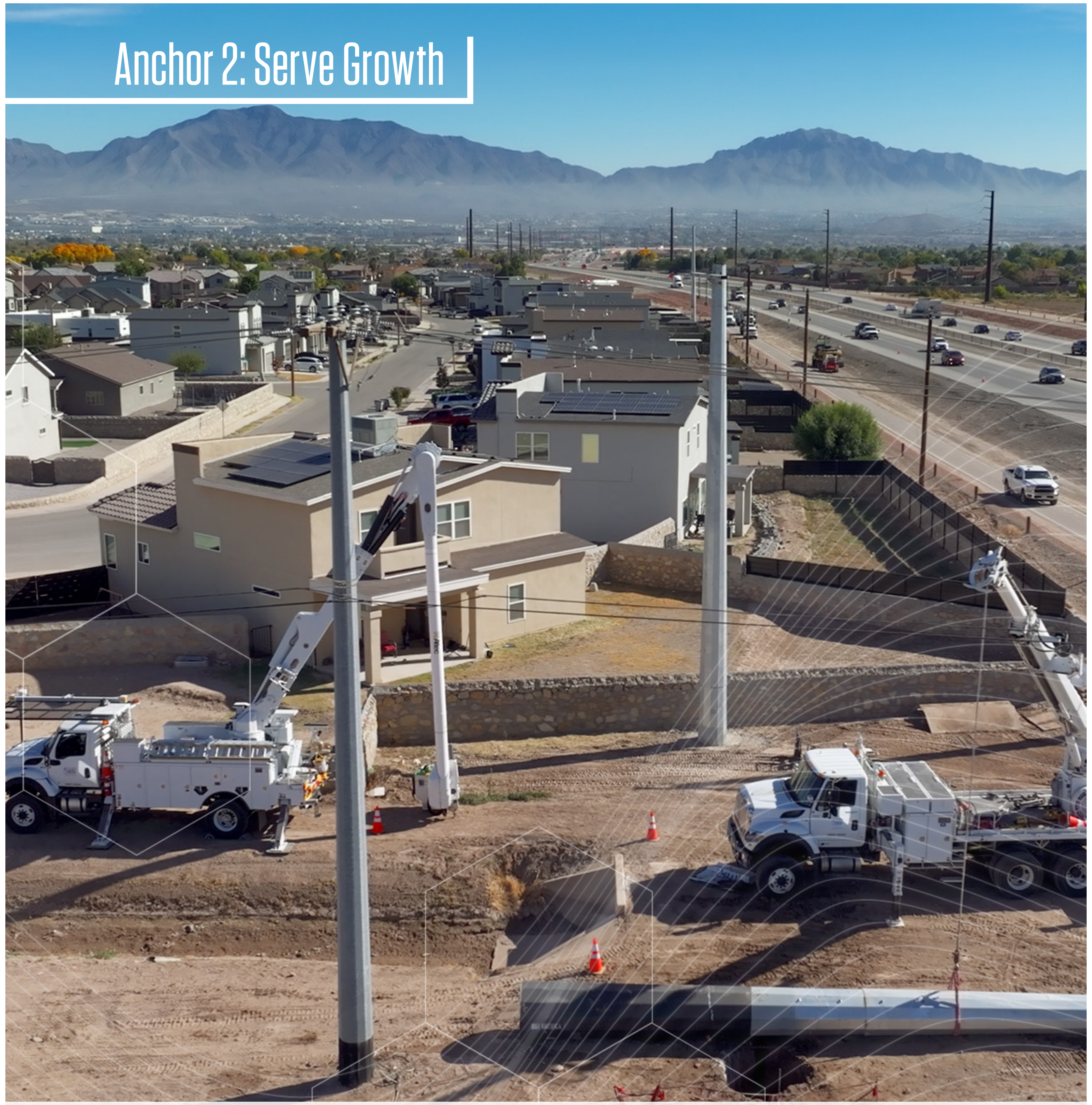
Transformer Partnership with KP Electric

EPE entered a multi-year manufacturing agreement with KP Electric, a South Korean leader in electrical equipment, to enhance operational readiness and service reliability. This partnership ensures a consistent supply of high-demand transformers, enabling EPE to meet customer needs while supporting regional economic growth. With the first delivery expected by the end of 2024, EPE is proactively addressing inventory management, strengthening service delivery, and advancing clean energy initiatives through collaboration with a trusted global supplier.

Expanding our Lineworker Certification Program with Western Technical College

In May, EPE took an important step in workforce development by partnering with Western Technical College to establish a Lineworker Certification Program in Texas. Fourteen students were awarded full tuition scholarships, marking the start of their training as lineworkers. This collaboration reflects EPE's investment in cultivating skilled professionals who will support the growing needs of the energy industry and contribute to a strong workforce.

Anchor 2: Serve Growth



We are committed to driving growth by attracting and supporting large customers, improving our customer mix, and expanding our generation portfolio. Our efforts are designed to serve the growth and prosperity of our communities by innovating the grid, securing resources for growing infrastructure, and executing energy service agreements for high-load customers.

Resource Planning

As of 2024, EPE has made resource selections for the 2023 New Mexico Renewable Portfolio Standard (RPS)/Texas All-Source request for proposals that were issued back in 2023. The selections are a mixture of solar and battery storage resources that are aimed to become commercially operational between 2026-2028.

Transmission Interconnections

While demand for providing reliable and clean energy within EPE's service territory continues to grow, interconnection projects are key to meeting our energy delivery needs while upholding our environmental and sustainability commitments. Verde substation, constructed and energized in April 2024, provided the essential infrastructure needed to connect new renewable energy sources forecasted to be completed in 2025 in the Santa Teresa, NM area. Increasing efforts in the planning, design, and execution of interconnection projects, to further facilitate the transmission of renewable energy within its service territory, continues to be EPE's priority for a more sustainable future.

Energy Delivery Investments

In 2024, EPE invested $233M to enhance energy delivery infrastructure, improving system reliability and supporting growing demand for sustainable electricity within our service territory. Major projects included upgrading 4.2 miles of transmission lines and infrastructure improvements at 30 substation facilities. Additionally, 107 maintenance projects were completed at critical facilities to ensure continued reliability. To address increasing demand within our service territory, EPE constructed two temporary substations in El Paso, adding 80MW of distribution capacity, and installed a new transformer in Clint, TX, providing a permanent 50MW increase in capacity.

Anchor 3: Leverage Technology

We leverage technology to enhance our efficiency, strengthen our cybersecurity, and embrace innovation. By integrating enterprise systems and advancing digital tools, we boot productivity and modernize operations. Our use of data and AI optimizes processes, sharpens decision-making, and drives new opportunities to stay competitive and forward-thinking.

Cybersecurity at EPE Safeguarding Systems and Building Trust

Cybersecurity is at the core of our operations, ensuring the reliability and security of systems critical to public safety, service continuity, and the trust of our community, employees, and customers alike.

Excellence in Cybersecurity Standards:

EPE proudly ranks in the Advanced category for BitSight Security Ratings, placing us in the top 1% of 179 companies within our Utilities Industry Peer group – a testament to our unwavering commitment to cybersecurity excellence.

Comprehensive Cybersecurity Awareness Program:

Our program addresses vital topics such as Cyber Awareness, Email Security, Password Strength, Mobile Device Security, and defense against Phishing/Vishing attacks. In 2024, we exceeded our goals, achieving a phishing training failure rate below 3.5% and delivering annual cybersecurity training to 100% of staff members.

Leadership in Community Cybersecurity:

Beyond internal efforts, EPE leads regional cybersecurity awareness by collaborating with organizations like InfraGard and participating in events such as ResponseCon, Hack the Border, and the FBI Annual Cyber Conference. These initiatives reinforce our role as a trusted leader in advancing cybersecurity knowledge and awareness within the broader community.

100%
OF EMPLOYEES
RECEIVED COMPREHENSIVE CYBERSECURITY AWARENESS TRAINING IN 2023

TOP 14%
IN SECURITY RATING
RANGE WHEN COMPARED TO 191 OTHER UTILITIES

BITSIGHT SCORE OF 750 IN THE ADVANCED CATEGORY DEMONSTRATING OUR DEDICATION TO
MAINTAINING A SECURE DIGITAL ENVIRONMENT

Smart Meter Update

2024 Summary

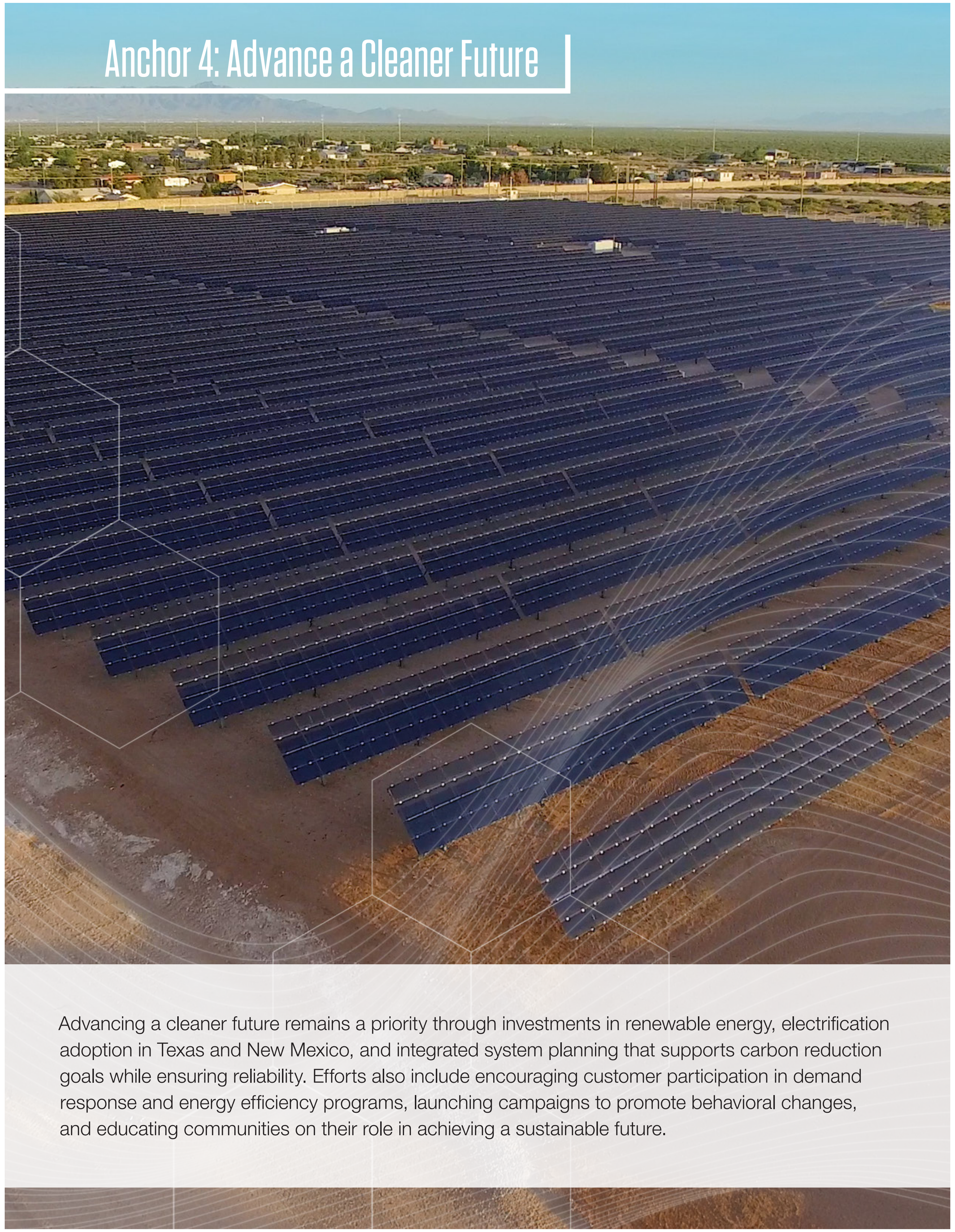
	Installed Jan - Dec 2024	AMR Meter Remaining Dec 31
Texas	233,060	73,579
New Mexico	92,673	11,267
Total	**325,733**	**84,846**

TEXAS COMPLETION
81.48%

NM COMPLETION
91.35%

TOTAL COMPLETION
83.90%

Anchor 4: Advance a Cleaner Future



Advancing a cleaner future remains a priority through investments in renewable energy, electrification adoption in Texas and New Mexico, and integrated system planning that supports carbon reduction goals while ensuring reliability. Efforts also include encouraging customer participation in demand response and energy efficiency programs, launching campaigns to promote behavioral changes, and educating communities on their role in achieving a sustainable future.

Carbon Reduction Goals

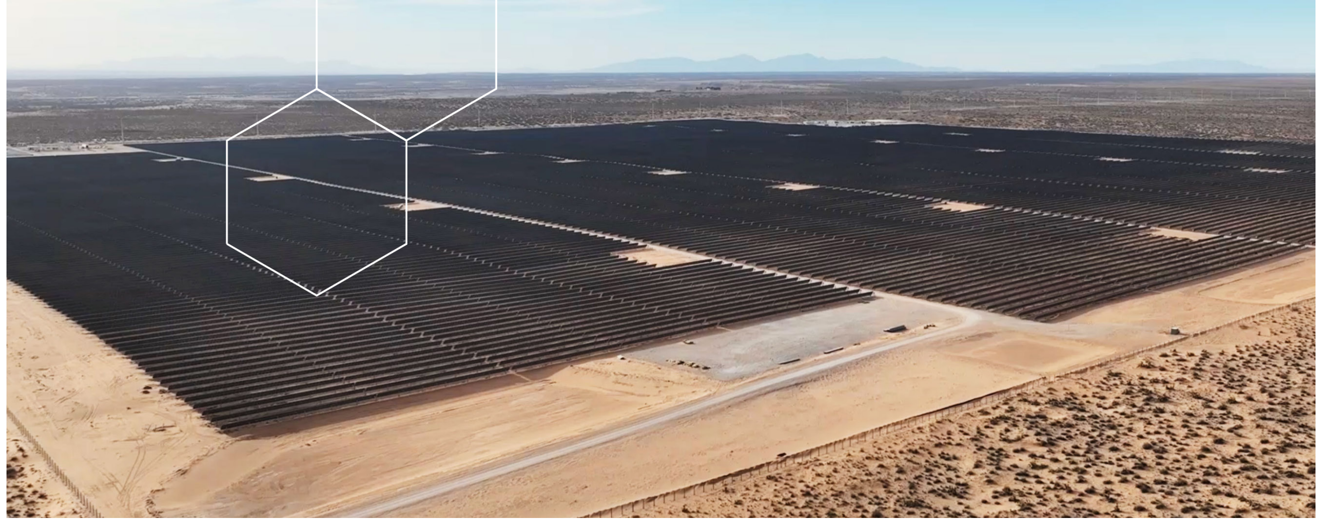
EPE is committed to transforming the energy sector with ambitious carbon-free energy targets: 80% by 2035 and 100% by 2045. To achieve our 2035 goal, we have enhanced our generation portfolio by integrating renewable energy sources and storage solutions, leveraging existing carbon-free nuclear resources, and advancing emerging fuel technologies. EPE is dedicated to pioneering innovative solutions, constantly exploring and adopting new technologies driving our transition towards a comprehensive decarbonized future.

Felina Ground-Breaking Ceremony

In Honor of Earth Day, EPE celebrated with the groundbreaking of Felina, our new 150 MW solar panel facility. This initiative aligns with our dedication to promoting a cleaner, greener future. Felina represents a major advancement in our renewable energy efforts, helping to reduce environmental impact while powering our communities' sustainably.

This project will allocate 50 MW for EPE's Texas Business Community Solar. This innovative program provides solar energy solutions for mid to large commercial, industrial, educational and non-military governmental customers.

The Felina Solar project will generate 150 MW of power using around 340,000 solar panels. The project will produce about 450,000 megawatt hours every year and will create 250 to 300 full-time jobs during its construction phase.



Texas Community Solar Expansion

EPE marked a momentous occasion in January 2024 with the groundbreaking of a 10 MW community solar expansion in San Elizario, Texas. The event highlighted the importance of collaboration and community support, with key leaders and stakeholders in attendance. EPE achieved mechanical completion of the site in November 2024, and the expansion of community solar opened enrollment spots for 5,000 customers.

2024 Community Solar Statistics

Customer Class	Number of Customers	Approved Capacity (kW)[1]
Residential	2,199	4,689
Small Commercial	48	167
Commercial and Industrial	10	129
Total	**2,257**	**4,985**

[1] Total approved capacity can be more or less than 5,000 kW due to customers moving in and out of the program and being on different billing cycles as well as waiting list customers pending to confirm interest in the program.

Transportation Electrification of EPE Fleet and Community

As part of its steadfast commitment to electrification, EPE is actively spearheading fleet electrification initiatives, marking a significant stride towards a sustainable future. Complementing these efforts, EPE extends its dedication to electrification by providing convenient vehicle charging opportunities for its employees across various company facilities. These charging stations not only encourage the adoption of EVs among employees but also underscore EPE's proactive stance in promoting clean transportation solutions.

By facilitating employee access to charging infrastructure and providing services and experiences to its customers, EPE reaffirms its commitment to reducing emissions, advancing electrification, and fostering a culture of sustainability within its operations and beyond.

Additional Electric and Hybrid Vehicles in EPE's Fleet

EPE has continued its fleet electrification efforts with an addition of 20 F-150 Lightning pick-up trucks, one Chevy Blazer, and 13 more ePTO bucket trucks in 2024.

2024 Electric And Hybrid Vehicles in EPE's Fleet

Vehicle Make and Model	Number of Vehicles	Vehicle Power Source
Ford F-150 Lightning	20	Electricity
Chevy Blazer	1	Electricity
Toyota RAV4 Hybrid	1	Unleaded
Ford F-550 ePTO bucket truck	38	Diesel and Electricity
Chevy Bolt	12	Electricity
Lifts, Forklifts, and Off-Road Vehicles	9	Electricity
Total	**81**	

Transportation Electrification Plans

New Mexico Transportation Electrification Plan

EPE continues its drive toward a greener and more sustainable future with the approval of the latest Transportation Electrification Plan (TEP), for years 2024-2026. The latest plan was designed to expand the use of electric vehicles (EVs) by EPE customers through education and outreach program, various residential and commercial rebate programs as well as a turnkey EV charging infrastructure solutions. EPE's TEP launched on April 1, 2024, with a budget of $11.8 million. In 2024, this plan allowed EPE to launch its first residential managed charging program, shifting a portion of EV load to off-peak or low-carbon hours, and to install EV charging at several multi-unit dwelling complexes to ensure equitable access to charging infrastructure for EPE customers. EPE also organized several Ride and Drive events in Las Cruces where customers had an opportunity to test drive a variety of EVs and learned more about EV ownership experience and available federal, state, and EPE incentives.

Texas EV Ready Pilot Programs

The Public Utility Commission of Texas (PUCT) approved EPE's Texas EV-Ready Pilot Program and Tariffs, which will help EPE evaluate customer's responsiveness to special time-of-use rate options and managed charging programs to ensure EV loads are efficiently integrated with the electric grid. Furthermore, EPE will be offering new make-ready infrastructure programs and turnkey solutions to its commercial customers to help expand public EV charging infrastructure in our region.

EV Grants Awarded for EPE's Service Territory

EPE continues to be engaged with its customers and local stakeholders in a pursuit of federal and state funding opportunities. As a result of those efforts, several electrification grants were secured by customers in EPE's service territory.

Clean School Bus Program

Clean School Bus grants and rebates were secured from Environmental Protection Agency (EPA) which resulted in the addition of 30 all-electric school buses in EPE's service territory in 2024.

Charging and Fueling Infrastructure (CFI) Grant with EPE

El Paso was awarded $15 million Charging and Fueling Infrastructure grant from the U.S. Department of Transportation Federal Highway Administration to install EV charging stations throughout the city of El Paso that will be meeting the Justice40 initiative.

Environmental Stewardship

Environmental Stewardship refers to the responsible use and protection of the natural environment through sustainable practices. EPE actively participates in conservation efforts that directly align with our goals to reduce carbon emissions, minimize regulated waste and preserve natural resources, biodiversity & vegetation.

Environmental Scorecard

Category	2022	2023	2024
Agency Inspections	10	7	11
Notices of Violation (NOV)[1, 2,3]	1	1	8
Avian Incidents	5	4	0
Reportable Spills	3	5	5

[1] 2022 Failure to timely report Whole Effluent Toxicity sample results.
[2] 2023 Failure to report a spill/discharge within 24 hours of discovery.
[3] 2024 NOV associated with Newman Drinking Water System. All incidents were resolved and had no environmental impacts.

Air Quality

Despite increased demand of our gas generation fleet due to load growth, EPE consistently maintains carbon emissions that fall below the average of the largest U.S power producers[1]. EPE ranked in the 70th percentile when comparing total CO2 emissions and CO2 rate from all generating resources. We will continue to strive towards reducing our emissions to preserve the quality of our air.

[1] The Sustainability Institute by ERM (2024). Benchmarking Air Emissions of the 100 Largest Electric Power Producers in the United States

CO_{2e}[1] Emissions (Metric Tons)

Source	2022	2023	2024
Direct Emissions from Stationary Combustion Units	2,485,124	2,841,067	3,061,460
Direct Emissions from Mobile Combustion	4,406	4,262	4,202
Direct Emissions from Electric T&D	46,692	23,900	16,765
Direct Emissions from Natural Gas Fugitives	2,767	2,868	3,355
Indirect Emissions from Energy Purchased	24,619	29,530	24,440
Total CO_{2e} Emissions	**2,563,609**	**2,901,627**	**3,110,223**

[1] CO_{2e} is comprised of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and sulfur hexafluoride (SF_6).

Air Quality Scorecard (Short Tons)[1]

Parameter	2022	2023	2024
Nitrogen Oxides (NOx)	2,374	2,840	2,661
Carbon Monoxide (CO)	604	920	846
Particulate Matter (PM)	201	236	228
Sulfur Dioxide (SO_2)	12	13	15

[1] Criteria pollutant totals are for local generation only (natural gas).

Carbon Footprint

As EPE transitions to a carbon-free portfolio, we will continue reporting our emission intensities (carbon mass per MWH of net generation) with full transparency. This rate refers to the amount of carbon dioxide (equivalent) produced per megawatt-hour of electricity generated. In order to quantify progress towards our goal, the current year's rate is compared to a consistent 2015 baseline (last year using coal sources).

Carbon Footprint[1,2,3] Trend (Short Tons of CO_{2e} /MWh)

2015 Baseline Rate	0.282	Change from 2015 Baseline
2024 Rate	0.2486	<12%

[1] Carbon footprint is comprised of emissions of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) from the fuel combustion at the power plants, from fluorinated gases (SF_6) from transmission and distribution equipment and CO_2 emissions from our vehicle fleet.
[2] Rate includes all carbon sources from CO2e emissions table
[3] Rate includes total load served (net generation)

Water

EPE utilizes water in power generation for temperature regulation to maintain the efficiency of the power plant units and to decrease NOx emissions during the combustion cycle. As we generate electricity in a desert, we remain mindful and carefully manage water usage by ensuring we optimize the cycling of water in our cooling towers, utilize dry cooling technology in our latest units and continue to transform our generation portfolio with more renewable resources.

Water Consumption Rate

Year	Rate (Liters/Net MWh)[1]
2024	2,048
2023	2,291
2022	2,349

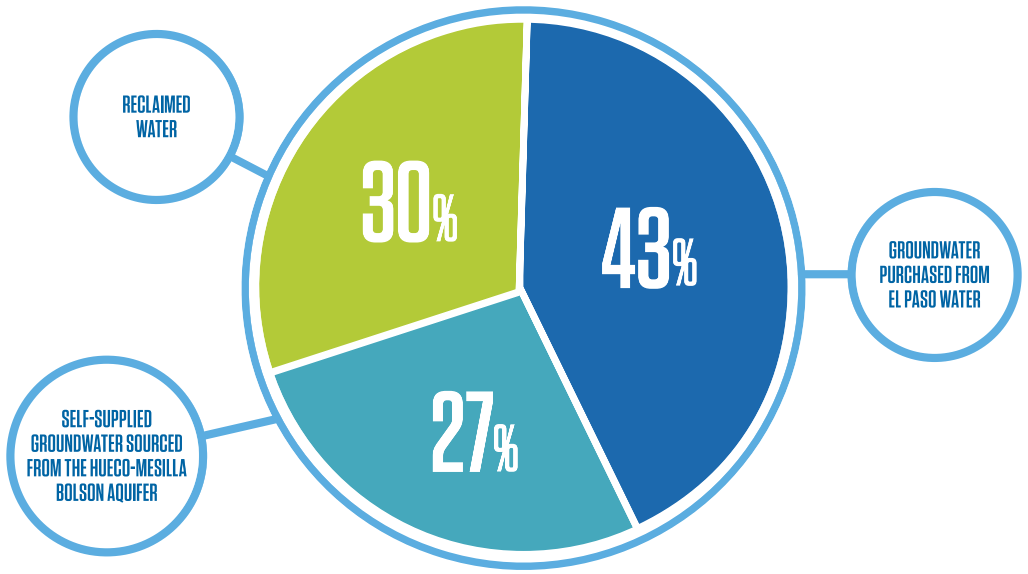
[1] Water rates include reclaimed water provided to Newman Power Station from the Fred Hervey Water Reclamation Plant.

2024 Water Rates: EPE-Owned Generation

Power Station	Water Consumption[1] (gal/kWh)
Montana	0.17
Rio Grande	0.65
Newman	0.39
Copper	0.06
Palo Verde[2]	0.7

[1] Water consumption data calculated based on gross generation.
[2] Water consumption from Palo Verde is estimated as 15.8 percent (EPE's ownership) of water consumed by Units 1, 2 and 3.

Sources of Water for EPE's Local Generation



Waste Management

Waste management stewardship stems from environmental stewardship and refers to the responsible oversight and management of waste to reduce its impact on the environment. EPE continues to implement sustainable practices that prioritize the mitigation of pollution and hazardous waste in our daily operations. We also help reduce landfill waste with our waste diversion strategies that help redirect generated waste to more eco-friendly disposal methods such as recycling, composting, reusing, and or repurposing waste materials.

High Volume Non-Hazardous WasteStreams (LBS)

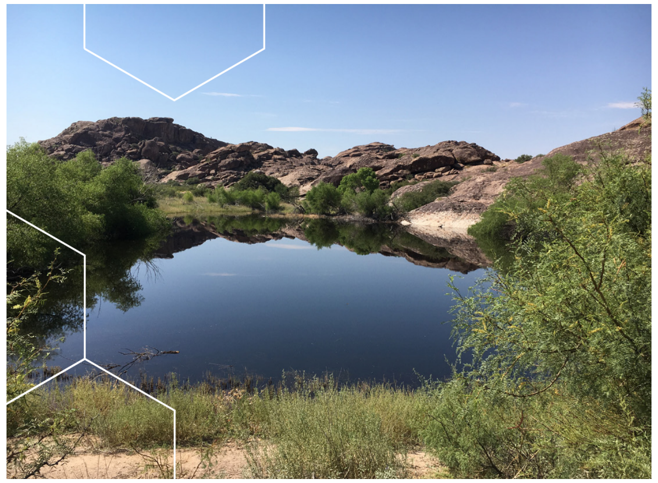
Non-Hazardous Waste	2022	2023	2024
Oily Water[1]	578,856	267,153	655,685
Petroleum Contaminated Soils[2]	262,804	7,915,997	631,898
Oil Rags/Debris[3]	22,439	88,537	124,606

[1] Excludes oily water managed under the used oil program. 2022: Increase due to Rio Grande U7 Intercooler Lube Oil release.
[2] 2023 Increase due to clean out of Newman Zeolite Pond sludge and sediment (7.2 million lbs) and Copper Transformer spill (73,000 lbs of impacted soil).
[3] 2023 Increase due to an estimated 56,000 lbs of air filters managed as oily debris.

High Volume Hazardous/Toxic Waste Streams (LBS)

Hazardous/Toxic Waste	2022	2023	2024
Asbestos Containing Material[1]	121,730	7,665	7,910
PCB Waste (Landfilled)[2]	1,030	41,757	10,444
Corrosives[3]	31,637	9,899	6,674

[1] 2022 Increase due to removal of asbestos coated metal pipe from Rio Grande Power Plants.
[2] 2023 Increase due to Copper Transformer spill which generated soil, gravel and concrete impacted with 11 ppm PCB oil.



Biodiversity and Vegetation

Swainson's Hawk Rescue

On June 16, 2024 EPE Environmental was notified of an active nest containing Swainson's hawk hatchlings on our Greenlee-Hidalgo line (structure #333) near Lordsburg, NM.

Oscar Trillo from Environmental reached out to EPE Transmission's, Hugo Ramirez and Jody Carmona for assistance removing the nest from the above referenced transmission structure. Oscar also contacted Dennis Miller from the Gila Wildlife Rescue and Rehabilitation Sanctuary in Silver City, New Mexico to coordinate the rescue of two Swainson's hawk hatchlings.

On June 18, 2024. Linemen Oscar Escapita and Brian Garcia mobilized bucket truck equipment to the structure and were able to successfully remove the nest and hatchlings safely, bringing them down from the structure, and handing them over to Dennis Miller for transportation back to his sanctuary in Silver City, NM.

Dennis Miller and his team cared for the approximately six-week old hatchlings until they matured and were ready to be released back into their natural habitat. On August 8, 2024, Dennis transported the Swainson's hawks from his sanctuary to an area approximately 0.25 miles west of Red Rock Road (north of Lordsburg, NM) where they were released.

Energy Efficiency and Load Management

EPE is proud to have Project Bravo participate in our TX Income Qualified Solutions Program in 2024. With support from EPE incentives, Project Bravo delivered essential home upgrades and energy-saving installations to over 86 low-income homes in the El Paso community. Families benefited from attic and wall insulation, LED lighting, air and duct sealing, and water heater pipe insulation. These energy efficient services saved a total of 39.90 kW, 51,235 kWh, with a lifetime kWh of 1,068,861. We are proud to help our customers improve their homes' air quality, maintain a more consistent temperature in their homes, and expand their overall comfort while reducing their energy use.

Anchor 5: Drive a Culture of Excellence

Driving a culture of excellence begins with prioritizing employee safety, wellness, and engagement. Operational performance is strengthened through KPIs and process improvements, while skill development and industry knowledge are advanced through targeted programs. By fostering innovation and accountability, we empower our teams to excel and create meaningful impacts across the organization.

EPE's PAC Empowered Employees During the Election Year

In preparation for the 2024 elections, the EPE Political Action Committee (PAC) demonstrated its commitment to civic engagement and community involvement through a series of impactful events. In Texas, these efforts included Mayoral Meet and Greets and forums for El Paso City Council candidates across multiple districts. At the same time, the PAC engaged with New Mexico candidates in Las Cruces through events like Coffee and Donuts, fostering political involvement across its broader service territory.

To empower voters, the PAC distributed the El Paso Matters and Las Cruces Bulletin Voter Guides during these events in both regions, offering essential resources to support informed participation in elections. Additionally, the PAC organized a go-out-to-vote initiative for EPE employees, emphasizing the importance of civic responsibility during both general and run-off elections.

The success of these initiatives was driven by the active participation and dedication of PAC members, whose insightful questions enriched discussions and ensured the representation of EPE employees, retirees, and their families in the political process. Through these efforts, the PAC reinforced EPE's commitment to community engagement, transparency, and fostering meaningful connections between employees, candidates, and policymakers.

Employee Resource Groups

EPE's three Employee Resource Groups, which are open to all employees, celebrate diversity, recognize historical contributions and promote awareness through educational, cultural and historical observances.

Highlights

Roots: Pan African Heritage Council

- Launched in January by organizing several successful MLK Day volunteer activities in which employees across the organization participated
- "Did You Know" employee newsletter series for Black History month showcasing Black contributions to leadership and the electrical industry
- Organized a successful summer food drive for Opportunity Center for the Homeless
- Recognized by Black Voice El Paso for community involvement for Juneteenth city event participation

B.R.A.V.E.

- Grew employee membership to include 49 allies and 77 veterans
- Partnered with the other ERGs to assist in organizing and executing the Company Appreciation event.
- Led the coordination of the Annual Veteran's Appreciation Breakfast and 9/11 Remembrance 5K Run.
- Assisted with the design and construction of the Sun Bowl EPE Parade float.
- Partnered with the Bienavidez-Patterson "All Airborne" Chapter for a VOLTs activity involving area clean-up and setting the foundation for a storage shed.
- Partnered with HR recruiters to attend career fairs to assist in Veteran Recruiting.
- Partnered with the City of El Paso to learn more about a future initiative linking the Active Duty Army to local businesses.
- Coordinated with local Veteran Organizations to receive information on available resources for EPE's Veteran and ally population.

PWR – Power-ful Women Resources

- PWR continues to be a pivotal platform for fostering leadership and allyship among our female team members.
- PWR hosted two impactful conferences, each with a unique focus on enhancing competency and driving significant impact across the Company.
- Each PWR Day also provided opportunities to deepen EPE knowledge, foster connections, and learn about other members through the HerStory segment.
- Throughout 2024, PWR also supported Bright Hearts and the El Paso Children's Grief Center.

Wellbeing & Wellness Programming

EPE's wellness program offers comprehensive support across financial, physical, mental well-being and more. Utilize the on-site gym, Sworkit fitness and mindfulness sessions, monthly expert webinars on diverse subjects, discounted gym memberships via Planet Fitness and BCBS's Well on Target Program, and confidential counseling and legal guidance via ComPsych- EPE's Employee Assistance Program. Activate your wellness and earn rewards by downloading Personify Health (formerly Virgin Pulse) for personalized fitness plans, stress management tools, financial resources, coaching, tailored health programs, and simplified benefits navigation.

Wellness Initiatives

- Onsite Biometric Screenings.
- Hinge Health- virtual musculoskeletal care.
- Improved wellness areas.
- Annual Safety & Health Fairs.

Safety Successes

EPE's 2024 Safety Training Achievements

In 2024, the Safety Department made significant strides in enhancing training across the company, reinforcing its dedication to creating a safe work environment. One of the standout initiatives was the in-house OSHA 30-Hour General Industry Safety Training, tailored specifically for field leadership. This program focused on hazard recognition, equipping leaders with the skills to identify and address risks effectively.

Additionally, the department introduced a comprehensive standard compliance training curriculum for all field employees, incorporating monthly safety meetings, computer-based training, and in-person sessions to accommodate diverse learning styles.

Employees also achieved three accident-free months—March, August, and September—demonstrating the success of the POWER Defensive Driving training and practices like 360 walkarounds.

A remarkable 17,512 safety training hours were logged company-wide by October 31, 2024. These milestones reflect EPE's commitment to cultivating a strong safety culture and ensuring a secure environment for all employees through effective training and safe practices.

Kid's Safety Town

Kids' Safety Town: Turning Learning into an Adventure!

Team EPE collaborated with Safety Town to educate our youngest community members on electrical safety. Our mission is to build a safer community by instilling essential safety habits early, ensuring lifelong well-being and security around electricity. Safety Town operates in partnership with local law enforcement, making safety education engaging and impactful.

31 EMPLOYEES VOLUNTEERED
TO LEAD SESSIONS

105 CHILDREN AGES 5-6
ATTENDED AND GRADUATED

11 SESSIONS
HELD IN 2024

Safety Scorecard[1]

Year	2022	2023	2024
OSHA Recordable Rate (EPE)	1.24	1.4	2.26
OSHA Recordable Rate (Industry)	0.99	1.7	N/A
OSHA Lost Workday Case Rate (EPE)	0.44	0.44	0.72
OSHA Lost Workday Case Rate (Industry)	0.51	0.6	N/A

[1] EPE OSHA injury rates as of 4/11/2025

[2] 2024 OSHA Industry Rates were not available at the time of preparation of this report. Prior years' Industry rates are Electric Power Generation, Transmission, Distribution NAICS 2211, Average Rate All Establishments (All Size).

VOLTS

EPE recognizes the diverse passions and talents that our employees bring to the act of volunteering. When EPE has Volunteers On Location To Serve (VOLTS), we showcase the transformative impact of connection, strength in numbers, and sustainable action. In 2024, VOLTS gave back more than 13,000 hours to our community.

Making a Difference Together – MLK Day of Service 2024

Thank you to all who joined hands and worked tirelessly side by side, making our volunteer events an outstanding success. In the words of Martin Luther King Jr., 'The time is always right to do what is right.' Your collective efforts truly embody the spirit of unity and positive change. Thank you for making a difference together."

Earth Month Success: 120 Trees Planted in El Paso and Las Cruces

During Earth Month, our dedicated volunteers made a significant impact by planting 120 trees across El Paso and Las Cruces. This initiative is part of our commitment to enhancing the environment and fostering healthier communities. A heartfelt thank you to all the volunteers who contributed their time and effort to this green cause. Your participation has helped make our planet a greener, more sustainable place to live.

Volunteering at The Mustard Seed Garden

Our VOLTS members from EPE's Safety Department had an inspiring experience volunteering at The Mustard Seed garden. They helped tend to veggies, fruits, and herbs, all of which are used to prepare over 1000 free meals weekly and are delivered to several shelters. The sense of community and fulfillment from knowing our efforts are nourishing those in need was truly rewarding.

Pride Month

Supporting Back-to-School Events Across Our Community

Through meaningful community partnerships, EPE participated in back-to-school events to provide valuable support for children and families in its service territory. Our team distributed free school supplies to help families prepare for the academic year and shared essential information about our services, such as smart meters, the EPE app, and the benefits of autopay and paperless billing. Additionally, we highlighted energy-saving programs to assist families in managing their energy use effectively, reinforcing our commitment to empowering the community as the new school year began.

Celebrating Independence Day at the Electric Light Parade

Our EPE team had a blast participating in Las Cruces' annual Electric Light Parade, where we "rocked in the USA" alongside our community. The event was a vibrant celebration of our country's Independence Day, filled with dazzling lights and enthusiastic participation from all. We were thrilled to be part of this patriotic tradition and to share in the joy and pride of our community.

A Thanksgiving Tradition: Sun Bowl Parade

EPE was proud to participate in the 2024 Sun Bowl Parade, a cherished Thanksgiving Day tradition in El Paso. This year's float celebrated the theme, *Celebrating, Honoring & Remembering All the Heroes Who Have Served*. We were honored to recognize the bravery and sacrifice of heroes who have served our country while bringing joy to the community with our creative float. Thank you to everyone who joined us in celebrating this special event.

Awards & Recognitions

Energy Star Partner of the Year Award

We are proud to announce that the U.S. Environmental Protection Agency has awarded EPE with the 2024 ENERGY STAR® Sustained Excellence Award. This award is a testament to our unwavering dedication to advancing energy efficiency and environmental stewardship. It reaffirms our commitment to leading the change towards a sustainable and vibrant future.

EEI, IBEW Present Edwin D. Hill Award to EPE and IBEW Local 960

EEI and the International Brotherhood of Electrical Workers presented the Edwin D. Hill Award to EPE and IBEW Local 960 in Washington D.C. on March 4, 2024. This distinguished award recognizes efforts to advance state and local initiatives on behalf of EEI's member electric companies and IBEW members.

EPE Named Top Utility in Economic Development for 2024

EPE is honored to be named a Top Utility in Economic Development for 2024 by Site Selection magazine, recognizing our innovative infrastructure investments, deployment of renewable energy, and collaborative partnerships that are driving economic growth in West Texas and Southern New Mexico. Our efforts in modernizing the electric grid, supporting business attraction and retention, and fostering strong community partnerships with local governments and educational institutions underscore our commitment to the region's economic vitality.

Kelly Tomblin Receives Inaugural Woody L. Hunt Excellence in Economic Development Award from The Borderplex Alliance

In a move that underscores its commitment to regional economic vitality, The Borderplex Alliance has unveiled the inaugural Woody L. Hunt Excellence in Economic Development Award, a tribute to its founding chairman, businessman, and philanthropist Woody Hunt. This prestigious accolade is set to honor leaders making extraordinary contributions to improving our region's economic competitiveness. The first recipient of this distinguished award is EPE, under the stewardship of President and CEO Kelly Tomblin.

Recognized for Excellence: Local Employer of Excellence Award

We are proud to announce that EPE has been named a Local Employer of Excellence by the Texas Workforce Commission. This prestigious award recognizes our efforts to empower employees, support the community, and strengthen the workforce. Achievements like this reflect the hard work and dedication of our incredible team, whose commitment drives positive change every day. We extend our heartfelt gratitude to the Texas Workforce Commission and our employees for making this recognition possible.

DEFINITIONS FOR EPE /SUSTAINABILITY METRICS

Ref. No.	Metric Name	Definition	Units Reported in	Time Period (if applicable)	Reference to Source (if applicable)
	Portfolio				
1	**Owned Nameplate Generation Capacity at end of year (MW)**	**Provide generation capacity data that is consistent with other external reporting by your company.** The alternative default is to use the summation of the nameplate capacity of installed owned generation in the company portfolio, as reported to the U.S. Energy Information Administration (EIA) on **Form 860 Generator Information.** Note that data should be provided in terms of equity ownership for shared facilities. Nameplate capacity is defined as the maximum rated output of a generator, prime mover, or other electric power production equipment under specific conditions designated by the manufacturer. Installed generator nameplate capacity is commonly expressed in megawatts (MW) and is usually indicated on a nameplate physically attached to the generator.	Megawatt (MW): One million watts of electricity.	End of Year	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/. Form 860 instructions available at: www.eia.gov/survey/form/eia_860/instructions.pdf.
1.1	Coal	Nameplate capacity of generation resources that produce electricity through the combustion of coal (a readily combustible black or brownish-black rock whose composition, including inherent moisture, consists of more than 50 percent by weight and more than 70 percent by volume of carbonaceous material. It is formed from plant remains that have been compacted, hardened, chemically altered, and metamorphosed by heat and pressure over geologic time).	MW	End of Year	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
1.2	Natural Gas	Nameplate capacity of generation resources that produce electricity through the combustion of natural gas (a gaseous mixture of hydrocarbon compounds, the primary one being methane).	MW	End of Year	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
1.3	Nuclear	Nameplate capacity of generation resources that produce electricity through the use of thermal energy released from the fission of nuclear fuel in a reactor.	MW	End of Year	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
1.4	Petroleum	Nameplate capacity of generation resources that produce electricity through the combustion of petroleum (a broadly defined class of liquid hydrocarbon mixtures. Included are crude oil, lease condensate, unfinished oils, refined products obtained from the processing of crude oil, and natural gas plant liquids).	MW	End of Year	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
1.5	Total Renewable Energy Sources	Energy resources that are naturally replenishing but flow-limited. They are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time. Renewable energy resources include biomass, hydro, geothermal, solar, wind, ocean thermal, wave action, and tidal action.	MW	End of Year	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
1.5.1	Biomass/Biogas	Nameplate capacity of generation resources that produce electricity through the combustion of biomass (an organic nonfossil material of biological origin constituting a renewable energy source).	MW	End of Year	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
1.5.2	Geothermal	Nameplate capacity of generation resources that produce electricity through the use of thermal energy released from hot water or steam extracted from geothermal reservoirs in the earth's crust.	MW	End of Year	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
1.5.3	Hydroelectric	Nameplate capacity of generation resources that produce electricity through the use of flowing water.	MW	End of Year	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
1.5.4	Solar	Nameplate capacity of generation resources that produce electricity through the use of the radiant energy of the sun, which can be converted into other forms of energy, such as heat or electricity.	MW	End of Year	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
1.5.5	Wind	Nameplate capacity of generation resources that produce electricity through the use of kinetic energy present in wind motion that can be converted to mechanical energy for driving pumps, mills, and electric power generators.	MW	End of Year	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
1.6	Other	Nameplate capacity of generation resources that are not defined above.	MW	End of Year	
2	**Net Generation for the data year (MWh)**	Net generation is defined as the summation of the amount of gross generation less the electrical energy consumed at the generating station(s) for station service or auxiliaries. Data can be provided in terms of total, owned, and/or purchased, depending on how the company prefers to disseminate data in this template. **Provide net generation data that is consistent with other external reporting by your company**. The alternative default is to provide owned generation data as reported to EIA on **Form 923 Schedule 3** and align purchased power data with the Federal Energy Regulatory Commission (FERC) **Form 1 Purchased Power Schedule**, Reference page numbers 326-327. Note: Electricity required for pumping at pumped-storage plants is regarded as electricity for station service and is deducted from gross generation.	Megawatthour (MWh): One thousand kilowatt-hours or one million watt-hours.	Annual	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/. Form 923 instructions available at: www.eia.gov/survey/form/eia_923/instructions.pdf.
2.1	Coal	Net electricity generated by the combustion of coal (a readily combustible black or brownish-black rock whose composition, including inherent moisture, consists of more than 50 percent by weight and more than 70 percent by volume of carbonaceous material. It is formed from plant remains that have been compacted, hardened, chemically altered, and metamorphosed by heat and pressure over geologic time).	MWh	Annual	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
2.2	Natural Gas	Net electricity generated by the combustion of natural gas (a gaseous mixture of hydrocarbon compounds, the primary one being methane).	MWh	Annual	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
2.3	Nuclear	Net electricity generated by the use of the thermal energy released from the fission of nuclear fuel in a reactor.	MWh	Annual	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
2.4	Petroleum	Net electricity generated by the combustion of petroleum (a broadly defined class of liquid hydrocarbon mixtures. Included are crude oil, lease condensate, unfinished oils, refined products obtained from the processing of crude oil, and natural gas plant liquids).	MWh	Annual	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
2.5	Total Renewable Energy Sources	Energy resources that are naturally replenishing but flow-limited. They are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time. Renewable energy resources include biomass, hydro, geothermal, solar, wind, ocean thermal, wave action, and tidal action.	MWh	Annual	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
2.5.1	Biomass/Biogas	Net electricity generated by the combustion of biomass (an organic nonfossil material of biological origin constituting a renewable energy source).	MWh	Annual	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
2.5.2	Geothermal	Net electricity generated by the use of thermal energy released from hot water or steam extracted from geothermal reservoirs in the earth's crust.	MWh	Annual	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
2.5.3	Hydroelectric	Net electricity generated by the use of flowing water.	MWh	Annual	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
2.5.4	Solar	Net electricity generated by the use of the radiant energy of the sun, which can be converted into other forms of energy, such as heat or electricity.	MWh	Annual	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
2.5.5	Wind	Net electricity generated by the use of kinetic energy present in wind motion that can be converted to mechanical energy for driving pumps, mills, and electric power generators.	MWh	Annual	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
2.6	Other	Net electricity generated by other resources that are not defined above. If applicable, this metric should also include market purchases where the generation resource is unknown.	MWh	Annual	
3	**Investing in the Future: Capital Expenditures, Energy Efficiency (EE), and Smart Meters**				
3.1	Total Annual Capital Expenditures	Align annual capital expenditures with data reported in recent investor presentations or financial filings. Total capital expenditures should reflect all investments made at the company level (i.e., parent level or operating company) for which other data (e.g., number of customers, emissions, etc.) is reported. A capital expenditure is the use of funds or assumption of a liability in order to obtain physical assets that are to be used for productive purposes for at least one year. This type of expenditure is made in order to expand the productive or competitive posture of a business.	Nominal Dollars	Annual	Accounting Tools, Q&A, http://www.accountingtools.com/questions-and-answers/what-is-a-capital-expenditure.html
3.2	Incremental Annual Electricity Savings from EE Measures (MWh)	Incremental Annual Electricity Savings for the reporting year as reported to EIA on **Form 861**. Incremental Annual Savings for the reporting year are those changes in energy use caused in the current reporting year by: (1) new participants in DSM programs that operated in the previous reporting year, and (2) participants in new DSM programs that operated for the first time in the current reporting year. A "New program" is a program for which the reporting year is the first year the program achieved savings, regardless of when program development and expenditures began.	MWh	End of Year	U.S. Energy Information Administration, *Form EIA-861 Annual Electric Power Industry Report Instructions*. Available at: www.eia.gov/survey/form/eia_861/instructions.pdf.
3.3	Incremental Annual Investment in Electric EE Programs (nominal dollars)	Total annual investment in electric energy efficiency programs as reported to EIA on **Form 861**.	Nominal Dollars	End of Year	U.S. Energy Information Administration, *Form EIA-861 Annual Electric Power Industry Report Instructions*. Available at: www.eia.gov/survey/form/eia_861/instructions.pdf.

Ref. No.	Metric Name	Definition	Units Reported in	Time Period (if applicable)	Reference to Source (if applicable)
4	**Retail Electric Customer Count (at end of year)**	Electric customer counts should be aligned with the data provided to EIA on **Form 861 - Sales to Utility Customers**.			U.S. Energy Information Administration, *Form EIA-861 Annual Electric Power Industry Report Instructions*. Available at: www.eia.gov/survey/form/eia_861/instructions.pdf.
4.1	Commercial	An energy-consuming sector that consists of service-providing facilities and equipment of businesses; Federal, State, and local governments; and other private and public organizations, such as religious, social, or fraternal groups. The commercial sector includes institutional living quarters. It also includes sewage treatment facilities. Common uses of energy associated with this sector include space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a wide variety of other equipment. Note: This sector includes generators that produce electricity and/or useful thermal output primarily to support the activities of the above-mentioned commercial establishments.	Number of end-use retail customers receiving electricity (individual homes and businesses count as one).	End of Year	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
4.2	Industrial	An energy-consuming sector that consists of all facilities and equipment used for producing, processing, or assembling goods. The industrial sector encompasses the following types of activity manufacturing (NAICS codes 31-33); agriculture, forestry, fishing and hunting (NAICS code 11); mining, including oil and gas extraction (NAICS code 21); and construction (NAICS code 23). Overall energy use in this sector is largely for process heat and cooling and powering machinery, with lesser amounts used for facility heating, air conditioning, and lighting. Fossil fuels are also used as raw material inputs to manufactured products. Note: This sector includes generators that produce electricity and/or useful thermal output primarily to support the above-mentioned industrial activities. Various EIA programs differ in sectoral coverage.	Number of end-use retail customers receiving electricity (individual homes and businesses count as one).	End of Year	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
4.3	Residential	An energy-consuming sector that consists of living quarters for private households. Common uses of energy associated with this sector include space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a variety of other appliances. The residential sector excludes institutional living quarters. Note: Various EIA programs differ in sectoral coverage.	Number of end-use retail customers receiving electricity (individual homes and businesses count as one).	End of Year	U.S. Energy Information Administration, *Online Glossary*, https://www.eia.gov/tools/glossary/.
	Emissions				
5	**GHG Emissions: Carbon Dioxide (CO2) and Carbon Dioxide Equivalent (CO2e)**				
5.1	**Owned Generation**				
5.1.1	**Carbon Dioxide (CO2)**				
5.1.1.1	Total Owned Generation CO2 Emissions	Total direct CO2 emissions from company equity-owned fossil fuel combustion generation based on EPA's **GHG Reporting Program** (40 CFR, part 98, Subpart C – General Stationary Fuel Combustion and Subpart D – Electricity Production), using a continuous emission monitoring system (CEMS) or other relevant protocols.	Metric Tons	Annual	U.S. Environmental Protection Agency, *Greenhouse Gas Reporting Program* (40 CFR, part 98, Subparts C and D).
5.1.1.2	Total Owned Generation CO2 Emissions Intensity	Total direct CO2 emissions from 5.1.1.1, divided by total MWh of **owned** net generation reported in the Utility Portfolio section.	Metric Tons/Net MWh	Annual	
5.1.2	**Carbon Dioxide Equivalent (CO2e)**				
5.1.2.1	Total Owned Generation CO2e Emissions	Total direct CO2e emissions (CO2, CH4, and N2O) from company equity-owned fossil fuel combustion generation in accordance with EPA's **GHG Reporting Program** (40 CFR, part 98, Subpart C – General Stationary Fuel Combustion and Subpart D – Electricity Production), using a continuous emission monitoring system (CEMS) or other approved methodology.	Metric Tons	Annual	U.S. Environmental Protection Agency, *Greenhouse Gas Reporting Program* (40 CFR, part 98, Subparts C and D).
5.1.2.2	Total Owned Generation CO2 Emissions Intensity	Total direct CO2e emissions from 5.1.2.1, divided by total MWh of **owned** net generation reported in the Utility Portfolio section.	Metric Tons/Net MWh	Annual	
5.2	**Purchased Power**				
5.2.1	Carbon Dioxide (CO2e)				
5.2.1.1	Total Purchased Generation CO2e Emissions	Purchased power CO2 emissions should be calculated using the most relevant and accurate of the following methods: (1) For direct purchases, such as PPAs, use the direct emissions data as reported to EPA. (2) For market purchases where emissions attributes are unknown, use applicable regional or national emissions rate: - ISO/RTO-level emission factors - Climate Registry emission factors - E-Grid emission factors	Metric Tons	Annual	
5.2.1.2	Total Purchased Generation CO2 Emissions Intensity	Total purchased power CO2 emissions from 5.2.1.1, divided by total MWh of **purchased** net generation reported in the Utility Portfolio section.	Metric Tons/Net MWh	Annual	
5.2.2	Carbon Dioxide Equivalent (CO2e)				
5.2.2.1	Total Purchased Generation CO2 Emissions	Purchased power CO2e emissions should be calculated using the most relevant and accurate of the following methods: (1) For direct purchases, such as PPAs, use the direct emissions data as reported to EPA. (2) For market purchases where emissions attributes are unknown, use applicable regional or national emissions rate: - ISO/RTO-level emission factors - Climate Registry emission factors - E-Grid emission factors	Metric Tons	Annual	
5.2.2.2	Total Purchased Generation CO2e Emissions Intensity	Total purchased power CO2e emissions from 5.2.2.1, divided by total MWh of **purchased** net generation reported in the Utility Portfolio section.	Metric Tons/Net MWh	Annual	
5.3	**Owned Generation + Purchased Power**				
5.3.1	Carbon Dioxide (CO2)				
5.3.1.1	Total Owned + Purchased Generation CO2 Emissions	Sum of total CO2 emissions reported under 5.1.1.1 and 5.2.1.1.	Metric Tons	Annual	
5.3.1.2	Total Owned + Purchased Generation CO2 Emissions Intensity	Total emissions from 5.3.1.1, divided by total MWh of **owned and purchased** net generation reported in the Utility Portfolio section.	Metric Tons/Net MWh	Annual	
5.3.2	Carbon Dioxide Equivalent (CO2e)				
5.3.2.1	Total Owned + Purchased Generation CO2e Emissions	Sum of total CO2e emissions reported under 5.1.2.1 and 5.2.2.1.	Metric Tons	Annual	
5.3.2.2	Total Owned + Purchased Generation CO2e Emissions Intensity	Total emissions from 5.3.2.1, divided by total MWh of **owned and purchased** net generation reported in the Utility Portfolio section.	Metric Tons/Net MWh	Annual	

Ref. No. Metric Name	Definition	Units Reported in	Time Period (if applicable)	Reference to Source (if applicable)
Emissions				
5.4 Non-Generation CO2e Emissions of Sulfur Hexafluoride (SF6)				
5.4.1 Total CO2e emissions of SF6	Total CO2e emissions of SF6 in accordance with EPA's **GHG Reporting Program** (40 CFR Part 98, Subpart DD).	Pounds (lbs)	Annual	U.S. Environmental Protection Agency, *Greenhouse Gas Reporting Program* (40 CFR, part 98, Subpart DD).
5.4.2 Leak rate of CO2e emissions of SF6	Leak rate of CO2e emissions of SF6 in accordance with EPA's **GHG Reporting Program** (40 CFR Part 98, Subpart DD)	Pounds/Net MWh	Annual	U.S. Environmental Protection Agency, *Greenhouse Gas Reporting Program* (40 CFR, part 98, Subpart W).
6 Nitrogen Oxide (NOx), Sulfur Dioxide (SO2), Mercury (Hg)				
6.1 Generation basis for calculation	Indicate the generation basis for calculating SO2, NOx, and Hg emissions and intensity. Fossil: Fossil Fuel Generation Only Total: Total System Generation Other: Other (please specify in comment section)			
6.2 Nitrogen Oxide (NOx)				
6.2.1 Total NOx Emissions	Total NOx emissions from company equity-owned fossil fuel combustion generation. In accordance with EPA's **Acid Rain Reporting Program** (40 CFR, part 75) or regulatory equivalent.	Metric Tons	Annual	U.S. Environmental Protection Agency, *Acid Rain Reporting Program* (40 CFR, part 75).
6.2.2 Total NOx Emissions Intensity	Total from above, divided by the MWh of generation basis as indicated in 6.1.	Metric Tons/Net MWh	Annual	
6.3 Sulfur Dioxide (SO2)				
6.3.1 Total NOx Emissions	Total SO2 emissions from company equity-owned fossil fuel combustion generation. In accordance with EPA's **Acid Rain Reporting Program** (40 CFR, part 75) or regulatory equivalent.	Metric Tons	Annual	U.S. Environmental Protection Agency, *Acid Rain Reporting Program* (40 CFR, part 75).
6.3.2 Total NOx Emissions Intensity	Total from above, divided by the MWh of generation basis as indicated in 6.1.	Metric Tons/Net MWh	Annual	
6.4 Mercury (Hg)				
6.4.1 Total Hg Emissions	Total Mercury emissions from company equity-owned fossil fuel combustion generation. Preferred methods of measurement are performance-based, direct measurement as outlined in the EPA Mercury and Air Toxics Standard **(MATS)**. In the absence of performance-based measures, report value aligned with Toxics Release Inventory **(TRI)** or regulatory equivalent for international operations.	Kilograms	Annual	EPRI, *Metrics to Benchmark Electric Power Company Sustainability Performance*, 2018 Technical Report.
6.4.2 Total Hg Emissions Intensity	Total from above, divided by the MWh of generation basis as indicated in 6.1.	Metric Tons/Net MWh	Annual	
Resources				
7 Human Resources				
7.1 Total Number of Employees	Average number of employees over the year. To calculate the annual average number of employees: (1) Calculate the total number of employees your establishment paid for all periods. Add the number of employees your establishment paid in every pay period during the data year. Count all employees that you paid at any time during the year and include full-time, part-time, temporary, seasonal, salaried, and hourly workers. Note that pay periods could be monthly, weekly, bi-weekly, and so on. (2) Divide the total number of employees (from step 1) by the number of pay periods your establishment had in during the data year. Be sure to count any pay periods when you had no (zero) employees. (3) Round the answer you computed in step 2 to the next highest whole number.	Number of Employees	Annual	U.S. Department of Labor, Bureau of Labor Statistics, Steps to estimate annual average number of employees, www.bls.gov/respondents/iif/annualavghours.htm. EPRI, *Metrics to Benchmark Electric Power Company Sustainability Performance*, 2018 Technical Report.
7.2 Percentage of Women in Total Workforce	Percentage of women (defined as employees who identify as female) in workforce.	Percent of Employees	Annual	U.S. Equal Employment Opportunity Commission, EEO Terminology, www.archives.gov/eeo/terminology.html. EPRI, *Metrics to Benchmark Electric Power Company Sustainability Performance*, 2018 Technical Report.
7.3 Percentage of Minorities in Total Workforce	Percentage of minorities in workforce. Minority employees are defined as "the smaller part of a group. A group within a country or state that differs in race, religion or national origin from the dominant group. Minority is used to mean four particular groups who share a race, color or national origin." These groups are: "(1) American Indian or Alaskan Native. A person having origins in any of the original peoples of North America, and who maintain their culture through a tribe or community; (2) Asian or Pacific Islander. A person having origins in any of the original people of the Far East, Southeast Asia, India, or the Pacific Islands. These areas include, for example, China, India, Korea, the Philippine Islands, and Samoa; (3) Black (except Hispanic). A person having origins in any of the black racial groups of Africa; (4) Hispanic. A person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race."	Percent of Employees	Annual	U.S. Equal Employment Opportunity Commission, EEO Terminology, www.archives.gov/eeo/terminology.html. EPRI, *Metrics to Benchmark Electric Power Company Sustainability Performance*, 2018 Technical Report.
7.4 Total Number of Board of Directors/Trustees	Average number of employees on the Board of Directors/Trustees over the year.	Number of Employees	Annual	
7.5 Percentage of Women on Board of Directors/Trustees	Percentage of women (defined as employees who identify as female) on Board of Directors/Trustees.	Percent of Employees	Annual	U.S. Equal Employment Opportunity Commission, EEO Terminology, www.archives.gov/eeo/terminology.html. EPRI, *Metrics to Benchmark Electric Power Company Sustainability Performance*, 2018 Technical Report.
7.6 Percentage of Minorities on Board of Directors/ Trustees	Percentage of minorities on Board of Directors/Trustees. Minority employees are defined as "the smaller part of a group. A group within a country or state that differs in race, religion or national origin from the dominant group. Minority is used to mean four particular groups who share a race, color or national origin." These groups are: "(1) American Indian or Alaskan Native. A person having origins in any of the original peoples of North America, and who maintain their culture through a tribe or community; (2) Asian or Pacific Islander. A person having origins in any of the original people of the Far East, Southeast Asia, India, or the Pacific Islands. These areas include, for example, China, India, Korea, the Philippine Islands, and Samoa; (3) Black (except Hispanic). A person having origins in any of the black racial groups of Africa; (4) Hispanic. A person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race."	Percent of Employees	Annual	U.S. Equal Employment Opportunity Commission, EEO Terminology, www.archives.gov/eeo/terminology.html. EPRI, *Metrics to Benchmark Electric Power Company Sustainability Performance*, 2018 Technical Report.
7.7 Employee Safety Metrics				
7.7.1 Recordable Incident Rate	Number of injuries or illnesses x 200,000 / Number of employee labor hours worked. Injury or illness is recordable if it results in any of the following: death, days away from work, restricted work or transfer to another job, medical treatment beyond first aid, or loss of consciousness. You must also consider a case to meet the general recording criteria if it involves a significant injury or illness diagnosed by a physician or other licensed health care professional, even if it does not result in death, days away from work, restricted work or job transfer, medical treatment beyond first aid, or loss of consciousness. Record the injuries and illnesses of all employees on your payroll, whether they are labor, executive, hourly, salary, part-time, seasonal, or migrant workers. You also must record the recordable injuries and illnesses that occur to employees who are not on your payroll if you supervise these employees on a day-to-day basis. If your business is organized as a sole proprietorship or partnership, the owner or partners are not considered employees for recordkeeping purposes. For temporary employees, you must record these injuries and illnesses if you supervise these employees on a day-to-day basis. If the contractor's employee is under the day-to-day supervision of the contractor, the contractor is responsible for recording the injury or illness. If you supervise the contractor employee's work on a day-to-day basis, you must record the injury or illness.	Percent	Annual	U.S. Department of Labor, Occupational Health and Safety Administration, OSHA Recordable Incidents. EPRI, *Metrics to Benchmark Sustainability Performance for the Electric Power Industry*, 2018 Technical Report.
7.7.2 Lost-time Case Rate	Calculated as: Number of lost-time cases x 200,000 / Number of employee labor hours worked. Only report for employees of the company as defined for the "recordable incident rate for employees" metric. A lost-time incident is one that resulted in an employee's inability to work the next full work day.	Percent	Annual	U.S. Department of Labor, Occupational Health and Safety Administration, OSHA Recordable Incidents. EPRI, *Metrics to Benchmark Electric Power Company Sustainability Performance*, 2018 Technical Report.
7.7.3 Days Away, Restricted, and Transfer (DART) Rate	Calculated as: Total number of DART incidents x 200,000 / Number of employee labor hours worked. A DART incident is one in which there were one or more lost days or one or more restricted days, or one that resulted in an employee transferring to a different job within the company.	Percent	Annual	U.S. Department of Labor, Occupational Health and Safety Administration, OSHA Recordable Incidents. EPRI, *Metrics to Benchmark Electric Power Company Sustainability Performance*, 2018 Technical Report.
7.7.4 Work-related Fatalities	Total employee fatalities. Record for all employees on your payroll, whether they are labor, executive, hourly, salary, part-time, seasonal, or migrant workers. Include fatalities to those that occur to employees who are not on your payroll if you supervise these employees on a day-to-day basis. For temporary employees, report fatalities if you supervise these employees on a day-to-day basis.	Number of Employees	Annual	U.S. Department of Labor, Occupational Health and Safety Administration, OSHA Recordable Incidents. EPRI, *Metrics to Benchmark Electric Power Company Sustainability Performance*, 2018 Technical Report.

Ref. No.	Metric Name	Definition	Units Reported in	Time Period (if applicable)	Reference to Source (if applicable)
8	**Fresh Water Resources used in Thermal Power Generation Activities**				
8.1	Water Withdrawals - Consumptive (Millions of Gallons)	Amount of freshwater consumed for use in thermal generation. "Freshwater" includes water sourced from fresh surface water, groundwater, rain water, and fresh municipal water. Do NOT include recycled, reclaimed, or gray water. Water consumption is defined as water that is not returned to the original water source after being withdrawn, including evaporation to the atmosphere.	Millions of Gallons	Annual	Partially sourced from EPRI, *Metrics to Benchmark Electric Power Company Sustainability Performance*, 2018 Technical Report.
8.2	Water Withdrawals - Non-Consumptive (Millions of Gallons)	Amount of fresh water withdrawn, but not consumed, for use in thermal generation."Freshwater" includes water sourced from fresh surface water, groundwater, rain water, and fresh municipal water. Do NOT include recycled, reclaimed, or gray water. Information on organizational water withdrawal may be drawn from water meters, water bills, calculations derived from other available water data or (if neither water meters nor bills or reference data exist) the organization's own estimates.	Millions of Gallons	Annual	Partially sourced from EPRI, *Metrics to Benchmark Electric Power Company Sustainability Performance*, 2018 Technical Report.
8.3	Water Withdrawals - Consumptive Rate (Millions of Gallons/Net MWh)	Rate of freshwater consumed for use in thermal generation. "Freshwater" includes water sourced from fresh surface water, groundwater, rain water, and fresh municipal water. Do NOT include recycled, reclaimed, or gray water. Water consumption is defined as water that is not returned to the original water source after being withdrawn, including evaporation to the atmosphere. Divide millions of gallons by equity-owned total net generation from all equity-owned net electric generation as reported under Metric 2, Net Generation for the data year (MWh).	Millions of Gallons/Net MWh	Annual	Partially sourced from EPRI, *Metrics to Benchmark Electric Power Company Sustainability Performance*, 2018 Technical Report.
8.4	Water Withdrawals - Non-Consumptive Rate (Millions of Gallons/ Net MWh)	Rate of fresh water withdrawn, but not consumed, for use in thermal generation."Freshwater" includes water sourced from fresh surface water, groundwater, rain water, and fresh municipal water. Do NOT include recycled, reclaimed, or gray water. Information on organizational water withdrawal may be drawn from water meters, water bills, calculations derived from other available water data or (if neither water meters nor bills or reference data exist) the organization's own estimates. Divide millions of gallons by equity-owned total net generation from all equity-owned net electric generation as reported under Metric 2, Net Generation for the data year (MWh).	Millions of Gallons/Net MWh	Annual	Partially sourced from EPRI, *Metrics to Benchmark Electric Power Company Sustainability Performance*, 2018 Technical Report.
9	**Waste Products**				
9.1	Amount of Hazardous Waste Manifested for Disposal	Metric tons of hazardous waste, as defined by the Resource Conservation and Recovery Act (RCRA), manifested for disposal at a Treatment Storage and Disposal (TSD) facility. Methods of disposal include disposing to landfill, surface impoundment, waste pile, and land treatment units. Hazardous wastes include either listed wastes (F, K, P and U lists) or characteristic wastes (wastes which exhibit at least one of the following characteristics - ignitability, corrosivity, reactivity, toxicity). Include hazardous waste from all company operations including generation, transmissions, distribution, and other operations.	Metric Tons	Annual	Partially sourced from EPRI, *Metrics to Benchmark Electric Power Company Sustainability Performance*, 2018 Technical Report.
9.2	Percent of Coal Combustion Products Beneficially Used	Percent of coal combustion products (CCPs) - fly ash, bottom ash, boiler slag, flue gas desulfurization materials, scrubber bi-product - diverted from disposal into beneficial uses, including being sold. Include any CCP that is generated during the data year and stored for beneficial use in a future year. Only include CCP generated at company equity-owned facilities. If no weight data are available, estimate the weight using available information on waste density and volume collected, mass balances, or similar information.	Percent	Annual	Partially sourced from EPRI, *Metrics to Benchmark Electric Power Company Sustainability Performance*, 2018 Technical Report.

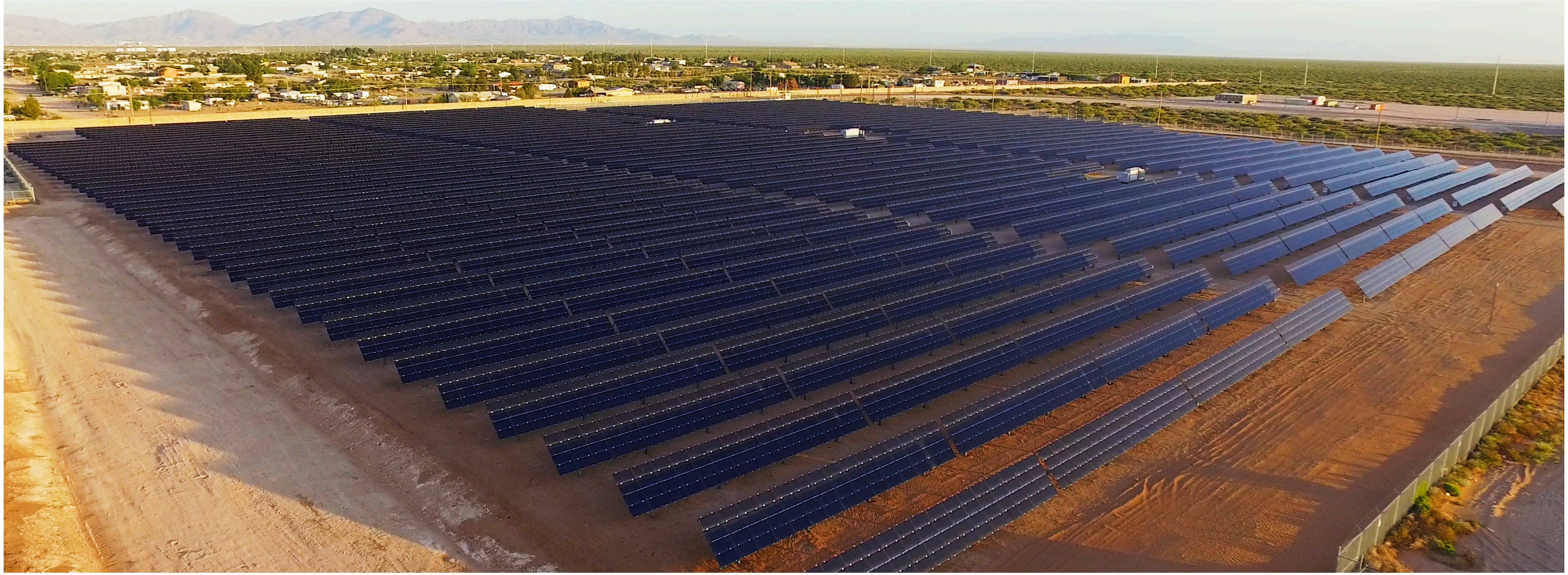


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Table E-4.7. Selected Electric Utility Emission Factors—New Mexico (lb CO_2e per MWh)

Utility [1]	2021	2022	2023	2024	2025
El Paso Electric Co. [2]	518	490	462	435	315
Public Service Co. of NM [2]	—	—	395	315	316
Southwestern Public Service Co. [3]	—	—	—	841	731
Tri-State Generation and Transmission Assoc. Inc.[4]	1,459	1,383	1,394	1,263	1,341
Utility	**2026**	**2027**	**2028**	**2029**	**2030**
El Paso Electric Co. [2]	318	321	313	306	299
Public Service Co. of NM [2]	293	285	276	247	224
Southwestern Public Service Co. [3]	651	595	594	587	574
Tri-State Generation and Transmission Assoc. Inc.[4]	1,345	1,304	1,293	1,198	998
Utility	**2031**	**2032**	**2033**	**2034**	**2035**
El Paso Electric Co.[2]	292	283	274	265	257
Public Service Co. of NM[2]	139	36	29	21	16
Southwestern Public Service Co.[3]	561	546	531	514	498
Tri-State Generation and Transmission Assoc. Inc.[4]	947	949	938	893	908
Utility	**2036**	**2037**	**2038**	**2039**	**2040**
El Paso Electric Co.[2]	270	283	294	306	316
Public Service Co. of NM[2]	7	6	8	9	0
Southwestern Public Service Co.[3]	496	507	530	552	573
Tri-State Generation and Transmission Assoc. Inc.[4]	914	890	870	864	821

Sources: New Mexico Energy Conservation and Management (ECAM). 2025. Excel database with utility emission factors, provided to ICF in March 2025.

lb. = pounds; MWh = megawatt-hour; CO_2e = carbon dioxide equivalent; RPS = renewables portfolio standard

Notes: All utilities listed in this table are subject to the state's RPS.

[1] This table only includes a subset of New Mexico electric utilities. A complete list of utilities serving New Mexico is available from the U.S. Energy Information Administration (EIA). 2023. *Utility Bundled Retail Sales-Total*. Accessed January 25, 2025. https://www.eia.gov/electricity/sales_revenue_price/pdf/table_10.pdf.

[2] Future year emission factors account for compliance with the state's RPS and CES and implementation of utility-specific renewable procurement or GHG reduction plans.

[3] Future year emission factors do not account for compliance with the state's RPS or CES (would not accurately reflect member carbon intensity in the regional transmission organization market).

[4] Future year emission factors assume the carbon intensity for the whole generating region and incorporate compliance with Colorado's RPS and New Mexico's RPS.

Users should consult their local electricity provider for updated emission factors available at the time of their analysis before proceeding with the defaults provided in this table.

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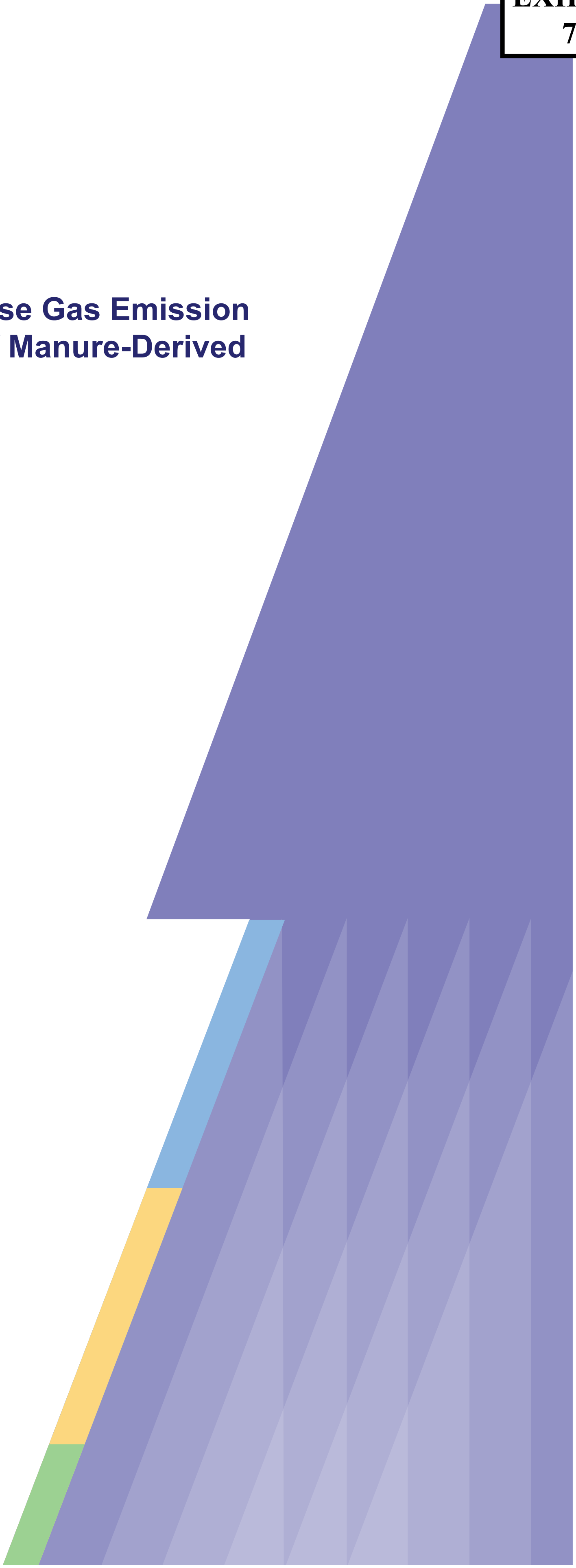

A Generic Counterfactual Greenhouse Gas Emission Factor for Life-Cycle Assessment of Manure-Derived Biogas and Renewable Natural Gas

January, 2025

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Appendix 14

A. Introduction

Biogas, a methane (CH_4)-containing gas resulting from the decomposition of organic matter under anaerobic conditions, can be produced from a wide variety of organic feedstocks, including food waste, agricultural residues, and manure. The biogas can be combusted for heat/electricity or upgraded to renewable natural gas (RNG), sometimes referred to as biomethane.[1] The life-cycle greenhouse gas (GHG)-intensities of biogas and RNG are of great interest to policymakers, researchers, and industry decision-makers because GHG-intensities are in some cases tied directly to the monetary incentives received by producers.

There is particular interest in animal manure as an input for biogas production because of the potential for GHG benefits in circumstances where improved manure management practices can be implemented that reduce GHG emissions. Biogas production from animal manure occurs via anaerobic digestion, a process that breaks down organic materials in the absence of oxygen to produce biogas (a mixture of CH_4, carbon dioxide (CO_2), and other trace gases). Putting animal-derived waste materials into an anaerobic digester serves as an alternative to more conventional organic waste management practices, such as storage in open lagoons and land application, although the residual solids and liquid remaining after anaerobic digestion may still be land-applied or composted. Relative to conventional management systems, treating animal manure in a digester has the potential to reduce CH_4 emissions as it facilitates capture and productive use of the biogas. The business-as-usual management of organic waste is referred to as the counterfactual (what would have happened in the absence of a policy or other driver for sending such materials to an anaerobic digester). Life-cycle assessment (LCA) can allow for consideration of counterfactual emissions that are avoided if the organic waste is diverted to anaerobic digesters from other previous management practices. Some conventional management practices for organic wastes, such as certain manure management practices other than sending the materials to digesters, result in substantial emissions.

This white paper focuses on estimating counterfactual emissions for manure generated in the U.S., and specifically on establishing a generic average manure GHG counterfactual emissions value that is agnostic to manure management method and to animal type and can be applied broadly to biogas and RNG production from manures when prior and future manure management practices are varied or uncertain. The basic equations and underlying data needed to calculate counterfactual GHG emissions for average manure are provided, along with numeric results using the most up-to-date data available.

B. Technical Background

Manure management in the U.S. resulted in an estimated 2.31 million metric tons (MMT) of CH_4 emissions in 2022 and 64,000 metric tons (MT) of nitrous oxide (N_2O).[2] Manure is produced from livestock and poultry operations including dairy cattle, beef cattle, swine, sheep, goats, poultry, horses, mules and asses, and bison, although approximately 90% of the CH_4 emissions originate from cattle and swine operations.[1] This outsized share of total emissions is due to differences in how dairy cattle and swine are managed, compared to other livestock and poultry, and the resulting options for managing their manure. Diverting manure from business-as-usual practices by constructing anaerobic digesters to break down manure into usable biogas can avoid direct GHG and other air pollutant emissions, particularly CH_4 emitted from open storage lagoons and deep pit storage. The net impact of manure diversion to anaerobic digestion on N_2O emissions is more nuanced, as the fate of nitrogen depends on how liquid and solid manure is land-applied, and the degree to which those emissions are attributed to manure management versus the crop benefitting from manure as a supplemental fertilizer.[3] This white paper incorporates estimates of both CH_4 and N_2O emissions from manure management. The white paper does not, however, include emissions that occur if/when manure, solid digestate, and liquid digestate are collected and land-applied (e.g., on-field N_2O emissions). These emissions are not included because more data is required to accurately quantify differences between GHG emissions from untreated manure application versus land application of post-anaerobic digestion solids/liquids, as well as the expected net effects on farmers' application of synthetic fertilizers. Future iterations of this approach could include these factors.

Manure management practices vary farm-to-farm and by the type of livestock and poultry operation. It is not uncommon for individual farms to employ several different practices as part of their Manure Management Plan (MMP), which depends on the crops on which manure is eventually land-applied, type(s) and number of livestock and poultry, and systems in place for manure handling.[4] A manure management system includes:[5]

- Where, and how much manure is produced (excreted) by the livestock or poultry
- How manure is collected
- How manure is stored
- What manure treatment is used (e.g., solid-liquid separation)
- How manure is transferred and utilized (e.g., energy generation, supplemental fertilizer)

Tracking and managing manure is difficult because it can change in mass, volume, consistency, and composition during an animal's growth cycle or with a change in feed provided to the animals. Additionally, the composition of manure changes as it passes through the management system (e.g., water is added or removed, bedding may be mixed in). There are three different points at which manure flows can be tracked, and each will result in a different total mass value:

1. Manure as excreted, which includes urine and feces
2. Manure as collected, which potentially includes drinking water, wasted feed, bedding material, and flush or recharge water
3. Manure as stored, which includes any added wastewater, runoff, and direct precipitation into uncovered storage facilities

When discussing total mass of manure, this white paper refers exclusively to manure as excreted (#1 above), unless otherwise noted. However, the list above provides context for why tracking manure for the purposes of calculating avoided manure management emissions can be onerous. Dairy cattle and swine manure as excreted is 88-92% water by mass[5] (8-12% total solids) but the total mass and moisture fraction of manure will vary considerably once it is comingled with bedding, flush water, and other wastewater or runoff. At points where an inflow or outflow of manure might be simplest to track, it may have already been mixed with additional water or other solids.

Availability of data on current manure management by farm is limited because there is no national reporting requirement for MMPs, and state-level reporting requirements and regulations vary.[6] The associated emissions from manure management also vary widely by management practice. Wet methods, such as lagoon and deep pit storage, result in more uncontrolled emissions of CH_4, whereas dry methods, including solid storage, daily spread, and pasture, emit less CH_4. The practical options for controlling CH_4 emissions also vary by MMP. Lagoons can be covered to allow for the capture of biogas for combustion or upgrading to RNG, whereas the head space above deep pit storage must be adequately ventilated for health and safety reasons, meaning the CH_4 concentration at the outlet is typically too low to ignite in a flare or be upgraded cost-effectively.

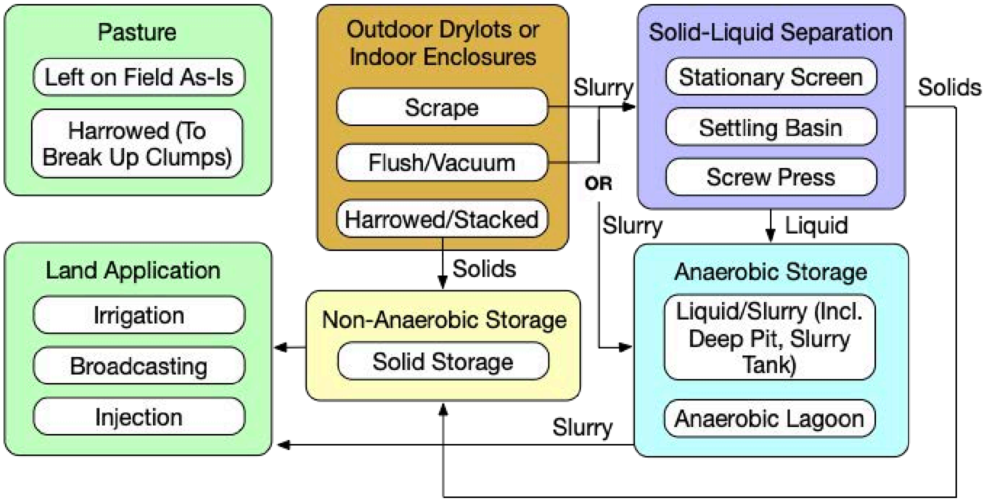

Figure 1: Overview of Common Manure Management Practices, Adapted from Greene et al. (2024)[7]

Manure can be diverted from the conventional practices, as exemplified in Figure 1, to anaerobic digesters. After processing in anaerobic digesters, the produced biogas can be captured and used, either for generation of heat/power or for upgrading to renewable natural gas (RNG) that is suitable for a variety of uses, including fueling vehicles or electricity generators directly or injection into natural gas pipelines. RNG produced from manure digesters is not cost-competitive with natural gas, absent the availability of subsidies, and the construction of digesters in the last decade has been largely driven by government programs and incentives, such as those provided through the Renewable Fuel Standard and state Low Carbon Fuel Standards. There are manure digesters across the U.S. that currently process dairy cattle, swine, beef cattle, and poultry manure. The AgSTAR Livestock Anaerobic Digester Database[8] lists 473 digesters that are operational or under construction as of 2024, including 52 swine manure digesters, 398 dairy manure digesters, 4 beef cattle manure digesters, and 7 poultry manure digesters. Of those digesters, 104 co-digest the primary type of manure specified with one or more other wastes, including other types of manure, food waste, agricultural residues, and dairy/food processor waste. The relative quantities of different manure types and other wastes co-digested in these anaerobic digesters is not provided in any publicly available datasets. The diversity of feedstocks processed in these digesters further exacerbates the difficulty of tracking specific types of manure sent to anaerobic digestion and assigning avoided emissions values specific to the counterfactual for each type of manure (and how the manure would have otherwise been managed).

The appropriate methods for calculating life-cycle GHG footprints for manure-derived biogas and RNG remain a subject of debate, as technical LCA approaches can justifiably differ based on the specific research or policy context for the analysis. These GHG intensities, sometimes referred to as carbon intensity (CI) scores, can be driven in large part by the assumed counterfactual manure management practices, when included as part of the analysis. Analyses that assume CH_4 emissions are avoided when manure is diverted to anaerobic digestion for the generation of biogas typically apply these avoided emissions in perpetuity (as opposed to a one-time or otherwise limited avoided emissions value). As of 2024, the California Air Resources Board (CARB) had approved manure-derived RNG pathways for the LCFS with GHG intensities from -130 to -532 grams (g) CO_2-equivalent (CO_2e) per megajoule (MJ),[9] Even in the case where detailed facility-specific GHG accounting is done, and a robust verification process is in place, the resulting GHG intensities in CARB's program do not incorporate the potential for broader shifts in livestock or poultry operations and manure management or broader market impacts because of the policy incentive (or in the base case absent any policy incentive) – i.e., these GHG intensities do not take into account any emissions indirectly associated with the changes in supply of biogas or RNG under the policy. For example, one potential indirect effect of significant monetary incentives tied to avoidance of manure CH_4 emissions could be an industry-wide shift away from lower-emitting dry manure management (e.g., solid storage and pasture) toward higher-CH_4-producing wet methods that are better suited for the installation of anaerobic digestion. These types of potential shifts are not accounted for in CARB's facility-specific GHG intensity values.

This white paper discusses a simple, but technically sound approach to estimate a broadly applicable value for avoided GHG emissions for diversion of manure from conventional management practices to anaerobic digesters. Developing a broadly applicable manure counterfactual emissions value, based on a weighted average of all estimated emissions for manure management across the U.S., can be a technically sound approach at this point in time given the paucity of comprehensive and reliable data. The counterfactual emissions value is easily administered, as it assigns credit for estimated emissions avoided from typical manure management practices. If used in policy applications, this approach improves administrability by reducing or eliminating the need for farm-level tracking of historical management practices, which would be highly challenging to administer and verify. The use of a single generic counterfactual emissions value for manure also reduces accounting complexity for farms that process multiple types of manure in a single digester. Finally, this approach helps to address concerns that calculating counterfactual emissions specific to wet methods may overestimate avoided CH_4 if the indirect effects of a policy incentive include a shift from dry to wet manure management.

C. Methodology

A generic manure counterfactual GHG emissions value can be generated based on a weighted average of estimated emissions from all conventional manure management practices across the U.S., inclusive of all types of manure. If adopted for a specific application, this counterfactual GHG (CH_4 and N_2O) emissions value can be uniformly applied to all manure processed in anaerobic digesters for the purpose of generating biogas (and potentially upgrading that biogas to RNG). To simplify the application of the generic manure counterfactual emissions value, it is possible to establish an average manure-to-biogas yield factor and produce the emissions value on a per-unit biogas basis. The resulting counterfactual value can be applied for life-cycle GHG emissions modeling of manure biogas production without the need to track mass or type(s) of manure loaded into digesters. Based on the most up-to-date data available, the manure counterfactual GHG emissions translate to an abated GHG (CH_4 and N_2O) value for the *biomethane portion of untreated biogas* equal to **-53 gCO_2e/standard cubic foot (scf) biomethane in biogas (or -51 gCO_2e/MJ)**. We report this value on the basis of scf of biomethane contained in the untreated biogas, as opposed to scf of the biogas itself to avoid confusion, given that untreated biogas contains other gases including CO_2, and the CH_4 content of biogas varies. Similarly, we also provide the value per MJ lower heating value (LHV) of biomethane contained in the biogas, as the LHV of untreated biogas varies and is impacted by the concentration of other non-CH_4 gases.

This section provides additional details regarding the calculation of the generic manure counterfactual GHG (CH_4 and N_2O) emissions value and the underlying data required to generate and update this value. This value can be applied directly as an estimated emissions *avoidance* credit to any biogas (on a biomethane basis) produced from manure in the U.S. The final GHG intensity of the energy product (e.g., RNG or electricity) should account for emissions downstream of the digester as appropriate, such as biogas upgrading and compression, as well as for any GHG emissions associated with transportation or other processing of the digester inputs and outputs.

Estimated Emissions Per Unit of Manure

At the most basic level, estimation of a generic counterfactual for all manure generated in the U.S. requires that total emissions for manure management be calculated and then allocated across the total manure generated:

Equation 1: GHG emissions per unit of manure (MT= Metric Ton)

$$\left[\frac{\text{MT CO}_2\text{e}}{\text{MT Manure}}\right]$$

Quantification of the Numerator for Equation 1 (MT CO_2e): Calculating a GHG emissions footprint for manure management requires estimated values for CH_4 and N_2O emissions (numerator in Equation 1) from business-as-usual manure management practices for all animal types (dairy cattle, swine, beef cattle, poultry, sheep, goats, horses, mules and asses, and bison). There are no sector-wide reported emissions values for the livestock and poultry sectors (analogous to large-scale measurement campaigns conducted in the oil and gas sector[10]), so all published CH_4 and N_2O emissions values from manure management are based on bottom-up calculations. These calculations are done as part of the Inventory of U.S. Greenhouse Gas Emissions and Sinks (hereafter referred to as the GHG Inventory) using practice-specific emission estimation methods aligned with Intergovernmental Panel on Climate Change (IPCC) Tier 1 and Tier 2 methodologies and publicly available industry statistics and U.S. Department of Agriculture data. For the purposes of this white paper, we used the total CH_4 and N_2O emissions values for manure management from 2022 (reported in the 2024 release of the GHG Inventory[2]), which is the most up-to-date representation of the state of manure management practices and the resulting GHG emissions. The manure management emissions shown in Table 1 include CH_4 and N_2O emissions from the collection and storage of manure, as well as the CH_4 emissions from manure that is directly deposited by animals on pasture, range, or paddock lands. The emissions values in Table 1 account for all manure management practices including the portion of manure that is handled in anaerobic digesters as of 2022 (manure sent to anaerobic digestion is generally less emissions-intensive relative to manure stored in uncovered lagoons or deep pits, depending on the operating period and operating conditions of a covered anaerobic digester). The values in Table 1 do not include direct and indirect N_2O emissions that occur on fields from manure that is collected and spread as supplemental fertilizer (either via daily spread or after storage/anaerobic digestion) as this is highly variable per practice, weather, landowner and operators, biogeochemical conditions, and these GHG emissions profiles would be challenging to track and verify. Additionally, emissions from the spread of manure as supplemental fertilizer may be included as part of the life-cycle GHG footprint of the related agricultural products and omission can help avoid double counting.

Table 1: Estimated 2022 Total CH_4 and N_2O Emissions from Manure Management[11]

Animal Type	MT CH_4 emitted/year	MT N_2O emitted/year
Dairy Cattle	1,193,000	23,000
Swine	851,000	7,000
Poultry	108,000	9,000
Beef Cattle	154,000	24,000
Other (Bison, Goats, Horses, Mules, Sheep)	6,000	1,000
Total	**2,312,000**	**64,000**

The values in Table 1 can be converted to CO_2-equivalents (CO_2e) using 100-year global warming potential (GWP100) (see Table 2). This white paper uses Fifth IPCC Assessment Report (AR5) GWP100 values.[12] The AR5 GWP100 value for CH_4 is 28. The AR5 GWP100 value for N_2O is 265. The total emissions of manure management in the U.S. are estimated to be 81,696,000 MT CO_2e/year using AR5 GWP100 values, as shown in Table 2. This value is used for the numerator in Equation 1.

Table 2: 2022 GHG Emissions (CH_4 and N_2O) on a GWP100 Basis for Manure Management in the U.S.

Animal Type	AR5 GWP100[13] (MT CO_2e/year)
Dairy Cattle	39,499,000
Swine	25,683,000
Poultry	5,409,000
Beef Cattle	10,672,000
Other (Bison, Goats, Horses, Mules, Sheep)	433,000
Total	**81,696,000**

Quantification of the Denominator for Equation 1 (MT Manure): Quantities of each type of manure produced, based on the most recent data available, are required to complete an updated bottom-up calculation of generalized GHG-intensity of biogas and related manure management in the U.S. The total manure generated across all animal types must be calculated and used as the denominator in Equation 1 to produce a generic value for mass CO_2e emitted in the business-as-usual counterfactual scenario per mass of manure, which can later be converted to a per-unit-biomethane basis. For the estimate provided in this white paper, the manure production total was derived for 2022 as published in the 2024 GHG Inventory submission,[2] which provides estimates of total manure production on a volatile solids (VS) basis by combining per-animal manure production estimates with total heads by animal type. The total estimated VS production per year is shown in Table 3.

To calculate the total as-excreted manure, this paper applies the following steps. First, take the VS manure production shown in Table 3 and divide it by the VS fraction[13] of total solids (TS). This will be different for each species and will result in the TS of manure. Second, divide TS by the total solids fraction of as-excreted manure (calculated as one minus the moisture content in Equation 2) to calculate the as-excreted total manure, and then sum the resulting quantity for each species. Equation 2 depicts this method.

Equation 2 Calculation of total manure mass as excreted

$$\text{MT Manure} = \sum_{i \in livestock} \frac{\text{TS}_\text{i}}{(1 - M_i)}$$

Where: M_i is the moisture content (fraction) of as-excreted manure for each species and TS_i is the TS in metric tons. TS_i is calculated as follows:

$$\text{TS}_i = X_i \times \text{VS}_\text{i}$$

Where: X_i is the ratio of

$$\frac{\text{TS}}{\text{VS}}$$

taken from Lorimor et al. 2005.[13] This ratio will be different for each species. Table 3 shows both the TS and total manure values alongside the specific VS fraction of TS and moisture content of manure for each species.

Table 3: 2022 Total U.S. Manure Production by Animal Type on the Basis of Volatile Solids, Total Solids, and Total Mass (Including Water Content) rounded to the nearest metric ton. MT=metric tons, VS=volatile solids, TS=total solids.

Animal Type	2022 Manure Production (VS, MT/year)[14]	Volatile Solids Fraction of TS[15]	Calculated 2022 Manure Production (TS, MT/year)	Estimated Moisture Content in As-Excreted Manure[15]	Calculated As-Excreted Total Manure (MT/year)
Dairy Cattle	**34,473,946**	**-**	**40,617,184**	**-**	**338,476,533**
Dairy Cows	27,287,966	85%	32,164,166	88%	268,034,716
Dairy Heifer	5,514,470	85%	6,468,100	88%	53,900,835
Dairy Calves	1,671,510	84%	1,984,918	88%	16,540,982
Swine	**7,744,408**	**-**	**9,531,700**	**-**	**87,878,704**
Market <50 lb	880,468	81%	1,080,573	89%	9,823,392
Market 50-119 lb	1,467,045	80%	1,833,806	89%	16,670,964
Market 120-179 lb	1,930,673	79%	2,430,218	89%	22,092,893
Market >180 lb	2,266,764	80%	2,837,532	89%	25,795,748
Market Breeding	1,199,458	89%	1,349,571	90%	13,495,706
Beef Cattle	**86,527,132**	**-**	**102,749,993**	**-**	**931,812,553**
Feedlot Steers	6,195,088	82%	7,595,988	92%	94,949,844
Feedlot Heifers	3,512,418	82%	4,306,683	92%	53,833,542
NOF Bulls	3,682,950	85%	4,356,178	88%	36,301,481
NOF Calves	5,248,300	84%	6,232,356	92%	77,904,447
NOF Heifers	9,662,220	85%	11,418,987	88%	95,158,225
NOF Steers	7,602,985	85%	8,985,346	88%	74,877,881
NOF Cows	50,623,172	85%	59,854,456	88%	498,787,133
Sheep	**802,666**	**-**	**926,153**	**-**	**3,704,612**
Sheep on Feed	**193,131**	**87%**	**222,843**	**75%**	**891,372**
Sheep NOF	**609,535**	**87%**	**703,310**	**75%**	**2,813,240**
Goats	**616,050**	**87%**	**710,827**	**75%**	**2,843,307**
Poultry	**14,224,432**	**-**	**18,883,668**	**-**	**73,650,822**
Hens >1yr	2,530,489	73%	3,467,707	75%	13,870,828
Pullets	861,733	76%	1,133,859	75%	4,535,437
Other Chickens	49,209	75%	65,864	75%	263,456
Broilers	9,306,212	76%	12,245,016	74%	47,096,214
Turkeys	1,476,790	75%	1,971,222	75%	7,884,888
Horses	**2,076,991**	**85%**	**2,448,331**	**86%**	**17,488,080**
Mules and Asses	**117,182**	**85%**	**138,133**	**86%**	**986,667**
American Bison	**375,474**	**85%**	**444,110**	**88%**	**3,700,913**
TOTAL	**146,958,281**	**-**	**176,450,099**	**-**	**1,460,542,191**

Combining the total GHG emissions and total manure values in Equation 1 gives the following results (using AR5 GWP100 values):

- 0.56 kg CO_2e per kg manure (VS only)
- 0.46 kg CO_2e per kg manure (TS only)
- 0.056 kg CO_2e per kg manure (total manure mass, as excreted including moisture)

Estimated Emissions Per Unit Biomethane

There are two facility-specific factors that could impact the GHG estimates for manure-derived RNG: digester performance (e.g., yield of biogas per unit manure processed, leakage, energy requirements) and the performance of the upgrader that converts biogas to RNG by removing CO_2, water vapor, and other trace contaminants to produce a relatively pure biomethane output (e.g., RNG yield, leakage, and energy requirements). Other factors, such as transportation of manure and digestate, also impact GHG emissions and these factors are included in the white paper as well. Establishing clear system boundaries and the intended end use of the RNG is also essential, as this determines the degree to which additional RNG compression-related energy use and emissions should be included. The possible range of GHG intensities for RNG depends on whether the GHG intensity is generated for RNG from an individual facility using performance metrics specific to that facility's operations (referred to as foreground data in some LCA models) or whether industry-wide average default values for facility performance are used (referred to as background data). If biogas is *not* upgraded to RNG, but instead combusted to generate electricity and/or heat, the GHG intensity of the electricity or heat also would be affected by the digester performance and efficiency of the heat/power generation.

Digester performance (biogas yield per unit of manure input): Different digester designs, operating conditions, and feedstocks will impact biogas yields. Anaerobic digester operators may also choose to co-digest manure alongside other food wastes or wastewater to achieve the optimal carbon-to-nitrogen ratio for maximal biogas yields. Assigning appropriate facility-specific manure emissions abatement credits based on individual manure types and quantities would require operators to track each type of manure entering the digester and document the total solids in the manure separately from additional water or other materials that have been mixed with the manure prior to entering the digester. Conversely, it is possible to calculate an average biogas yield per unit manure and use this single value as background data (in place of detailed facility-specific tracking) in a life-cycle GHG model, which can simplify the GHG accounting and related tracking and verification processes if required in specific contexts.

Assuming digester performance is provided as background data in an LCA, an average biogas conversion must be developed. Units:

$$\left[\frac{\text{scf CH}_4\text{ in biogas}}{\text{MT manure}}\right]$$

When combined with the GHG calculation described above (0.056 kgCO_2e/kg manure as excreted), this would produce a GHG emissions estimate in units of:

$$\left[\frac{\text{gCO}_2\text{e}}{\text{scf CH}_4\text{ in biogas}}\right]$$

The average digester emissions intensity is expected to be different for each digester technology and animal species. To generate a generic digester emissions factor for the purposes of this white paper, using the values from R&D GREET 2023 (hereafter referred to as R&D GREET), the digester technology values were averaged and applied to a manure-weighted average for each species. These calculations resulted in a fixed yield of 0.61 standard cubic foot (scf) biomethane in biogas per kg manure (as excreted) used for this white paper to calculate the resulting emissions factor of -90 gCO_2e/scf biomethane in biogas (the negative value indicates GHG emissions avoidance).[15] The emissions intensity of operating the digester was calculated as a manure-weighted average of the three primary digester technologies (covered lagoon, mixed plug flow, and complete mix) from R&D GREET. The resulting emissions intensity of operating the digester is 39 gCO_2e/MJ biomethane in biogas. This value assumes grid electricity and natural gas are used to supply the energy necessary to operate the digester. It also includes a 3-mile truck hauling distance for manure processed in the digester, as well as 3-mile truck transport to backhaul digestate for application to land. If digester yield and performance are used as background data, the -90 gCO_2e/MJ and 39 gCO_2e/MJ values are summed to calculate a net GHG intensity (including the credit for counterfactual GHG emissions and positive GHG emissions from anaerobic digestion) of approximately **-53 gCO_2e/scf biomethane in biogas (or -51 gCO_2e/MJ)** for digesters exclusively processing manure. Assigning default digester performance values as background data in an LCA model based on a weighted average across different manure types is a robust technical approach, given the uncertainties and heterogeneity of underlying systems, that alleviates some of the challenges of tracking quantities and types of manure processed for the purposes of subsequently using those values to calculate GHG intensities for the resulting biogas, electricity, and/or RNG. This value does not include indirect effects, such as potential increased demand for synthetic fertilizer on farms previously land-applying manure, although solid and liquid digestate is assumed to be land applied.

Electricity and heat generation performance: Manure anaerobic digesters often use biogas for power generation or cogeneration of heat and power. Of the 473 manure digesters listed in the AgSTAR Digester Database, 90 list cogeneration as their biogas end use, 70 list electricity, 13 list boiler/furnace fuel, and 14 list co-generation as one of multiple biogas end uses. Heat may be required to maintain an optimal temperature in the digester(s), among other uses. If biogas is used exclusively to generate and export electricity, a GHG intensity can be calculated by adding any additional leakage emissions to the counterfactual emissions value and dividing by the total electricity exported, resulting in a factor with the following units:

$$\left[\frac{\mathrm{gCO_2e}}{\mathrm{MJ\ electricity}}\right]$$

For example, assuming the standard R&D GREET reciprocating engine efficiency of 30% and an additional biogas leakage rate of 2% associated with the power generation portion of the facility,[16] the GHG intensity of the electricity is calculated as -165 gCO_2e/MJ electricity (-601 gCO_2e/kWh).

RNG upgrader performance: RNG upgraders are the facilities that take in biogas and remove CO_2, water vapor, and other impurities. Upgraders require electricity and can make investments to improve their efficiency and reduce leakage rates. Upgraders may be co-located with an anaerobic digester or biogas may be transported from multiple digesters to a centralized upgrading facility. Upgrader performance (RNG yield per unit of biogas input and the upgraders' energy demand and source of energy) varies by facility but may be relatively straightforward to document and verify. Where appropriate in the context of the policy application, enabling users of an LCA tool to enter facility-specific data could provide an incentive to improve their efficiency and source clean energy to run their operations. Units of resulting RNG:

$$\left[\frac{\mathrm{gCO_2e}}{\mathrm{MJ\ RNG}}\right]$$

The standard GHG intensity from R&D GREET[16] for RNG upgraders of biogas from manure anaerobic digesters is 19.4 gCO_2e/MJ RNG at pipeline injection (including leakage and upstream emissions associated with grid electricity supply). When combined with the biogas GHG intensity (**-51 gCO_2e/MJ of biomethane in biogas**) this would result in a **GHG intensity of -31 gCO_2e/MJ RNG** when rounded to the nearest gram. This estimated GHG intensity of RNG includes the credit for avoided emissions from conventional manure management (except emissions from land application as supplemental fertilizer), all life-cycle emissions from managing manure using anaerobic digestion, and life-cycle emissions from upgrading to RNG. It does not include net GHG emissions effects associated with potential changes in nutrient management as a result of managing manure using anaerobic digestion rather than direct land application due to the heterogeneity of on-farm practices and lack of reliable data. Future iterations of this approach could incorporate these and other factors to improve the comprehensiveness of the GHG emissions estimates.

D. Summary and Potential for Future Updates

A generic manure counterfactual GHG emissions value is a simple, technically sound, and transparent option for incorporating avoided emissions credits in LCA in a manner that reduces the challenges involved in tracking the specific type(s) of manure loaded into each digester and each facility's past and expected future manure management practices in the absence of monetary incentives. The inclusion of all manure management practices, and hence all types of manure, is based on the acknowledgement that monetary incentives provided for manure RNG could cause broader shifts in manure management away from lower-emitting dry methods to wet methods that facilitate the additional production and use of biogas. This white paper provides a streamlined calculation approach based on the best-available data as of December 2024. However, future updates to this approach are possible based on updated national emissions inventories and more comprehensive, detailed, and robust reporting of manure production and management practices in the livestock and poultry industries at a national scale.

Endnotes

[1] See https://afdc.energy.gov/fuels/natural-gas-renewable

[2] EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2022 https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks.

[3] Zhou, M., Zhu, B., Wang, S., Zhu, X., Vereecken, H., & Brüggemann, N. (2017). Stimulation of N2O emission by manure application to agricultural soils may largely offset carbon benefits: A global meta-analysis. Global Change Biology, 23(10), 4068-4083. https://doi.org/10.1111/gcb.13648.

[4] Purdue Cooperative Extensive Service (1999) "Swine Manure Management Planning" https://www.extension.purdue.edu/extmedia/id/id-205.html

[5] Varma, V. S., Parajuli, R., Scott, E., Canter, T., Lim, T. T., Popp, J., & Thoma, G. (2021). Dairy and swine manure management–Challenges and perspectives for sustainable treatment technology. Science of The Total Environment, 778, 146319. https://doi.org/10.1016/j.scitotenv.2021.146319.

[6] Rosov, K. A., Mallin, M. A., & Cahoon, L. B. (2020). Waste nutrients from US animal feeding operations: Regulations are inconsistent across states and inadequately assess nutrient export risk. Journal of Environmental Management, 269, 110738. https://doi.org/10.1016/j.jenvman.2020.110738.

[7] Greene, J. M., Wallace, J., Williams, R. B., Leytem, A. B., Bock, B. R., McCully, M., ... & Quinn, J. C. (2024). National Greenhouse Gas Emission Reduction Potential from Adopting Anaerobic Digestion on Large-Scale Dairy Farms in the United States. Environmental Science & Technology, 58(28), 12409-12419. https://doi.org/10.1021/acs.est.4c00367.

[8] U.S. EPA. Livestock Anaerobic Digester Database. https://www.epa.gov/agstar/livestock-anaerobic-digester-database

[9] California Air Resources Board. LCFS Pathway Certified Carbon Intensities. LCFS Pathway Certified Carbon Intensities | California Air Resources Board.

[10] Sherwin, E.D., Rutherford, J.S., Zhang, Z. et al. US oil and gas system emissions from nearly one million aerial site measurements. Nature 627, 328–334 (2024). https://doi.org/10.1038/s41586-024-07117-5

[11] GHG Inventory Table 5-6

[12] GWPs of GHGs are published periodically by the Intergovernmental Panel on Climate Change (IPCC). The Fifth Assessment Report GWPs are currently utilized in reporting to the United Nations Framework Convention on Climate Change (UNFCCC). See: Subsidiary Body for Scientific and Technological Advice, "Common metrics used to calculate the carbon dioxide equivalence of anthropogenic greenhouse gas emissions by sources and removals by sinks," UNFCCC; 2022, Sharm el-Sheikh. https://unfccc.int/sites/default/files/resource/sbsta2022_L25a01E.pdf

[13] Calculated based on published values for total solids and volatile solids by animal in Table 6 in Michigan State University's Manure Characteristics report: https://www.canr.msu.edu/uploads/files/ManureCharacteristicsMWPS-18_1.pdf

[14] Estimated using animal counts and volatile solids production per animal provided in Tables A-155 through A-158 the 2024 GHG Inventory submission, available in Annex 3: https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-annex-3-additional-source-or-sink-categories-part-b.pdf. Cattle VS production is reported on a statewide basis in table A-158. To get to a national VS production factor of kg/animal-year factor the statewide VS production is weighted based upon the statewide manure emissions data reported in Table A-171. All of these tables are reproduced in the Appendix of this white paper.

[15] Digester and upgrader yield and performance are generated from R&D GREET 2023. U.S. Department of Energy. R&D GREET Life Cycle Assessment Model. R&D GREET Life Cycle Analysis Model | Department of Energy.

U.S. Department of Energy. R&D GREET Life Cycle Assessment Model. R&D GREET Life Cycle Analysis Model | Department of Energy.

[16] The 2% leakage rate is the default rate for electric generator sets from biogas in R&D GREET 2023.

Appendix

Table A1 Copy of table A-155 from Annex 3 of the 2024 GHG Inventory submission[2]: Livestock Population (1,000 head)

Animal Type	1990	2005	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Dairy Cattle	**19,512**	**17,793**	**18,587**	**18,505**	**18,517**	**18,812**	**18,857**	**18,923**	**19,006**	**18,849**	**18,804**	**18,828**	**18,626**
Dairy Cows	10,015	9,004	9,236	9,221	9,209	9,312	9,312	9,369	9,432	9,353	9,343	9,442	9,377
Dairy Heifer	4,129	4,162	4,581	4,523	4,571	4,727	4,785	4,757	4,741	4,677	4,637	4,562	4,394
Dairy Calves	5,369	4,628	4,770	4,761	4,737	4,774	4,760	4,797	4,833	4,818	4,825	4,823	4,855
Swine[a]	**53,941**	**61,073**	**66,363**	**65,437**	**64,195**	**68,178**	**70,065**	**72,125**	**73,430**	**76,898**	**77,267**	**74,100**	**73,362**
Market <50 lb.	18,359	20,228	19,472	19,002	18,939	19,843	20,572	20,973	21,359	22,278	22,047	21,219	21,086
Market 50-119 lb.	11,734	13,519	17,140	16,834	16,559	17,577	18,175	18,767	19,039	20,195	20,153	19,318	19,085
Market 120-179 lb.	9,440	11,336	12,714	12,674	12,281	13,225	13,575	13,982	14,311	14,852	15,143	14,457	14,405
Market >180 lb.	7,510	9,997	11,199	11,116	10,525	11,555	11,714	12,282	12,418	13,138	13,604	12,918	12,638
Breeding	6,899	5,993	5,839	5,812	5,892	5,978	6,030	6,122	6,303	6,435	6,321	6,187	6,147
Beef Cattle[b]	**81,576**	**82,193**	**76,858**	**76,010**	**74,966**	**76,149**	**79,323**	**81,385**	**81,722**	**82,049**	**80,812**	**80,525**	**79,389**
Feedlot Steers	6,357	8,116	8,586	8,613	8,696	8,594	9,017	9,560	9,605	9,706	9,685	9,691	9,960
Feedlot Heifers	3,192	4,536	4,742	4,655	4,518	4,334	4,433	4,786	5,085	5,210	5,250	5,253	5,514
NOF Bulls	2,160	2,214	2,100	2,074	2,038	2,109	2,137	2,244	2,252	2,253	2,237	2,211	2,110
Beef Calves	16,909	16,918	15,288	14,805	14,737	14,998	15,546	15,931	16,221	16,146	15,635	15,631	15,244
NOF Heifers	10,182	9,550	8,687	8,780	8,730	9,291	9,892	9,790	9,460	9,257	9,066	9,181	8,896
NOF Steers	10,321	8,185	7,173	7,451	7,291	7,491	8,133	7,904	7,633	7,786	7,600	7,714	7,682
NOF Cows	32,455	32,674	30,282	29,631	28,956	29,332	30,164	31,171	31,466	31,691	31,339	30,844	29,983
Sheep	**11,358**	**6,135**	**5,375**	**5,360**	**5,235**	**5,270**	**5,295**	**5,270**	**5,265**	**5,230**	**5,200**	**5,170**	**5,065**
Sheep On Feed	1,180	2,976	2,669	2,658	2,588	2,587	2,624	2,618	2,623	2,616	2,611	2,596	2,550
Sheep NOF	10,178	3,159	2,706	2,702	2,647	2,683	2,671	2,652	2,642	2,614	2,589	2,574	2,515
Goats	**2,516**	**2,897**	**2,622**	**2,637**	**2,652**	**2,668**	**2,683**	**2,699**	**2,714**	**2,729**	**2,745**	**2,753**	**2,776**
Poultry[c]	**1,537,074**	**2,150,410**	**2,168,697**	**2,106,502**	**2,116,333**	**2,134,445**	**2,173,216**	**2,214,462**	**2,256,552**	**2,276,951**	**2,269,691**	**2,254,998**	**2,249,441**
Hens >1 yr.	273,467	348,203	346,965	361,403	370,637	351,656	377,299	388,006	402,536	403,102	391,010	393,078	377,606
Pullets	73,167	96,809	104,460	106,646	106,490	118,114	112,061	117,173	124,729	121,971	119,898	123,179	128,590
Chickens	6,545	8,289	6,827	6,853	6,403	7,211	6,759	6,859	6,626	7,130	7,371	6,447	6,809
Broilers	1,066,209	1,613,091	1,625,945	1,551,600	1,553,636	1,579,764	1,595,764	1,620,691	1,643,327	1,668,582	1,676,745	1,660,127	1,666,436
Turkeys	117,685	84,018	84,500	80,000	79,167	77,700	81,333	81,733	79,333	76,167	74,667	72,167	70,000

Animal Type	1990	2005	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Horses	2,212	3,875	3,621	3,467	3,312	3,157	3,002	2,847	2,692	2,538	2,383	2,233	2,073
Mules and Asses	63	212	293	298	303	308	313	318	323	328	333	337	343
American Bison	47	212	162	166	171	175	179	184	188	193	197	201	209

[a] Prior to 2008, the Market <50 lbs category was <60 lbs and the Market 50-119 lbs category was Market 60-119 lbs; USDA updated the categories to be more consistent with international animal categories.

[b] NOF - Not on Feed,

[c] Pullets includes laying pullets, pullets younger than 3 months, and pullets older than 3 months.

Note: Totals may not sum due to independent rounding.

Table A2 Copy of A-156 from 2024 GHG Inventory submission[2]: Waste Characteristics Data

	Typical Animal Mass, TAM		Total Nitrogen Excreted, Nex[a]		Maximum Methane Generation Potential, B_0		Volatile Solids Excreted, VS[a]	
Animal Group	**Value (kg)**	**Source**	**Value**	**Source**	**Value (m^3 CH_4/kg VS added)**	**Source**	**Value**	**Source**
Dairy Cows	680	CEFM[b]	Table A-158	CEFM	0.24	Morris 1976	Table A-158	CEFM
Dairy Heifers	406-408	CEFM	Table A-158	CEFM	0.17	Bryant et al. 1976	Table A-158	CEFM
Feedlot Steers	419-457	CEFM	Table A-158	CEFM	0.33	Hashimoto 1981	Table A-158	CEFM
Feedlot Heifers	384-430	CEFM	Table A-158	CEFM	0.33	Hashimoto 1981	Table A-158	CEFM
NOF Bulls	831-917	CEFM	Table A-158	CEFM	0.17	Hashimoto 1981	Table A-158	CEFM
NOF Calves	122-123	CEFM	Table A-158	USDA 1996, 2008	0.17	Hashimoto 1981	Table A-158	USDA 1996, 2008
NOF Heifers	296-407	CEFM	Table A-158	CEFM	0.17	Hashimoto 1981	Table A-158	CEFM
NOF Steers	314-335	CEFM	Table A-158	CEFM	0.17	Hashimoto 1981	Table A-158	CEFM
NOF Cows	554-611	CEFM	Table A-158	CEFM	0.17	Hashimoto 1981	Table A-158	CEFM
American Bison	578.5	Meagher 1986	Table A-158	CEFM	0.17	Hashimoto 1981	Table A-158	CEFM
Market Swine <50 lbs.	13	ERG 2010a	Table A-157	USDA 1996, 2008	0.48	Hashimoto 1984	Table A-157	USDA 1996, 2008
Market Swine <60 lbs.	16	Safley 2000	Table A-157	USDA 1996, 2008	0.48	Hashimoto 1984	Table A-157	USDA 1996, 2008
Market Swine 50-119 lbs.	39	ERG 2010a	Table A-157	USDA 1996, 2008	0.48	Hashimoto 1984	Table A-157	USDA 1996, 2008
Market Swine 60-119 lbs.	41	Safley 2000	Table A-157	USDA 1996, 2008	0.48	Hashimoto 1984	Table A-157	USDA 1996, 2008
Market Swine 120-179 lbs.	68	Safley 2000	Table A-157	USDA 1996, 2008	0.48	Hashimoto 1984	Table A-157	USDA 1996, 2008
Market Swine >180 lbs.	91	Safley 2000	Table A-157	USDA 1996, 2008	0.48	Hashimoto 1984	Table A-157	USDA 1996, 2008
Breeding Swine	198	Safley 2000	Table A-157	USDA 1996, 2008	0.48	Hashimoto 1984	Table A-157	USDA 1996, 2008
Feedlot Sheep	25	EPA 1992	Table A-157	ASAE 1998, USDA 2008	0.36	EPA 1992	Table A-157	ASAE 1998, USDA 2008
NOF Sheep	80	EPA 1992	Table A-157	ASAE 1998, USDA 2008	0.19	EPA 1992	Table A-157	ASAE 1998, USDA 2008
Goats	64	ASAE 1998	Table A-157	ASAE 1998	0.17	EPA 1992	Table A-157	ASAE 1998
Horses	450	ASAE 1998	Table A-157	ASAE 1998, USDA 2008	0.33	EPA 1992	Table A-157	ASAE 1998, USDA 2008
Mules and Asses	130	IPCC 2006	Table A-157	IPCC 2006	0.33	EPA 1992	Table A-157	IPCC 2006
Hens >/= 1 yr	1.8	ASAE 1998	Table A-157	USDA 1996, 2008	0.39	Hill 1982	Table A-157	USDA 1996, 2008
Pullets	1.8	ASAE 1998	Table A-157	USDA 1996, 2008	0.39	Hill 1982	Table A-157	USDA 1996, 2008
Other Chickens	1.8	ASAE 1998	Table A-157	USDA 1996, 2008	0.39	Hill 1982	Table A-157	USDA 1996, 2008
Broilers	0.9	ASAE 1998	Table A-157	USDA 1996, 2008	0.36	Hill 1984	Table A-157	USDA 1996, 2008

	Typical Animal Mass, TAM		Total Nitrogen Excreted, Nex[a]		Maximum Methane Generation Potential, B_0		Volatile Solids Excreted, VS[a]	
Turkeys	6.8	ASAE 1998	Table A-157	USDA 1996, 2008	0.36	Hill 1984	Table A-157	USDA 1996, 2008

[a] Nex and VS values vary by year; Table A-158 shows state-level values for 2022 only. CEFM = Cattle Enteric Fermentation Model

[b] CEFM = Cattle Enteric Fermentation Model, used within the Enteric Fermentation Category of the U.S. GHG Inventory. See Chapter 5.1 and Annex 3.10.[2]

Table A3 Copy of Table A-157 from 2024 GHG Inventory submission[2]: Estimated Volatile Solids (VS) and Total Nitrogen Excreted (Nex) Production Rates by year for Swine, Poultry, Sheep, Goats, Horses, Mules and Asses, and Cattle Calves (kg/day/1000 kg animal mass)

Animal Type	1990	2005	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
VS																	
Swine, Market <50 lbs.	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
Swine, Market 50-119 lbs.	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Swine, Market 120-179 lbs.	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Swine, Market >180 lbs.	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Swine, Breeding	2.6	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
NOF Cattle Calves	6.4	7.4	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
Sheep	9.2	8.6	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Goats	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
Hens >1yr.	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
Pullets	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
Chickens	10.8	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Broilers	15	16.5	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Turkeys	9.7	8.8	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Horses	10	7.3	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Mules and Asses	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
Nex																	
Swine, Market <50 lbs.	0.6	0.84	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Swine, Market 50-119 lbs.	0.42	0.51	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
Swine, Market 120-179 lbs.	0.42	0.51	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
Swine, Market >180 lbs.	0.42	0.51	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
Swine, Breeding	0.24	0.21	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
NOF Cattle Calves	0.3	0.41	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Sheep	0.42	0.44	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Goats	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Hens >1yr.	0.7	0.77	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Pullets	0.7	0.77	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Chickens	0.83	1.03	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Broilers	1.1	1	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Turkeys	0.74	0.65	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63

Animal Type	1990	2005	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Horses	0.3	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Mules and Asses	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3

Table A4 Copy of Table A-158 from 2024 GHG Inventory submission[2]: Estimated Volatile Solids (VS) and Total Nitrogen Excreted (Nex) Production Rates by State for Cattle (other than Calves) and American Bison[a] for 2022 (kg/animal/year)

	Volatile Solids									Nitrogen Excreted								
State	Dairy Cow	Dairy Heifers	Beef NOF Cow	Beef NOF Heifers	Beef NOF Steer	Beef OF Heifers	Beef OF Steer	Beef NOF Bull	American Bison	Dairy Cow	Dairy Heifers	Beef NOF Cow	Beef NOF Heifers	Beef NOF Steer	Beef OF Heifers	Beef OF Steer	Beef NOF Bull	American Bison
Alabama	1,951	1,255	1,665	1,096	974	637	622	1,721	1,721	122	69	73	50	42	59	61	83	83
Alaska	1,099	1,255	1,892	1,268	1,120	637	622	1,956	1,956	84	69	59	42	33	59	61	69	69
Arizona	2,911	1,255	1,892	1,239	1,120	637	622	1,956	1,956	162	69	59	40	33	59	61	69	69
Arkansas	1,945	1,255	1,665	1,093	974	637	622	1,721	1,721	120	69	73	50	42	59	61	83	83
California	2,895	1,255	1,892	1,219	1,120	637	622	1,956	1,956	160	69	59	39	33	59	61	69	69
Colorado	3,038	1,255	1,892	1,196	1,120	637	622	1,956	1,956	167	69	59	38	33	59	61	69	69
Connecticut	2,886	1,255	1,674	1,093	980	637	622	1,731	1,731	161	69	74	50	42	59	61	84	84
Delaware	2,432	1,255	1,674	1,101	980	637	622	1,731	1,731	141	69	74	51	42	59	61	84	84
Florida	2,644	1,255	1,665	1,108	974	637	623	1,721	1,721	152	69	73	51	42	59	61	83	83
Georgia	2,803	1,255	1,665	1,105	974	637	622	1,721	1,721	159	69	73	51	42	59	61	83	83
Hawaii	1,099	1,255	1,892	1,259	1,120	637	622	1,956	1,956	84	69	59	41	33	59	61	69	69
Idaho	2,995	1,255	1,892	1,213	1,120	637	622	1,956	1,956	165	69	59	39	33	59	61	69	69
Illinois	2,702	1,255	1,589	1,014	927	637	622	1,643	1,643	153	69	75	50	43	59	61	85	85
Indiana	2,874	1,255	1,589	1,020	927	637	622	1,643	1,643	160	69	75	50	43	59	61	85	85
Iowa	2,944	1,255	1,589	993	927	637	622	1,643	1,643	163	69	75	48	43	59	61	85	85
Kansas	2,891	1,255	1,589	982	927	637	622	1,643	1,643	161	69	75	47	43	59	61	85	85
Kentucky	2,693	1,255	1,665	1,082	974	637	622	1,721	1,721	154	69	73	49	42	59	61	83	83
Louisiana	2,034	1,255	1,665	1,106	974	637	622	1,721	1,721	124	69	73	51	42	59	61	83	83
Maine	2,693	1,255	1,674	1,093	980	637	622	1,731	1,731	152	69	74	50	42	59	61	84	84
Maryland	2,635	1,255	1,674	1,095	980	637	621	1,731	1,731	150	69	74	51	42	59	61	84	84
Massachusetts	2,662	1,255	1,674	1,108	980	637	622	1,731	1,731	151	69	74	52	42	59	61	84	84
Michigan	3,151	1,255	1,589	1,009	927	637	622	1,643	1,643	172	69	75	49	43	59	61	85	85
Minnesota	2,829	1,255	1,589	1,013	927	637	622	1,643	1,643	158	69	75	49	43	59	61	85	85
Mississippi	2,115	1,255	1,665	1,098	974	637	622	1,721	1,721	129	69	73	50	42	59	61	83	83
Missouri	2,150	1,255	1,589	1,033	927	637	622	1,643	1,643	129	69	75	51	43	59	61	85	85
Montana	2,767	1,255	1,892	1,253	1,120	637	622	1,956	1,956	155	69	59	41	33	59	61	69	69
Nebraska	2,957	1,255	1,589	989	927	637	622	1,643	1,643	164	69	75	48	43	59	61	85	85
Nevada	2,955	1,255	1,892	1,247	1,120	637	622	1,956	1,956	164	69	59	40	33	59	61	69	69

Volatile Solids										Nitrogen Excreted								
New Hampshire	2,737	1,255	1,674	1,095	980	637	622	1,731	1,731	154	69	74	51	42	59	61	84	84
New Jersey	2,726	1,255	1,674	1,091	980	637	621	1,731	1,731	154	69	74	50	42	59	61	84	84
New Mexico	2,956	1,255	1,892	1,239	1,120	637	622	1,956	1,956	164	69	59	40	33	59	61	69	69
New York	2,976	1,255	1,674	1,086	980	637	622	1,731	1,731	164	69	74	50	42	59	61	84	84
North Carolina	2,903	1,255	1,665	1,098	974	637	622	1,721	1,721	163	69	73	50	42	59	61	83	83
North Dakota	2,804	1,255	1,589	1,020	927	637	622	1,643	1,643	157	69	75	50	43	59	61	85	85
Ohio	2,751	1,255	1,589	1,028	927	637	622	1,643	1,643	155	69	75	51	43	59	61	85	85
Oklahoma	2,475	1,255	1,665	1,071	974	637	622	1,721	1,721	143	69	73	48	42	59	61	83	83
Oregon	2,664	1,255	1,892	1,234	1,120	637	621	1,956	1,956	151	69	59	40	33	59	60	69	69
Pennsylvania	2,689	1,255	1,674	1,087	980	637	622	1,731	1,731	152	69	74	50	42	59	61	84	84
Rhode Island	2,595	1,255	1,674	1,086	980	637	622	1,731	1,731	148	69	74	50	42	59	61	84	84
South Carolina	2,492	1,255	1,665	1,103	974	637	622	1,721	1,721	145	69	73	51	42	59	61	83	83
South Dakota	2,828	1,255	1,589	1,019	927	637	622	1,643	1,643	158	69	75	50	43	59	61	85	85
Tennessee	2,522	1,255	1,665	1,087	974	637	622	1,721	1,721	147	69	73	50	42	59	61	83	83
Texas	3,017	1,255	1,665	1,056	974	637	622	1,721	1,721	166	69	73	47	42	59	61	83	83
Utah	2,844	1,255	1,892	1,243	1,120	637	622	1,956	1,956	159	69	59	40	33	59	61	69	69
Vermont	2,718	1,255	1,674	1,076	980	637	622	1,731	1,731	153	69	74	49	42	59	61	84	84
Virginia	2,675	1,255	1,665	1,085	974	637	622	1,721	1,721	153	69	73	49	42	59	61	83	83
Washington	2,901	1,255	1,892	1,213	1,120	637	622	1,956	1,956	161	69	59	39	33	59	61	69	69
West Virginia	2,221	1,255	1,674	1,093	980	637	622	1,731	1,731	132	69	74	51	42	59	61	84	84
Wisconsin	2,974	1,255	1,589	1,026	927	637	622	1,643	1,643	164	69	75	50	43	59	61	85	85
Wyoming	3,026	1,255	1,892	1,241	1,120	637	622	1,956	1,956	167	69	59	40	33	59	61	69	69

[a] Beef NOF Bull values were used for bison Nex and VS

Source: CEFM

Table A5 Copy of Table A-171 from 2024 GHG Inventory submission[2]: Methane Emissions by State from Livestock Manure Management for 2022 (MMT CO_2e)[a]

State	Beef OF	Beef NOF	Dairy Cow	Dairy Heifer	Swine-Market	Swine-Breeding	Layer	Broiler	Turkey	Sheep	Goats	Horses	Mules and Asses	American Bison	Total
Alabama	0.0006	0.0215	0.0062	0.0001	0.0074	0.0042	0.1689	0.2056	0.0002	0.0003	0.0002	0.0012	0.0001	+	0.4167
Alaska	+	0.0004	0.0001	+	0.0001	+	+	+	+	+	+	+	+	+	0.0007
Arizona	0.0403	0.0091	0.5036	0.0079	0.0571	0.0122	0.0142	+	+	0.001	0.0002	0.0022	+	+	0.6478
Arkansas	0.0021	0.0291	0.0105	0.0002	0.0233	0.037	0.024	0.1515	0.0181	0.0003	0.0001	0.001	0.0001	+	0.2972
California	0.0826	0.0355	6.7126	0.0547	0.0303	0.005	0.0267	0.0437	0.0043	0.006	0.0005	0.0019	0.0001	+	7.0039
Colorado	0.1749	0.0342	0.6186	0.0048	0.0755	0.0596	0.0248	0.0001	+	0.0035	0.0002	0.0027	0.0001	0.0003	0.9992
Connecticut	+	0.0002	0.0742	0.0005	0.0002	0.0001	0.007	+	+	0.0001	+	0.0002	+	+	0.0825
Delaware	+	0.0001	0.0104	0.0001	0.0003	0.0008	0.0035	0.0278	+	+	+	0.0001	+	+	0.0429
Florida	0.0002	0.028	0.3631	0.0024	0.0013	0.0008	0.1061	0.0117	+	0.0003	0.0003	0.002	0.0001	+	0.5166
Georgia	0.0003	0.016	0.3153	0.0019	0.0073	0.0119	0.2232	0.2233	+	0.0003	0.0003	0.0011	0.0001	+	0.8009
Hawaii	0.0001	0.0028	0.0019	0.0001	0.0017	0.0013	0.0004	+	+	0.0002	0.0001	0.0001	+	+	0.0088
Idaho	0.0192	0.0238	3.1071	0.0147	0.0025	0.0025	0.0097	+	+	0.0019	0.0001	0.0011	+	0.001	3.1836
Illinois	0.1517	0.012	0.2914	0.0018	1.2832	0.3453	0.0064	0.0002	0.0008	0.0006	0.0001	0.0008	0.0001	+	2.0944
Indiana	0.0359	0.007	0.4827	0.0027	1.2288	0.1452	0.0386	0.0052	0.0139	0.0007	0.0002	0.0018	+	+	1.9628
Iowa	0.2501	0.0397	0.9743	0.0053	5.628	0.456	0.0434	0.0027	0.0081	0.0019	0.0004	0.0012	+	0.0001	7.4113
Kansas	1.1112	0.067	1.0175	0.0074	0.8313	0.1335	0.0031	+	0.0002	0.0008	0.0002	0.001	+	0.0001	3.1734
Kentucky	0.0011	0.0318	0.1122	0.0017	0.141	0.0347	0.0205	0.0273	0.0002	0.0008	0.0002	0.0031	0.0001	0.0001	0.3748
Louisiana	0.0005	0.0144	0.0211	0.0002	0.0007	0.0003	0.0198	0.0344	+	0.0002	0.0001	0.0009	0.0001	+	0.0927
Maine	+	0.0005	0.0719	0.0006	0.0002	0.0001	0.0054	+	+	0.0002	+	0.0002	+	+	0.0792
Maryland	0.0005	0.0016	0.1341	0.0013	0.0041	0.0011	0.0084	0.0289	0.0001	0.0002	0.0001	0.0008	+	+	0.1812
Massachusetts	+	0.0003	0.0105	0.0003	0.0005	0.0003	0.0002	+	+	0.0002	+	0.0003	+	+	0.0126
Michigan	0.0542	0.0057	1.8343	0.0067	0.2616	0.0522	0.021	0.0012	0.0036	0.001	0.0001	0.0013	+	0.0001	2.243
Minnesota	0.1287	0.0164	1.2603	0.0092	1.7258	0.2326	0.009	0.0047	0.0257	0.0013	0.0001	0.0009	+	0.0001	3.4149
Mississippi	0.0004	0.0158	0.0126	0.0004	0.0338	0.048	0.1075	0.1146	+	0.0002	0.0001	0.0008	0.0001	+	0.3344
Missouri	0.0103	0.0615	0.1742	0.0014	0.9108	0.304	0.019	0.0362	0.0118	0.0012	0.0002	0.0017	0.0001	+	1.5323
Montana	0.0027	0.0504	0.0338	0.0002	0.0264	0.0194	0.0088	0.0001	+	0.0015	0.0001	0.0019	+	0.0007	0.146
Nebraska	0.2577	0.0807	0.3166	0.0013	1.0142	0.278	0.0088	0.001	0.0002	0.0009	0.0001	0.001	+	0.0008	1.9613
Nevada	0.0002	0.009	0.1959	0.0004	+	0.0001	+	+	+	0.0005	+	0.0002	+	+	0.2062
New Hampshire	+	0.0002	0.0292	0.0003	0.0003	0.0001	0.0006	+	+	0.0001	+	0.0002	+	+	0.031

State	Beef OF	Beef NOF	Dairy Cow	Dairy Heifer	Swine-Market	Swine-Breeding	Layer	Broiler	Turkey	Sheep	Goats	Horses	Mules and Asses	American Bison	Total
New Jersey	+	0.0003	0.0117	0.0001	0.0009	0.0003	0.015	+	+	0.0002	+	0.0006	+	+	0.0291
New Mexico	0.0011	0.0177	0.9673	0.0054	0.0001	0.0001	0.0009	+	+	0.0007	0.0001	0.0011	+	0.0001	0.9948
New York	0.0017	0.006	2.3882	0.0153	0.0061	0.0006	0.015	0.0003	0.0002	0.001	0.0001	0.0015	+	+	2.436
North Carolina	0.0004	0.012	0.1368	0.001	3.3677	0.7817	0.1617	0.182	0.0195	0.0006	0.0002	0.0012	0.0001	+	4.6648
North Dakota	0.0152	0.0317	0.0645	0.0003	0.0186	0.017	0.0007	+	0.0005	0.0007	+	0.0004	+	0.0004	0.1502
Ohio	0.0691	0.0121	0.8559	0.0053	0.7084	0.1028	0.0398	0.0129	0.0042	0.0016	0.0002	0.0025	0.0001	+	1.815
Oklahoma	0.0456	0.0779	0.1128	0.0013	0.7342	0.494	0.0342	0.0363	0.0002	0.0009	0.0004	0.0031	0.0002	+	1.541
Oregon	0.0099	0.0207	0.2358	0.0026	0.0011	0.0006	0.0075	0.0021	+	0.0012	0.0002	0.0018	+	0.0001	0.2837
Pennsylvania	0.0052	0.0089	1.172	0.0093	0.3013	0.0684	0.0618	0.0241	0.0054	0.0012	0.0002	0.0018	0.0001	+	1.6597
Rhode Island	+	+	0.0011	+	0.0001	+	0.0001	+	+	+	+	+	+	+	0.0016
South Carolina	0.0002	0.0051	0.0302	0.0004	0.0728	0.0067	0.0378	0.0402	0.0071	0.0002	0.0002	0.0011	0.0001	+	0.202
South Dakota	0.1585	0.0574	0.885	0.0018	0.4545	0.1579	0.0025	+	0.0017	0.0028	0.0001	0.0011	+	0.0006	1.7241
Tennessee	0.0008	0.029	0.0724	0.001	0.1082	0.0246	0.0095	0.029	+	0.0009	0.0004	0.0026	0.0002	+	0.2788
Texas	0.4281	0.169	1.8206	0.0153	0.3943	0.1318	0.0718	0.1218	0.0012	0.007	0.0031	0.009	0.0012	0.0003	3.1744
Utah	0.0015	0.0132	0.2632	0.0023	0.1548	0.0264	0.0409	+	0.0032	0.0022	0.0001	0.0015	+	+	0.5094
Vermont	0.0001	0.0009	0.3469	0.0024	0.0002	0.0001	0.0004	+	+	0.0002	+	0.0002	+	+	0.3515
Virginia	0.0016	0.0201	0.188	0.0017	0.1167	0.0046	0.0048	0.0294	0.0106	0.0009	0.0002	0.0014	0.0001	+	0.3801
Washington	0.0181	0.0114	1.1536	0.0062	0.0019	0.0008	0.0098	0.0029	+	0.0004	0.0001	0.0013	+	+	1.2066
West Virginia	0.0003	0.0063	0.0095	0.0001	0.0001	0.0001	0.0047	0.0084	0.0026	0.0004	0.0001	0.0006	+	+	0.0334
Wisconsin	0.1019	0.0159	3.6958	0.0288	0.0543	0.0189	0.0065	0.0068	0.0022	0.001	0.0005	0.0015	+	0.0002	3.9343
Wyoming	0.0053	0.0263	0.0427	0.0002	0.005	0.0179	0.0001	+	+	0.0027	0.0001	0.0012	+	0.0003	0.1019

+ Does not exceed 0.0005 MMT CO_2e

[a] Accounts for CH_4 reductions due to capture and destruction of CH_4 at facilities using anaerobic digesters.

Table A6 Copied from Table 6 of Lormior et al: Daily manure production and characteristics, as-excreted (per head per day).[13]

	Size[a]	Total Manure[b]			Water[c]	Density[c]	TS[d]	VS[c]	BOD$_5$	Nutrient content		
	lbs	lbs	ft^3	gal	%	lb/ft^3	lb/ day	lb/ day	lb/day	(lbs N)[d]	(lbs P_2O_5)[d]	lbs K_2O
Dairy Calf	150	12	0.18	1.38	88	65	1.4	1.2	0.19	0.06	0.01[c]	0.05
	250	20	0.31	2.3	88	65	2.4	2	0.31	0.11	0.02[c]	0.09
Dairy Heifer	750	45	0.7	5.21	88	65	6.7	5.7	0.69	0.23	0.08[c]	0.23
	1,000	60	0.93	6.95	88	65	8.9	7.6	0.92	0.3	0.1[c]	0.31
Lactating	1,000	111	1.79	13.36	88	62	14.3	12.1	1.67	0.72	0.37[c]	0.4
	1,400	155	2.5	18.7	88	62	20	17	2.34	1.01	0.52[c]	0.57
Dry Cow	1,000	51	0.82	6.14	88	62	6.5	5.5	0.75	0.3	0.11[c]	0.24
	1,400	71	1.15	8.6	88	62	9.1	7.7	1.04	0.42	0.15[c]	0.33
	1,700	87	1.4	10.45	88	62	11	9.3	1.27	0.51	0.18[c]	0.4
Veal	250	6.6	0.11	0.79	96	62	0.26	0.11	0.04	0.03	0.02	0.05[d]
Calf (confinement)	450	48	0.76	5.66	92	63	3.81	3.2	1.06	0.2	0.09	0.16
	650	69	1.09	8.18	92	63	5.51	4.63	1.54	0.29	0.13	0.23
Finishing	750	37	0.59	4.4	92	63	2.97	2.42[d]	0.6	0.27	0.08	0.17
	1,100	54	0.86	6.46	92	63	4.35	3.55[d]	0.89	0.4	0.12	0.25
Cow (confinement)	1,000	92	1.46	10.91	88	63	11	9.38	2.04	0.35	0.18	0.29
Nursery	25	1.9	0.03	0.23	89	62	0.21	0.17	0.06	0.02	0.01	0.01
	40	3	0.05	0.37	89	62	0.33	0.27	0.1	0.03	0.01	0.02
Finishing	150	7.4	0.12	0.89	89	62	0.82	0.65	0.23	0.09	0.03	0.04
	180	8.9	0.14	1.07	89	62	0.98	0.78	0.28	0.1	0.04	0.05
	220	10.9	0.18	1.31	89	62	1.2	0.96	0.34	0.13	0.05	0.06
	260	12.8	0.21	1.55	89	62	1.41	1.13	0.41	0.15	0.05	0.08
	300	14.8	0.24	1.79	89	62	1.63	1.3	0.47	0.17	0.06	0.09
Gestating	300	6.8	0.11	0.82	91	62	0.61	0.52	0.21	0.05	0.03	0.04
	400	9.1	0.15	1.1	91	62	0.82	0.7	0.28	0.06	0.04	0.05
	500	11.4	0.18	1.37	91	62	1.02	0.87	0.35	0.08	0.05	0.06
Lactating	375	17.5	0.28	2.08	90	63	1.75	1.58	0.58	0.17	0.11	0.13
	500	23.4	0.37	2.78	90	63	2.34	2.11	0.78	0.22	0.15	0.18
	600	28.1	0.45	3.33	90	63	2.81	2.53	0.93	0.27	0.18	0.21
Boar[c]	300	6.2	0.1	0.74	91	62	0.57	0.51	0.2	0.04	0.03	0.03
	400	8.2	0.13	0.99	91	62	0.75	0.67	0.26	0.06	0.05	0.05
	500	10.3	0.17	1.24	91	62	0.94	0.84	0.33	0.07	0.06	0.06
Broiler	2	0.19	0.003	0.023	74	63	0.05	0.038	0.011	0.0021	0.0014	0.001
Layer	3	0.15	0.002	0.017	75	65	0.037	0.027	0.008	0.0026	0.0008	0.0012
Turkey (female)	10	0.47	0.007	0.056	75	63	0.117	0.088	0.034	0.0078	0.0051	0.0034
Turkey (male)	20	0.74	0.012	0.088	75	63	0.186	0.139	0.054	0.0111	0.0074	0.0048
Duck	4	0.44	0.007	0.053	73	62	0.118	0.089	0.016	0.0043	0.0034	0.0026
Feeder lamb[c]	100	4.1	0.06	0.5	75	63	1.05	0.91	0.1	0.04	0.02	0.04
horse - Sedentary	1,000	54.4	0.88	6.56	86[d]	62	7.61	6.5	1.52	0.18	0.06	0.06[d]
Horse - Intense	1,000	55.5	0.9	6.7	86[d]	62	7.78	6.6	1.56	0.3	0.15	0.23[d]

TS = total solids; VS = volatile solids; BOD_5 = the oxygen used in the biochemical oxidations of organic matter in five days at 68° F.

[a] Use linear interpolation to obtain values for weights not listed in the table.

[b] Calculated using TS divided by the solids content percentage.

[c] Based on Manure Management Planning System (MWPS) historical data.

[d] Values calculated or interpreted using diet based formulas being considered for the ASAE Standards D384: Manure Production and Characteristics.

NMED EXHIBIT 73

STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT BOARD

IN THE MATTER OF PROPOSED
ADOPTION OF 20.2.92 NMAC –
Clean Transportation Fuel Program **No. EIB 25-23(R)**

NEW MEXICO ENVIRONMENT DEPARTMENT
TESTIMONY OF MICHAEL FORD

I. Demonstration of Experience as Guided by the Resume

Thank you for the opportunity to come speak on the economics of the New Mexico Clean Transportation Fuel Program (CTFP). My name is Michael Ford, and I am a Climate Change Economist with the New Mexico Environment Department's Climate Change Bureau (NMED-CCB). My work focuses on assessing and quantifying the benefits and costs of New Mexico's state initiatives to reduce greenhouse gas (GHG) emissions, meeting with New Mexicans to discuss and gather feedback on how we can best accomplish our environmental goals, and identifying opportunities to develop a statewide workforce with the skills needed for New Mexico to gain an edge in cultivating the new job and investment opportunities that will arise from the energy transition.

I hold a Master's in Public Policy from the University of Chicago Harris School of Public Policy and a Master's in Economics from University of New Mexico. I am also pursuing a PhD in Environmental and Natural Resource Economics from the University of New Mexico. Prior to moving to New Mexico, I worked at the US Energy Information Administration Office of Petroleum, Natural Gas, and Biofuels Analysis. There, I routinely published reports on upstream natural gas and crude oil production and liquid fuels markets, including numerous articles on the

Permian Basin. Later, I worked at the Bureau of Land Management (BLM) Office of Energy, Minerals, and Realty Management. I later moved to New Mexico to work at the Sandia National Laboratory Office of Resilience and Regulatory Affairs, and later as an Economist specializing in Carbon Capture, Utilization, and Storage (CCUS) technologies at Carbon Solutions LLC, doing techno-economic analysis and cost modeling for applying CCUS to stationary emission sources.

II. Overview

I am here today to speak to you about the economic impact of the proposed CTFP rule under the New Mexico Administrative Code (NMAC), Title 20, Chapter 2, Part 92 (20.2.92 NMAC). Although the economic impact of proposed regulations is a high-priority item for any matter before the Environmental Improvement Board (EIB), it is of particular salience for this Revised Proposed New Rule. The CTFP would comprise New Mexico's first-ever environmental market-based program. It would leverage economic measures to reduce the GHG emissions intensity (of New Mexico's transportation sector. As I explain in my testimony, other states that have taken this approach have efficiently achieved mandatory CI reductions in a way that leverages innovation and market forces to maximize program benefits while improving consumer choice and minimizing cost.

I will start by providing an overview of the CTFP. I will describe how the program works and the ways that the Revised Proposed New Rule combines regulatory requirements with novel opportunities that reward regulated parties for finding the most effective and least-cost ways to reduce emissions from transportation fuels produced, imported, or dispensed for use in New Mexico. After highlighting such mechanisms, I will discuss the Revised Proposed New Rule provisions that provide guardrails to protect New Mexico's transportation fuel consumers. I will review existing research on how environmental policies impact retail fuel prices, what implications this research holds for the CTFP, and ways that the Revised Proposed New Rule's retail price effects may differ depending on various factors. Next, I will discuss how modeling in the Benefit Cost Analysis (BCA) from Berkeley Research Group, LLC (BRG) considered these factors in how BRG staff represented and discussed their results, and some broader context about how the CTFP's fuel market effects fit into the bigger picture of how the Revised Proposed New Rule impacts employment, air quality, health outcomes, and GHG emissions in the state. I will put these findings into context and note mechanisms in the Revised Proposed New Rule that channel benefits to low-income and underserved communities while safeguarding them and all New Mexicans from program costs that, while theoretically more than empirically salient in states with CTFP-like policies, remain an important consideration.

III. Program Description

The CTFP implements the Clean Transportation Fuel Standard (CTFS) codified under New Mexico Statutes Annotated (NMSA) 1978, Sections 74-1-3, 7(A)(15), 8(A)(15), and 18.[1] The CTFS mandates a statewide reduction in the CI of transportation fuels to 20 percent and 30 percent below the 2018 baseline by 2030 and 2040 respectively.

The CTFP is a collaborative, technology-neutral, market-based program designed to reduce transportation sector GHG emissions by establishing statewide annual CI targets for transportation fuels produced, imported, or dispensed for use in New Mexico. The CTFP sets a target CI each

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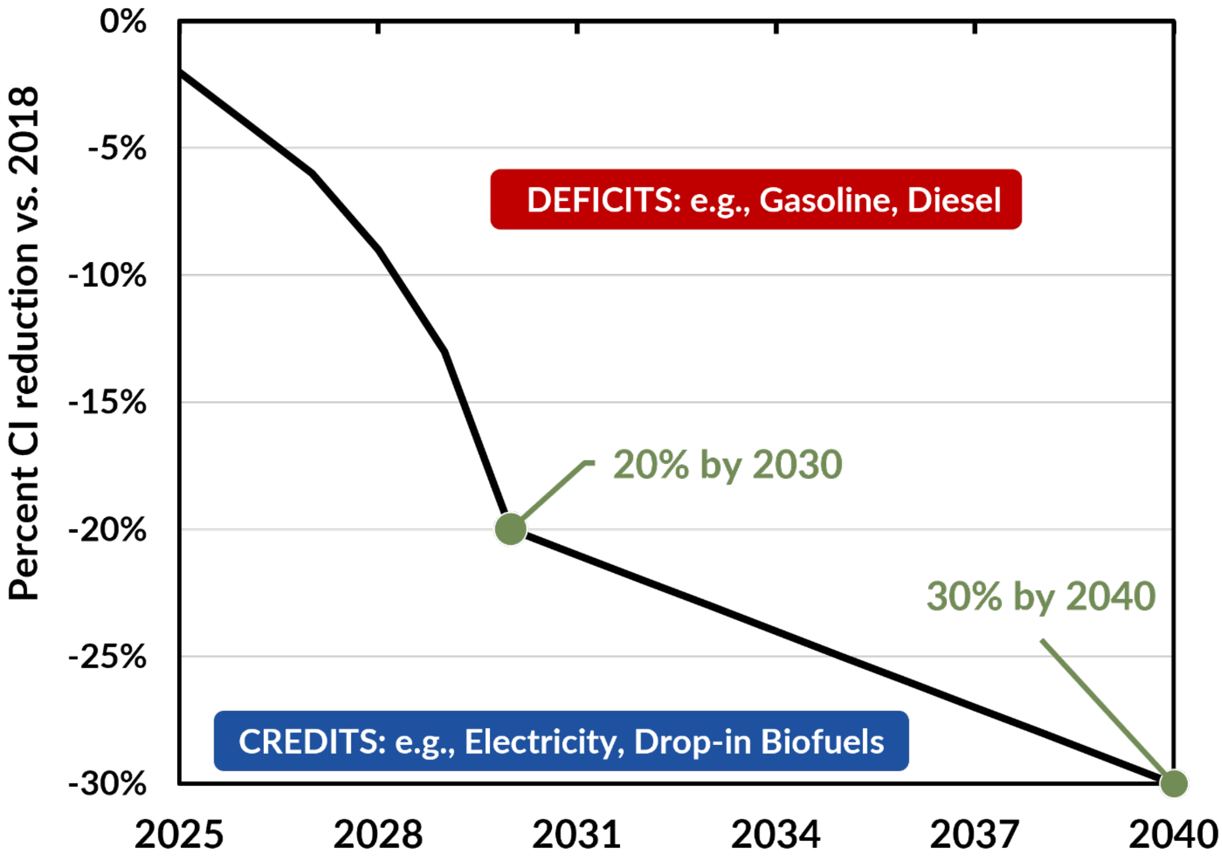
[1] https://nmonesource.com/nmos/nmsa/en/item/4415/index.do#a1.

year for gasoline and gasoline substitutes, diesel and diesel substitutes, and alternative jet fuel. These annual targets establish the schedule of annually decreasing CI for transportation fuel produced, imported, or dispensed for use in New Mexico. This schedule comprises the CTFS and achieves its statutorily mandated CI reduction targets under NMSA 1978, Section 74-1-18(C)(1). Each year, regulated parties producing, importing, or dispensing for use in New Mexico fuels with a CI pursuant to the CTFP that is above the annual target will generate deficits that must be offset by purchasing credits from regulated parties producing, importing, or dispensing for use in New Mexico fuels with a CI pursuant to the CTFP that is below the annual target (or generating those credits themselves through providing lower carbon fuels to New Mexico or other methods discussed in this testimony and the Benefit-Cost Analysis). This requirement ensures compliance with statewide annual CI targets, as shown in **Figure 1** below.

Figure 1. Annual decreases in the statewide carbon intensity (CI) of transportation fuel produced, imported, or dispensed for use in New Mexico under the CTFP with examples of credit- and deficit-generating fuels through 2040



IV. Promoting Competition and Innovation

Competition among regulated parties selling credits provides the incentive for regulated parties to innovate and identify process improvements. Although CTFP credits may come from many different sources, from the standpoint of a deficit generator all credits are identical in that they each offset a metric ton of carbon dioxide equivalent ($MTCO_2e$) emissions of the deficit generator's CTFP compliance obligation. As a result, deficit generators will generally seek to purchase the lowest-cost credits available on the market (in $\$/MTCO_2e$). Credit generators can offer the lowest-cost option by reducing the cost of producing, importing, and dispensing low-CI fuels in use in New Mexico, building the needed infrastructure to do so, improving the GHG reduction of their fuel pathways by lowering their CI footprint, or some combination of these options. This protects credit purchasers from high credit prices and spurs investment to produce, import, or dispense cleaner transportation fuels in New Mexico at a lower CTFP credit price than what others might offer.

In addition, regulated parties producing deficit-generating fuels may protect themselves from the cost of purchasing credits to achieve CTFP compliance in several ways. For one, regulated parties with net deficits may themselves generate credits to reduce their compliance obligation if doing so is more economic than the cost of purchasing a credit. In doing so, they reduce the quantity of credits that they must purchase and retire, limiting their exposure to compliance costs.

In New Mexico, The CTFP seeks to replicate the multitude of compliance options that regulated parties benefit from in West Coast states with CTFP-like policies – California, Oregon, and Washington. Experience in these states shows that credits can come from multiple fuel pathways, as well as credit-generation from non-fuel sources like fuel supply equipment (FSE) stations and other options. The following is a breakdown of the multiple credit-generating pathways available in the three West Coast states with CTFP-like policies:

- The California Low-Carbon Fuel Standard (LCFS), which as of July 1, 2025 had 1,073 active pathways for 15 different alternative transportation fuels from 32 different feedstock types that were produced, imported, or dispensed by 298 different companies from 866 different pathway types.[2,3]

- The Oregon Clean Fuels Program (CFP), which as of July 10, 2025, had 496 active alternative transportation fuel pathways for 14 different transportation fuels produced, imported, or dispensed by 75 different companies;[4,5] and
- The Washington Clean Fuel Standard (CFS), which as of March 7, 2025, had 253 unique alternative fuel pathways produced, imported, or dispensed in the state from 16 different transportation fuels.[6,7]
    - In addition, the Washington CFS had 86 alternative transportation fuel pathways that had received approval from the California and Oregon CTFP-like programs representing five transportation fuel types from 15 different feedstock types.[8]

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[2] California Air Resources Board. "Certified Fuel Pathways" spreadsheet. Last updated July 1, 2025. https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/fuelpathways/current-pathways_all.xlsx.

[3] Filtered to exclude retired pathways, unapproved pathway applications, and pathways for California Blendstock for Oxygenate Blending (CARBOB) and diesel fuel.

[4] State of Oregon Department of Environmental Quality. "Current List of Carbon Intensity Values." Revised date March 8, 2024. https://www.oregon.gov/deq/FilterDocs/cfp-All-CIs.xlsx.

[5] Filtered to exclude gasoline, E10 gasoline, diesel, and B5 diesel.

[6] State of Washington Department of Ecology. "WA Approved Fuel Pathways." Updated March 7, 2025. https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.ezview.wa.gov%2FPortals%2F_1962%2FDocuments%2Fclean-fuel%2FWashington%2520CFS%2520Approved%2520Fuel%2520Pathway%2520Codes%2520-%2520updated%2520Mar%25207%25202025.xlsx&wdOrigin=BROWSELINK.

[7] Filtered to exclude pathways for gasoline and diesel fuel.

[8] State of Washington Department of Ecology. "WA Re-certified Fuel Pathways from CARB or OR-DEQ." https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.ezview.wa.gov%2FPortals%2F_1962%2FDocuments%2Fclean-fuel%2FWA-ECY-Approved%2520CARB%2520or%2520OR-DEQ%2520CertifiedPathways61523.xlsx&wdOrigin=BROWSELINK.

- The Washington CFS had 342 registered parties as of December 17, 2024.[9]

In addition, the three West Coast credit markets have proven to be competitive and highly liquid. The number of credit transfers through the first half of 2025 are on pace to significantly surpass calendar year (CY) 2024 totals for all three states. There were a total 2,688 credit transfers across all three states during January-June 2025: 2,249 in California, 246 in Oregon, and 193 in Washington. California had already reached 61% of its CY2024 total (3,700 transfers), while Oregon and Washington had reached 65% and 87% of their CY2024 totals (381 transfers and 223 transfers, respectively).[10,11,12]

The timing of New Mexico's CTFP adoption will likely allow regulated parties that incur deficits to benefit from fuel pathways that they or other regulated parties have established to generate credits in CTFP-like programs for the three West Coast states. New Mexico might additionally benefit from its closer proximity to alternative fuel production facilities in the Midwestern and Midcontinental United States. This serves pathways from such facilities by both lowering transportation costs and improving the CI of their pathways under the CTFP.

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[9] State of Washington Department of Ecology. "Registered Parties in the Clean Fuel Standard Program." December 17, 2024. Publication 23-02—21. https://apps.ecology.wa.gov/publications/documents/2302021.pdf.

[10] California Air Resourced Board. "Monthly LCFS Credit Transfer Activity Report for June 2025." Posted on 7/8/2025. https://ww2.arb.ca.gov/sites/default/files/2025-07/June%202025%20-%20Monthly%20LCFS%20Credit%20Transfer%20Activity.pdf.

[11] State of Oregon Department of Environmental Quality. "Monthly CFP Credit Transfer Report for June 2025." Posted on 7/7/2025. https://www.oregon.gov/deq/FilterDocs/CFPCreditTransferActivityReport.xlsx.

[12] State of Washington Department of Ecology. "Monthly CFS Credit Transfer Report for June 2025." Posted on 7/11/2025. https://www.ezview.wa.gov/Portals/_1962/Documents/clean-fuel-data/CFSCreditTransferActivityReport_June2025.xlsx.

In addition, the CTFP allows alternative transportation fuel producers, importers, or distributors to “opt in” to the program to generate credits from quantities of supplied fuels below the CTFS when they are not otherwise required to participate. Market incentives will encourage opting in, thus increasing the credit-generating options under the CTFP to offset program deficits feasibly. Opt-in fuels under the CTFP include electricity, renewable natural gas (RNG), renewable liquefied petroleum gas (R-LPG), and alternative jet fuel (AJF).

Opt-in fuels like electricity and regulated fuels like hydrogen will likely benefit from the increased vehicle fleet penetration and fuel demand from zero-emissions vehicles (ZEVs) under the state’s New Motor Vehicle Emissions Standards (NMVES). Such fuels are expected to generate increasing credit quantities over time. Additional credit generating options arise from options through which regulated parties can quickly generate greater credit quantities in response to changes in the credit price. Such “incremental” credit generating options include blending increasing amounts of biomass-based diesels (BBDs) like biodiesel (BD) and renewable diesel (RD) into the pool of fuels serving internal combustion engine (ICE) vehicles, and using innovative, lower-CI pathways for producing, importing, or dispensing for use in New Mexico these fuels and other biofuels like RNG, R-LPG, and ethanol. The CTFP offers further flexibility in credit markets to include other options like generating or purchasing and retiring Renewable Energy Certificates (RECs) that are additional to compliance with renewable portfolio standard requirements to lower the CI of grid-based electricity below their annually assigned CI score, and “project credits” beginning in 2030 for innovative methods to reduce GHG emissions from different parts of the supply chain for deficit-generating transportation fuels.

V. Cost Containment Mechanisms

While providing market incentives that leverage competition and innovation to spur increasingly efficient methods of reducing GHGs to generate program credits, the CTFP also contains regulatory safeguards to protect regulated parties from high prices. These safeguards are most important for low-income and underserved communities in New Mexico whose households spend proportionately more on transportation fuel than the overall average.

The CTFP's cost containment mechanisms include measures to allow for credit banking, which allows regulated parties to generate more credits than are needed for compliance in periods when it is most economical to do so and sell or retire them in later periods when it is less efficient to do so. The availability of such banked credits can protect regulated parties from credit price increases when there are "tight" credit markets (low current credit generation relative to deficit generation). Public knowledge of the size of banked credits systemwide also can provide a buffer against higher credit prices during periods of low credit relative to deficit generation. The opportunity to bank also provides greater assurance to credit generators that they can eventually sell credits generated at present in future periods if necessary or desired and generally serves to smooth out credit price volatility over time.

In addition, NMED at its discretion may defer the CTFP in response to forecasted or emergency conditions. Such conditions include force majeure, credit shortages, supply chain disruptions, or other unforeseen circumstances. For the forecast deferral, a third party would publish by October 1st each year a forecast of the supply of deficit- and credit-generating transportation fuels produced, imported, or dispensed for use in New Mexico. By December 1st each year, the department would use information in this report to decide whether there would be a credit market shortage that requires deferral of the program for the next compliance period. A credit market shortage would occur if projected credit availability during the upcoming compliance period (from both new generation and available bank balances) were insufficient to cover registered parties' anticipated compliance obligation under the CTFS.

If NMED could not anticipate such conditions in advance through the forecast deferral process, the emergency deferral would allow the department to defer compliance. NMED would do so after issuing an emergency declaration in response to a fuel supply emergency. The department would declare a fuel supply emergency if there were extreme or unusual circumstances that could not have been foreseen or prevented. The department would need to decide whether to finalize its emergency determination and commensurate program deferral within 10 days of its initial emergency declaration.

Another important cost-containment measure is the credit clearance market (CCM). During normal credit market operations, credit- and deficit-generating regulated parties identify opportunities with the credits and deficits registered in the CTFP's data management system (CTFP-DMS) to engage in credit transactions. However, if multiple regulated parties could not offset deficits with purchased credits over the course of the compliance period, NMED may declare a CCM by May 1st each year. The CCM effectively works like an open auction and would operate from June 1st until July 31st. During this time, regulated parties with a balance of credits may publicly pledge credits for sale to any regulated party with an outstanding compliance obligation. This facilitates compliance with the statewide CTFS at minimal burden to regulated parties.

To ensure that the CCM is liquid, the CTFP requires that regulated parties holding a credit balance greater than or equal to 10 percent of total CTFP credits, pledge any credit above their 10 percent share into the CCM. Regulated parties must also pledge to the CCM any credit held for more than five years in the CTFP-DMS. The CTFP is the first such program to include a provision of this kind to ensure that regulated parties with net deficits have ample options to achieve program compliance in the CCM. It also protects against the risk of excessive credit market concentration that might otherwise result from regulated parties with a high share of available credits using the CTFP's banking provisions to withhold and carry them into future years. Doing so would create tighter market conditions (low credit supply relative to demand) that would run counter to the intent of the CTFP's banking provisions. The pledging requirements preventing such concentration provide guardrails against market manipulation that could otherwise drive the cost of the program higher than would be justified by supply / demand dynamics for both regulated parties and the public or the future flooding of markets with credits from large bank balances that could serve the opposite objective of deflating credit prices.

When regulated parties pledge credits to the CCM, this does not mean that they must sell their credits, unless they receive a purchase offer equal to the "maximum" CCM credit price. Such regulated parties must agree to sell any credits that they pledge to the CCM for which a buyer offers them the maximum price. In all other cases, these regulated parties would have the option of accepting or declining an offer to purchase the credits that they pledge to the CCM. The CTFP caps the price of credits sold in the CCM at \$270 per $MTCO_2e$ (\$270/$MTCO_2e$) in the initial program year, adjusted for inflation in future years.[13] Although this maximum price applies only to credits bought and sold under the CCM, it provides one option to cap the cost to deficit generators for their compliance obligations. NMED is most likely to declare a CCM under the tight CTFP credit market conditions (low credit supply relative to credit demand) that give rise to high credit prices. In such cases, regulated parties will choose to offset deficits by participating in the CCM before paying a credit price in regular CTFP credit markets that is above the CCM's maximum price.

NMED chose the maximum CCM credit price of $270/MTCO$_2$e based upon the Social Cost of Carbon (SCC) using two-percent discount rate for the first program year of 2026 (in 2026 $US).[14,15,16,17] The SCC measures the net near- and long-term modeled effects on global human well-being from each MTCO$_2$e of GHG emissions. These effects represent a "net harm" that is

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[13] Annual inflation determined using the last 12 twelve months of data from the U.S. Bureau of Labor Statistics Southwest Region Consumer Price Index for All Urban Consumers for All Items.

[14] A discount rate is a rate that helps determine the amount of future benefits or cost savings that are needed to justify spending today to realize them. Often these rates represent foregone returns from such spending that may have been earned if the same amount of money were saved or invested. Such rates compensate investors for the "time value of money" that they do not realize in the present when they choose to forego present benefits and subject themselves to future risk and uncertainty.

[15] For more information, see Prest, Brian C. "Discounting 101: A review of discounting—a concept that helps decisionmakers understand the costs and benefits of choices and policies—and how it applies to climate change." Resources for the Future. January 16, 2020 (Updated February 25, 2022). https://www.rff.org/publications/explainers/discounting-101/.

[16] US Environmental Protection Agency. "Supplementary Material for the Regulatory Impact Analysis for the Final Rulemaking, 'Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review.'" November 2023. Docket ID No. EPA-HQ-OAR-2021-0317. https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf.

[17] Rounded down from $273 /MTCO$_2$e.

equal to the difference between negative and positive future GHG impacts. The SCC considers such impacts across many factors including changes to net agricultural productivity, human health effects, property damage from increased flood risk, changes in the frequency and severity of natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services. Such effects are limited to those with observable data for modeling and are thus not fully comprehensive.[18]

In limiting credit prices in the CCM to the values established by the SCC, NMED ensures that the CTFP's climate benefits always exceed the program's compliance costs. Results from the BCA in Exhibit 79 support this claim, and project that CTFP credits will trade at well below half the SCC throughout the life of the program. It is noteworthy, however, that by setting the maximum CMM credit price to the SCC, the CTFP effectively requires that the program produce a "net social surplus" in which its benefits exceed the cost of compliance.

VI. Retail Price Impacts

A salient topic in states that have implemented CTFP-like programs is the degree to which retail prices incorporate the revenue from credits that regulated parties may sell or the cost of credits that regulated parties must purchase under the CTFP or similar programs. These pass-through rates (PTRs) represent the portion of the CTFP or similar program benefits or costs for transportation fuels that are "passed through" to the fuel's final user. PTRs can be a challenging and contentious topic, particularly in relation to deficit-generating transportation fuels like gasoline and diesel. They are also a topic of particular importance to members of low-income and

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[18] See **Footnote 16**.

underserved communities who stand to benefit from air quality and employment opportunities as well as from Revised Proposed New Rule provisions channeling investment from residential EV charging credit revenue to support decarbonization projects and direct rebates. Proportionately, lower-income households in New Mexico would also proportionately benefit most from the Revised Proposed New Rule's cost containment mechanisms.

In Oregon, passage of House Bill 2017 (HB2017) requires that the Oregon Department of Environmental Quality (OR-DEQ) address retail price impacts by calculating the quantity-weighted price of credits traded each month, and post both these prices and their calculation formulae on the OR-DEQ homepage.[19] The formulae used account only for the program's average credit price, multiplied by the energy units per gallon for gasoline and diesel, respectively, and the degree to which their CIs under the Oregon program exceed the program's annual standard. For each fuel, this provides a cost (7.48 cents per gallon of E10 gasoline and 8.53 cents per gallon of B5 diesel for 2024, respectively) that effectively assumes a 100-percent PTR for both the petroleum fuel and the biofuel in the reference fuel blend.[20]

Similarly, the State of Washington Department of Ecology (WA-ECY) publishes a report on April 15 each year showing the average cost of program per gallon for gasoline and diesel as

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[19] Joint Committee on Transportation Preservation and Modernization. 2017. Relating to Transportation; Prescribing an Effective Date; and Providing for Revenue Raising That Requires Approval by a Three-Fifths Majority. Oregon Revised Statutes. https://olis.oregonlegislature.gov/liz/2017R1/Measures/Overview/HB2017.

[20] Oregon DEQ. 2025. "2024 Annual Cost of the Clean Fuels Program." State of Oregon. https://www.oregon.gov/deq/ghgp/Documents/cfp2024costBene.pdf.

well as total GHG reductions from that state's CTFP-like program.[21] The WA-ECY's formula for the per-gallon cost for gasoline and diesel follows a similar formula as that used by OR-DEQ. As with OR-DEQ, WA-ECY's formula effectively assumes 100-percent PTR on the reference petroleum fuels E10 for the gasoline pool and, in this case, B2.5 for the diesel pool, but not accounting for credit value on blends above this level. WA-ECY's formula results in an estimated CFS cost for 2024 of 0.52 and 0.62 cents per gallon for E10 and B2.5, respectively, or 0.59 and 0.68 cents per gallon when including the cost of an administrative fee for participation in the program.[22]

A 2021 Stillwater Associates analysis used Oil Price Information Service (OPIS) data with credit price calculations that use a full PTR to illustrate the policy incentive associated with higher- and lower-carbon fuels, but cite the role of market dynamics in determining ultimate PTR for retail prices.[23,24]

Commentators, policymakers, and interested parties often cite these studies and reports as indicators of the retail price effect of CTFP-like programs in other states. However, when interpreting these results it is important to keep in mind that the calculations of the CTFP-program

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[21] See paragraph (5) of Section 710 of Chapter 173-424 of Washington Administrative Code (WAC 173-424-710(5). https://app.leg.wa.gov/wac/default.aspx?cite=173-424&full=true#173-424-710.

[22] State of Washington Department of Ecology. "2024 Annual Cost of the Clean Fuel Standard." April 2025. Publication 25-14-025. https://apps.ecology.wa.gov/publications/documents/2514025.pdf.

[23] Oil Price Information Service. A Dow Jones Company. https://www.opis.com/.

[24] Seymour, Kendra. 2021. "Potential Impacts of LCFS-Style Programs on Fuels Markets." Stillwater Associates (blog). February 15, 2021. https://stillwaterassociates.com/potential-impacts-of-lcfs-style-programs-on-fuels-markets/.

impacts that the studies and reports use depend only upon three factors to determine the retail effect of CTFP-like policies on gasoline and diesel fuel:

1. The CI and energy density of gasoline and diesel in each state's program;
2. The annual CI target ; and
3. Observed or assumed credit prices.

The effect of these states' CTFP-like programs on retail gasoline and diesel prices can be calculated with these three pieces of information, if complete pass-through is assumed. This straightforward exercise does not consider the numerous factors at play that will determine the actual effect that program compliance from regulated parties will have on retail transportation fuel, and especially gasoline and diesel prices. Moreover, this approach obscures the major drivers that shape these markets.

Observers, decision-makers, and the public should not consider the information derived from this pass-through calculation in a vacuum. For example, in earlier program years, the difference between the CI for gasoline and diesel fuel and the annual standard is smaller than in later years. When assuming a constant CTFP credit price, this leads to program cost estimates per unit of gasoline and diesel fuel that are smaller in earlier years than in later years. However, as discussed in my testimony, the BCA from Exhibit 79 projects declining future CTFP credit prices as more New Mexicans drive zero-emissions vehicles (ZEVs) that require credit-generating fuels. As the CI standard becomes stricter, the credits from such fuels also increase rapidly and cause the CTFP credit price to decline over the life of the program, as has occurred in California and Oregon. This, in turn, decreases the program cost that is subject to potential pass-through. Some skepticism is thus merited when working with program cost estimates that do not account for dynamic future CTFP price changes. In addition, it is important that they consider the following:

1. The top gasoline price drivers are crude oil costs, distribution and marketing costs and profits, refining costs and profits, and fuel taxes like the federal and state excise tax.
    a. The California Energy Commission found in a 2022 analysis of US Energy Information Administration (US EIA) and OPIS data that these four factors explained 87 percent of the state's retail gasoline prices.[25,26]
    b. Similarly, WA-ECY states in their Annual Cost of the Clean Fuel Standard report that "Factors such as seasonal fluctuations, refinery or pipeline disruptions, and geopolitical events dictate supply and demand, and fuel producers and suppliers use complex, competitive pricing strategies reflecting these varying conditions. Government policies, like the CFS, typically have a minor influence on retail fuel prices compared to global market forces."[27]
    c. A time-series regression analysis by Bates White finds that that crude oil price plus other costs and taxes explained 90 percent of regular gasoline pricing under the California Low-Carbon Fuel Standard (LCFS) from 2011-2022. They find that the remaining 10 percent came from unexplained factors that are not linked to clean fuels policies. In other words, the policy's influence has been within the "noise" of

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[25] California Energy Commission. "Breakdown of California Gasoline Prices." August 29, 2022. https://www.energy.ca.gov/sites/default/files/styles/content_image/public/2022-09/Energy_Insights_GasPrice_OverviewGraphics-05.jpg?itok=erQ8sfdP.

[26] California's CTFP-like policy is one of multiple "Environmental Programs" that when combined accounted for a 6.5-percent total share of the state's gasoline prices.

[27] See **Footnote 22**.

statistical error. The study finds that the remaining 10 percent come from unexplained factors that are not linked to clean fuels policies. [28]

d. In the past, the California Energy Commission has released gasoline and diesel price forecasts that result from a multi-variate regression analysis using historical data on US petroleum fuel prices and California specific factors to outline a range of potential future prices at the pump that would be expected if past relationships persist. In 2021, this regression estimated some non-zero coefficient to the relationship between that state's LCFS policies (and other factors) and gasoline prices, although the coefficient itself is not published.[29]

2. In some cases, transportation fuels at the point of retail sale contain a blend of fuels with various program-determined CIs. For example, diesel fuel sold at a gas station might include both deficit-generating fossil diesel along with biomass-based diesels (BBDs) like biodiesel (BD) and renewable diesel (RD) that have a different CI value and may be credit-generating.

   a. OR-DEQ acknowledges that its 100-percent PTR formula and methodology are conservative, and "result in a likely higher cost per gallon than the real effect on fuel prices in the prior year." In part, they find that this is because, "It does not account for the value of CFP credits being used to lower the cost of the low-carbon

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[28] Cain, Collin. 2022. "Low Carbon Fuels Standards: Market Impacts and Evidence for Retail Fuel Price Effects." Bates White. https://www.bateswhite.com/media/publication/226_BW%20LCF%20Report%20-%20April%202022.pdf.

[29] Van der Werf, Ysbrand. 2021. "California 2021 Fuel Price Forecasts." September 14. https://www.energy.ca.gov/sites/default/files/2021-09/2%20California%20Fuel%20Price%20Forecasts_ADA.pdf.

biofuels being blended into gasoline and diesel for use in Oregon….” beyond ethanol and biodiesel blending used for E10 and B5, respectively. This might include drop-in substitute fuels like renewable diesel (RD) that can directly replace fossil diesel in finished diesel blends, further lowering their CI beyond those assumed in the OR-DEQ calculations.[30] This would reduce net deficits per gallon from such fuels and thus their estimated additional cost resulting from the CFP.

3. As a policy suite, the state's New Motor Vehicle Emission Standard (NMVES) and CTFP improve the availability of ZEV and of alternative fuels for both ZEVs and internal combustion engine (ICE) vehicles. Alternatives to driving gasoline- and diesel-fueled vehicles in general increase consumer choice. Greater consumer choice may in turn limit the degree to which regulated parties can pass the cost of deficit-generating fuels on to retail gasoline and diesel prices.
    a. In its Annual Cost of the Clean Fuel Standard report, WA-ECY notes that, "In reality, a company's ability to pass on its full compliance cost to consumers may be limited by market competition."[31]
    b. Similarly, in its report on California's LCFS, Stillwater Consulting acknowledges that its cost estimates "are added before the fuel reaches the pump and are therefore

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[30] See **Footnote 20**.

[31] See **Footnote 22**.

> subject to competitive forces that might impact the ability [for them] to be passed through to consumers." [32]

In analyzing PTRs, it is important to keep in mind that regulated parties under the CTFP can be involved at various stages of the transportation fuel supply value chain, depending upon who owns the fuel at point of regulation. Often the regulated party for a fuel under the CTFP is not the same party that dispenses the transportation fuel for sale to retail consumers, although there are some exceptions like electricity. It is thus not one but multiple entities within a supply chain that each decide whether and to what degree to pass costs onto their fuel buyers before fuel reaches the ultimate customer, providing multiple degrees of separation depending upon transportation fuel supply logistics and vertical supply chain integration, among other factors.

Understanding the interplay of these different factors to assess the CTFP's ultimate impact on transportation fuel retail prices can prove challenging.

VII. Existing Research on PTRs

In states with a CTFP-like policy, pass-through can occur in the form of benefits to consumers from lower prices for credit-generating transportation fuels or costs to consumers in the form of higher prices for deficit-generating transportation fuels. However, whereas only three other U.S. states have a CTFP-like policy, every U.S. state and territory has some form of tax on gasoline and diesel, in addition to uniform federal tax rates. Most research on PTRs thus focuses on how

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[32] Seymour, Kendra. "Potential Impacts of LCFS-Style Programs on Fuels Markets." Stillwater Associates. February 15, 2021. https://stillwaterassociates.com/potential-impacts-of-lcfs-style-programs-on-fuels-markets/.

they impact prices for gasoline and diesel, the fuels used to establish the CTFS in Tables 1 and 2 from Subsections (a) and (b) of the Revised Proposed New Rule 20.2.92.701 NMAC, respectively.

Research on gasoline and diesel PTRs has often focused on how tax changes and tax holidays impact prices at the pump. Every U.S. state and territory has some form of gasoline or diesel tax in addition to the federal excise tax.[33,34] As a result, the PTR of motor fuel taxes has provided fertile ground for research using panel regressions, difference-in-difference comparisons, and other econometric techniques. A summary of the findings from a sample of these studies is shown in **Table A-1** of the **Appendix**.

Whereas some of these studies examined the ultimate PTR of gasoline and diesel excise taxes, other studies looked at the price responsiveness or "elasticity" of gasoline and diesel demand. Demand price elasticity is not strictly the same topic as PTRs but does measure how willing consumers are to reduce their purchasing of a product in response to its price changing. Demand price elasticity or "$\varepsilon_{demand}^{price}$" is a variable relating the percentage fall/rise in consumer purchasing of a good or service in response to a one-percentage rise / fall in its price. If consumers don't respond much when the price rises, for example if the percentage change in consumer purchasing is less than the percentage change in price, the demand is termed "inelastic." With extremely inelastic demand ($\varepsilon_{demand}^{price}$ near zero), a producer can respond to the cost of a policy

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[33] Walzer, Dan. "Average state tax rates for retail gasoline and diesel fuel flat since January 2024." US EIA. *Today in Energy*. August 20, 2024. https://www.eia.gov/todayinenergy/detail.php?id=62865.

[34] US EIA. "Federal and State Motor Fuels Taxes." Updated January 2025. https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.eia.gov%2Fpetroleum%2Fmarketing%2Fmonthly%2Fxls%2Ffueltaxes.xlsx&wdOrigin=BROWSELINK.

by increasing prices without seeing a significant fall in sales volumes. If demand, on the other hand, changes at least as much as the price in percentage terms, it is called "elastic." With elastic demand ($\varepsilon_{demand}^{price}$ further from zero),[35] suppliers see a greater fall in sales volumes if they respond to the cost of a policy by increasing prices. In such cases, regulated parties must weigh the trade-off between bringing in more revenue per unit if costs are passed on, and the resulting drop off in units sold due to the higher price that they would charge to do so. One can assume that a PTR will be closer to 100-percent when demand is more inelastic, and closer to zero-percent when demand is more elastic.

It is necessary in interpreting these findings to understand how the CTFP qualitatively differs as a policy measure from fuel taxes. The taxes that these studies examine are categorically different than the benefits and costs of the CTFP compliance. Whereas taxes are a payment that regulated parties make to the government, CTFP credit markets are a transfer between regulated parties, where one party's expenditure is another party's revenue. In fact, regulated parties may offset some of their own compliance obligations from producing, importing, or dispensing deficit-generating transportation fuels for use in New Mexico with credits that they themselves generate through methods like blending BBD volumes into their diesel pool, and would have an incentive to do so if they could at a cost lower than the credit value. However, like CTFP compliance obligations, excise taxes are generally levied on the first fuel reporting entity. This makes studies

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[35] Technically $\varepsilon_{demand}^{price}$ is more negative when there is more price elasticity of demand. This is because it measures the change in sales volumes in response to a change in prices. With greater elasticity, sales volumes fall more when prices rise. Because the change in quantity consumed and prices are in opposite directions (sales falling with prices rising), this creates a more negative value for $\varepsilon_{demand}^{price}$ (but greater absolute value) when there is more elasticity.

of excise tax PTRs the closest available analogy due to the similar level at which they are applied in the transportation fuel supply chain.

NMED thus analyzed excise tax studies to glean at least some information on what they may suggest about PTRs from the CTFP. **Table A-1** of the **Appendix** divides these studies into two categories: Studies that directly estimate PTRs and studies that indirectly provide information that is useful for estimating PTRs by estimating $\varepsilon_{demand}^{price}$. Studies on the PTR for gasoline and diesel excise taxes show that there is a wide range of variation in PTRs, in response to numerous factors. For example, Kaufmann (2019) analyzes pre- and post-tax gasoline prices for several states and finds PTRs ranging from 5.9 percent (a 0.059 percentage-point rise in gasoline prices with a one percentage-point rise in taxes) to 354 percent (3.54 percentage-point rise in gasoline prices with a one percentage-point rise in taxes) after the economy fully responds to the tax.[36]

Often and perhaps somewhat counter-intuitively, PTRs are greatest in competitive markets where existing prices are lowest, since suppliers cannot afford to internalize the cost of policy impacts because of already-thin margins. Prices in such markets have reached a point where suppliers must raise them to avoid loss-making, requiring near-full pass-through. Conversely, in less competitive gasoline and diesel retail markets suppliers often charge retail prices that are closer to what the market will bear, even if that is above their cost to supply the product. Where market structure is more monopolistic, consumers are ironically more primed to respond to pass-through by pulling back demand. The starting price in these cases is typically already higher than

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[36] Kaufmann, Robert K. "Pass-through of motor gasoline taxes: Efficiency and efficacy of environmental taxes." Energy Policy. Issue 125. November 10, 2018. https://doi.org/10.1016/j.enpol.2018.10.045.

those of competitive markets. When a new policy comes into play, suppliers that have already priced a good or service at what consumers are willing to pay may see a drop in sales volumes if they attempt to pass its cost through to the prices that they charge. This can result in PTRs that are lower in cases of greater market concentration than in cases where there is more competition between suppliers, because the higher prices prior to the new policy under market concentration lead to relatively greater $\varepsilon_{demand}^{price}$.

The upshot: when gasoline and diesel suppliers are subject to the same policy factors, PTRs will tend to be higher in more competitive gasoline and diesel retail markets and lower in more monopolistic gasoline and diesel retail markets, with most gasoline and diesel markets exhibiting some combination of concentration and competitiveness. PTRs will be higher in more competitive gasoline and diesel retail markets and lower in more monopolistic gasoline and diesel retail markets. This can be readily observed as such markets become more or less competitive in different time periods. For example, Marion and Muehlleger (2011) find PTRs for state and federal gasoline and diesel to be lower during times of high seasonal demand. During these periods, high refinery utilization rates lead to gasoline and diesel suppliers pricing the product at levels that are close to what the market will bear. As a result, they are more likely during these periods to internalize any additional changes to supply costs from variations in tax policy. They find "at least full, and potentially more than full, pass-through of both federal and state diesel and gasoline taxes to consumers", suggesting that gasoline and diesel suppliers could raise retail prices by more than the tax increase itself.[37] However, additional research from Kaufmann (2019) find that fuel taxes

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[37] Marion, Justin and Erich Muehlegger. "Fuel Tax Incidence and Supply Conditions." National Bureau of Economic Research. Working Paper 16863. http://www.nber.org/papers/w16863.

do not always result in more-than-full pass-through, and in fact led to less-than-full pass-through in Washington state.[38]

In addition, PTRs can vary based upon consumer access to markets that are subject to different policies. For example, Hurtado (2023) finds near-full PTRs at gasoline and diesel locations more than 15 miles from a state border. Within 15 miles, however, the study finds that PTRs are close to 100-percent at retail locations on the higher-tax side of a border where fuels are priced closer to cost and 75-percent at locations on the lower-tax sides of the border. On the lower-tax sides, suppliers can earn greater profit margins and can thus afford to internalize some degree of policy cost changes.[39]

Crucially for the CTFP, PTRs also vary based upon consumer ability to forego gasoline and diesel consumption altogether and instead choose other modes of transportation. Spiller, Stephens, and Chen (2017) use 2009 National Household Travel Survey data to model the response of household VMT to gasoline and diesel price changes. They find that living far from an urban center, living in a rural area, and having a longer commute all increase a household's elasticity of demand. Tsvetanov (2024) similarly finds that "isolated rural areas are likely to have a less competitive environment compared to urban centers, leading to less pass-through."[40] Kilian and Zhou (2024) examine $\varepsilon_{demand}^{price}$ during oil price shocks across U.S. states. They also find that

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[38] See **Footnote 36**.

[39] Hurtado, Carlos. "Behavioral Responses to Spatial Tax Notches in the Retail Gasoline Market." March 6, 2023. SSRN: https://ssrn.com/abstract=3469900 or http://dx.doi.org/10.2139/ssrn.3469900.

[40] Spiller, Elisheba, Heather M. Stephens, and Yong Chen. "Understanding the heterogeneous effects of gasoline taxes across income and location." Resource and Energy Economics. Issue 50. July 21, 2017. https://www.sciencedirect.com/science/article/pii/S0928765516302688.

consumer demand is most price elastic in states like New Mexico that are lower-income, have a low urban population share, a high number of vehicles per-capita, and less commuting by transit.[41]

By supporting NMVES and improving the overall availability of ZEVs to New Mexico drivers, CTFP also improves travel options for New Mexicans. This can have the effect of reducing PTRs in New Mexico's transportation fuel markets going forward.[42] Importantly, Spiller, Stephens, and Chen (2017) find that "demand price elasticity for gasoline is positively correlated with the number of vehicles owned by a household."[43] This is, in part, because households owning vehicles with different fuel efficiencies can re-allocate VMT for their trips to vehicles that have relatively greater fuel efficiencies, increasing $\varepsilon_{demand}^{price}$. This responsiveness could conceivably rise due to the CTFP's enactment as part of a suite of policies that provide more households with the option of responding to price changes by reallocating VMT from ICE to ZEV use, although no studies examined consider this explicitly.

Demand price elasticity $\varepsilon_{demand}^{price}$ thus plays a key role in determining PTRs. Numerous factors can impact estimates of $\varepsilon_{demand}^{price}$, including the amount of time over which drivers can respond by purchasing new vehicles or altering travel patterns. This makes it important to distinguish between $\varepsilon_{demand}^{price}$ estimates in the short-/medium-run versus the long-run. For example,

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[41] Lutz, Killian and Xiaoquing Zhou. "Heterogeneity in the pass-through from oil to gasoline prices: A new instrument for estimating the price elasticity of gasoline demand." Journal of Public Economics. 232. March 12, 2024. https://doi.org/10.1016/j.jpubeco.2024.105099.

[42] The need for more travel options is more acute in low-income and underserved communities, which will receive at least half of required reinvestments of revenue from the CTFP's residential electric vehicle charging credits under Paragraph (1) of Subsection (5) of 20.2.92.305 NMAC.

[43] See **Footnote 40**.

Espey (1998) looks at 363 estimates of short-/medium-run $\varepsilon_{demand}^{price}$ and 277 estimates of long-run $\varepsilon_{demand}^{price}$ published over three decades, from 1966 to 1997. This meta-analysis finds a median value for short-/medium-run $\varepsilon_{demand}^{price}$ of -0.23 (a 0.23-percent reduction in the quantity of fuel that consumers purchase for every one-percent increase in price) and a median long-run $\varepsilon_{demand}^{price}$ of -0.43 (a 0.43-percent reduction in the quantity of fuel that consumers purchase for every one-percent increase in price).[44]

Analyzing the large range of estimates found within short-/medium- and long-run $\varepsilon_{demand}^{price}$, respectively, Espey (1998) finds them largely driven by vehicle ownership followed by vehicle fuel efficiency. Models that control for these factors, more amenable to change by commuters over longer time periods, show much more price-inelastic gasoline and diesel demand whereas models that do not show much more price-elastic gasoline and diesel demand. Long-term policies like the CTFP, enacted alongside a projected shift in vehicle ownership by drivetrain type within the state that the NMVES could potentially accelerate, may enhance such relatively high long-run elasticities and ultimately limit PTR effects on gasoline and diesel retail prices.

VIII. PTRs in the BCA

The BCA that BRG staff provide in Exhibit 79 considered complex issues related to transportation fuel markets, GHG reduction, health, and job market / macroeconomic effects associated with the CTFP. The BCA provided in the Report from BRG (*see* Exhibit 79) accounted

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[44] Espey, Molly. "Gasoline demand revisited: An international meta-analysis of elasticities." Energy Economics. Issue 20. 1998. https://www.sciencedirect.com/science/article/pii/S0140988397000133.

for many issues that will shape how New Mexico's transportation fuel markets will look under the CTFP, including:

1. Post-processed projections from Eastern Research Group, LLC (ERG) with Version 5 of the U.S. Environmental Protection Agency (US EPA) Motor Vehicle Emission Simulator (EPA-MOVES5).[45] These projections modeled New Mexico's transportation fleet and vehicle miles traveled (VMT) under both the US EPA Phase-3 multi-pollutant emissions standards,[46,47] as well as New Mexico's New Motor Vehicle Emission Standards (NMVES) that the EIB ratified in late 2023 under NMAC Title 20, Chapter 2, Part 91 (20.2.91 NMAC), as permitted under Section 177 of the U.S. Clean Air Act.[48,49]
2. A lifecycle analysis (LCA) from ERG using the Argonne National Laboratory's Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation, 2023

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[45] US EPA. "MOVES5 Introduction & Overview." Webinar, December 18, 2024. https://www.epa.gov/system/files/documents/2024-12/moves5-webinar-2024-12-18.pdf.

[46] US Environmental Protection Agency. "Final Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles." Other Policies and Guidance. https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-multi-pollutant-emissions-standards-model.

[47] US Environmental Protection Agency. "Final Rule: Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3." Overviews and Factsheets. https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-greenhouse-gas-emissions-standards-heavy-duty.

[48] Office of Law Revision Counsel. New Motor Vehicle Emission Standards in Nonattainment Areas. US Code, laws in effect on May 28, 2025. Vol. 42 USC §7507. https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title42-section7507&num=0&edition=prelim.

[49] New Mexico State Records Center and Archives. "NEW MOTOR VEHICLE EMISSION STANDARDS." New Mexico Administrative Code. Title 20, Chapter 2, Part 91. December 31, 2023. https://www.srca.nm.gov/parts/title20/20.002.0091.html.

Research and Development version (R&D GREET 2023).[50] BRG staff used the results from the lookup tables in the petition draft rule, which in-turn were developed using calculations from ERG, other than for grid electricity CIs, for which BRG staff used projections specific to each electric distribution utility (EDU) service territory and CIs from other CTFP-like programs for BBDs from alternative feedstock.

3. BRG staff developed a transportation fuel and credit markets model ("the FCMM") that combined the fleet/VMT projections under NMVES from item (1) and the transportation fuel pathway CIs from item (2). The transportation fuel markets model used this information to forecast annual deficits from transportation fuel use in New Mexico. It also generated a supply curve to project the clean transportation fuel quantities and credit-generating opportunities that regulated parties could use to generate CTFP credits at different credit prices. The transportation fuel markets model assumed that regulated parties could buy and sell credits for use as offsets to current-year deficits or that they could use these credits for "banking" to offset deficits and achieve CTFP compliance in future years.

Regulated parties may have opportunities under the CTFP to generate credits at a lower cost than those assumed in the transportation fuel markets analysis. The transportation fuel markets analysis only considers that regulated parties may generate credits from the production, import, or distribution for use in New Mexico of regulated fuels listed under Subsection (B) and Paragraphs (1) and (2) of Subsection (C) of the Revised Proposed New Rule 20.2.92.101 NMAC. The BCA

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[50] Wang, Michael, et. al. "Summary of Expansions and Updates in R&D GREET® 2023." Argonne National Laboratory. December 2023. https://www.osti.gov/servlets/purl/2278803/.

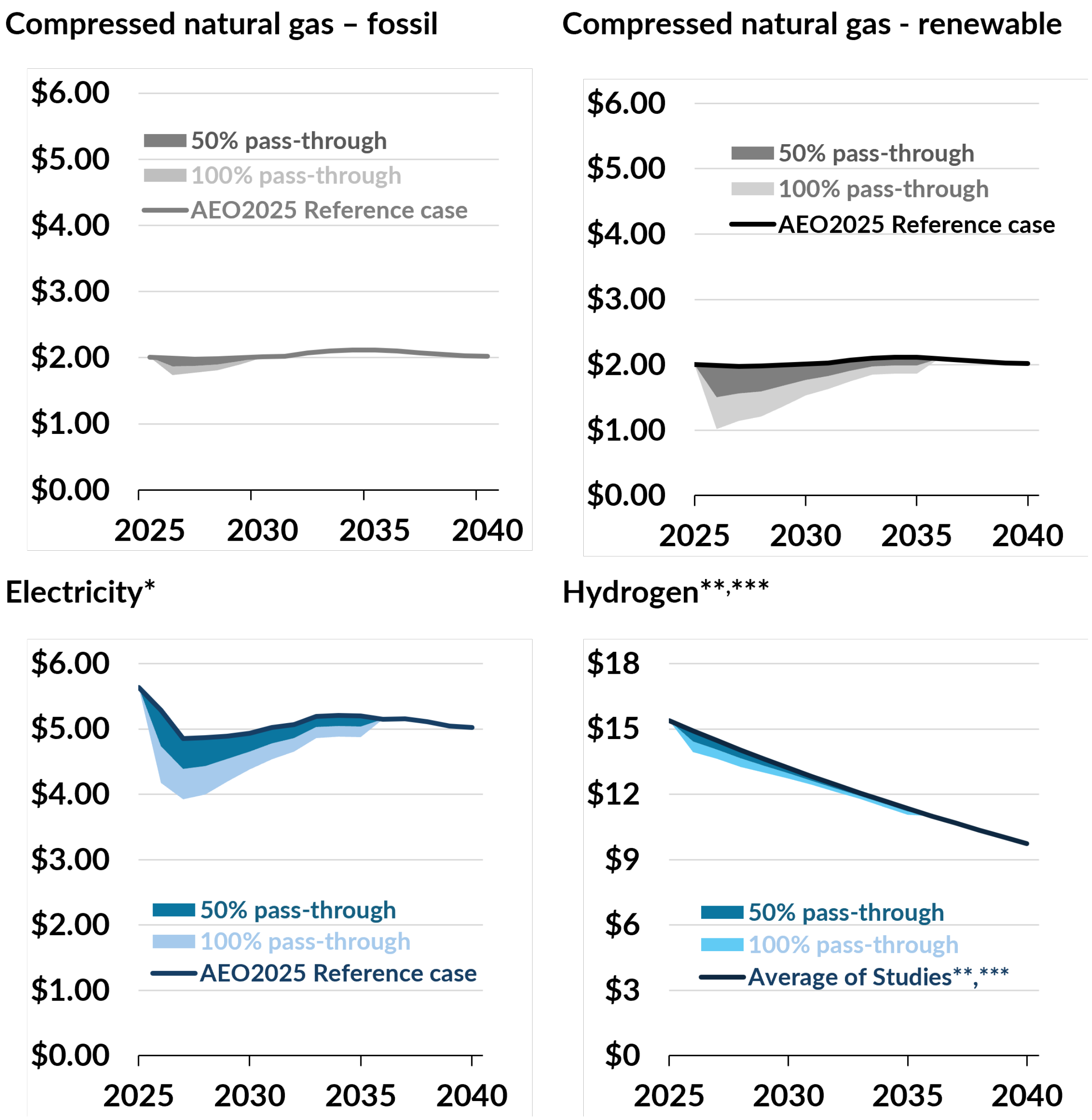
does not consider other credit generating opportunities that regulated parties may realize by supplying innovative transportation fuels or using innovative methods not listed in those parts of the Revised Proposed New Rule. The BCA also does not consider opportunities that regulated parties may have to supply credit-generating transportation fuels to users that are exempt under the Subsection (A) of the Revised Proposed New Rule 20.2.92.102 NMAC but who may opt in to the CTFP under the Subsection (C) of the Revised Proposed New Rule 20.2.92.102 NMAC. The BCA uses upper-bound CTFP compliance cost assumptions that assume regulated parties do not realize such opportunities, even if they reduce CTFP costs.

However, due to the issues noted above, the BCA makes no assumptions about the degree to which regulated parties pass revenue received for credit-generating transportation fuels or costs paid for deficit-generating transportation fuels into the prices paid at retail locations. Rather, for each transportation fuel considered, it depicts in Figures 2 and 3 the following possibilities:

1. Full pass-through (retail fuel prices reflect 100 percent of program effects);
2. No pass-through (program effects do not transfer at all to retail prices), or;
3. Partial pass-through (retail fuel prices reflect 50 percent of program effects).

The BCA then applies these three PTRs to a program cost per GGE for credit- and deficit-generating transportation fuels. For credit-generating transportation fuels, the BCA considers the credits that each fuel earns by year and divides this dollar amount by the annual EER-adjusted energy units of each fuel that regulated parties produce, import, or dispense for use in New Mexico. The BCA represents these credit revenues as a discount on the retail price of each fuel either fully (100-percent PTR), partially (50-percent PTR), or not at all (0-percent PTR), as shown in **Figure 2**.

Figure 2. Changes to credit-generating fuel prices by year from the CTFP compared to the US Energy Information Administration 2025 Annual Energy Outlook Reference case scenario and an average of hydrogen cost from the US National Renewable Energy Laboratory**



Sources: Projection cases from the US Energy Information Administration's (US EIA) 2025 Annual Energy Outlook (AEO2025) report for transportation sector electricity and natural gas in real $2024, converted from million British thermal units (MMBtu) into gallons of gasoline equivalent (GGE) with AEO2025 conversion factor of 0.125 MMBtu / GGE.[51,52] Pass-through rate series assume a percentage of credit purchase values added to projected prices. Pass-through rates converted from $2023 to $2024 using the US Bureau of Economic Analysis Personal Consumption Expenditures index.

Note: Drop-in substitute biofuels for gasoline and diesel fuels consumed in internal combustion engine (ICE) vehicles such as ethanol and biomass-based diesels (BBDs) like biodiesel (BD) and renewable diesel (RD) will also generate credit revenue under the CTFP. However, commuters purchase these fuels at retail locations as part of their final blended pool of motor gasoline and diesel fuel, respectively.[53] This analysis subsumes the effect of any such revenues in the finished gasoline and diesel prices shown in **Figure 3**. That figure uses prices for finished US gasoline and diesel, and the policy's estimated effect on these fuels in **Figure 3** is inclusive of biofuels that regulated parties blend into the state's gasoline and diesel pool.

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[51] https://www.eia.gov/outlooks/aeo/data/browser/#/?id=3-AEO2025&region=1-0&cases=ref2025~highprice~lowprice&start=2023&end=2050&f=A&linechart=~~~~~~~~~~~~~~~~~~~~~ref2025-d032025a.32-3-AEO2025.1-0~highprice-d032525b.32-3-AEO2025.1-0~lowprice-d032125a.32-3-AEO2025.1-0~~~~ref2025-d032025a.34-3-AEO2025.1-0~highprice-d032525b.34-3-AEO2025.1-0~lowprice-d032125a.34-3-AEO2025.1-0&map=ref2025-d032025a.3-3-AEO2025.1-0&sourcekey=0.

[52] 5.253 MMBtu / barrel of finished conventional gasoline: https://www.eia.gov/outlooks/aeo/data/browser/#/?id=20-AEO2025&region=0-0&cases=ref2025~highprice~lowprice&start=2023&end=2050&f=A&linechart=~~~~~ref2025-d032025a.77-20-AEO2025&map=&ctype=linechart&sourcekey=0. Multiplied by 1 barrel / 42 gallons (https://www.eia.gov/energyexplained/units-and-calculators/) = 0.125 MMBtu / GGE.

[53] Particularly for BBDs, credit revenue will partially cover the incremental costs associated with producing, importing, or dispensing fuel quantities for use in New Mexico. To the degree that this occurs, such revenues would not be available for pass-through to the consumer or buffering profits for regulated parties.

Note: RNG graph assumes that baseline prices for RNG as a transportation fuel equal baseline fossil CNG due to the large amount of available revenue under the federal RFS.

*In New Mexico, electric distribution utilities (EDUs) only change electricity rates with approval from the New Mexico Public Regulatory Commission (NM-PRC) pursuant to NMSA 1978 Section 62-8-7.[54] In addition, the CTFS retains under Paragraph 5 of Subsection C of 74-1-18 that those EDUs that are investor-owned utilities (IOUs) may adjust rates as needed to cover costs of their Transportation Electrification Plans (TEPs) pursuant to NMSA 1978 Section 62-8-12.[55] However, the CTFS requires in that paragraph that EDUs reinvest all CTFP credit revenues minus administrative costs into distribution, grid modernization, infrastructure and other projects that support transportation decarbonization, with at least 50 percent of this investment in low-income and underserved communities.[56] This analysis considers all such investments, including those made by IOUs, to be additional to those planned under TEPs. Absent the CTFP, this analysis assumes that IOUs or other EDUs may either not have made such investments or made them as standalone projects that could be subject to rate recovery. In either case, the CTFP results in IOUs or other EDUs passing value through to BEV and PHEV drivers with CTFP credit revenue.

**Annual hydrogen costs come from a linear interpolation between current (2025) and future (2050) expected costs from the US National Renewable Energy Laboratory (NREL) 2024

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[54] https://nmonesource.com/nmos/nmsa/en/item/4407/index.do#62-8-7.

[55] https://nmonesource.com/nmos/nmsa/en/item/4407/index.do#62-8-12.

[56] https://nmonesource.com/nmos/nmsa/en/item/4415/index.do#74-1-18.

Annual Technology Baseline (NREL-ATB 2024) data browser for hydrogen used in transportation.[57]

***Current (2025) hydrogen costs are an average of four data points: The upper- and low-bounds of cost ranges from the NREL-ATB 2024's high- and low- hydrogen production cost scenarios, respectively.[58] This same general method also produces an average projected future (2050) cost of producing hydrogen using the upper- and lower-bounds of future rather than current high- and low- hydrogen production cost ranges from NREL-ATB 2024.[59]

In addition to generating credit revenue, the CTFP imposes a compliance cost to deficit-generating fuels to pay for these credits, as shown in **Figure 3**. Such fuels include fossil gasoline

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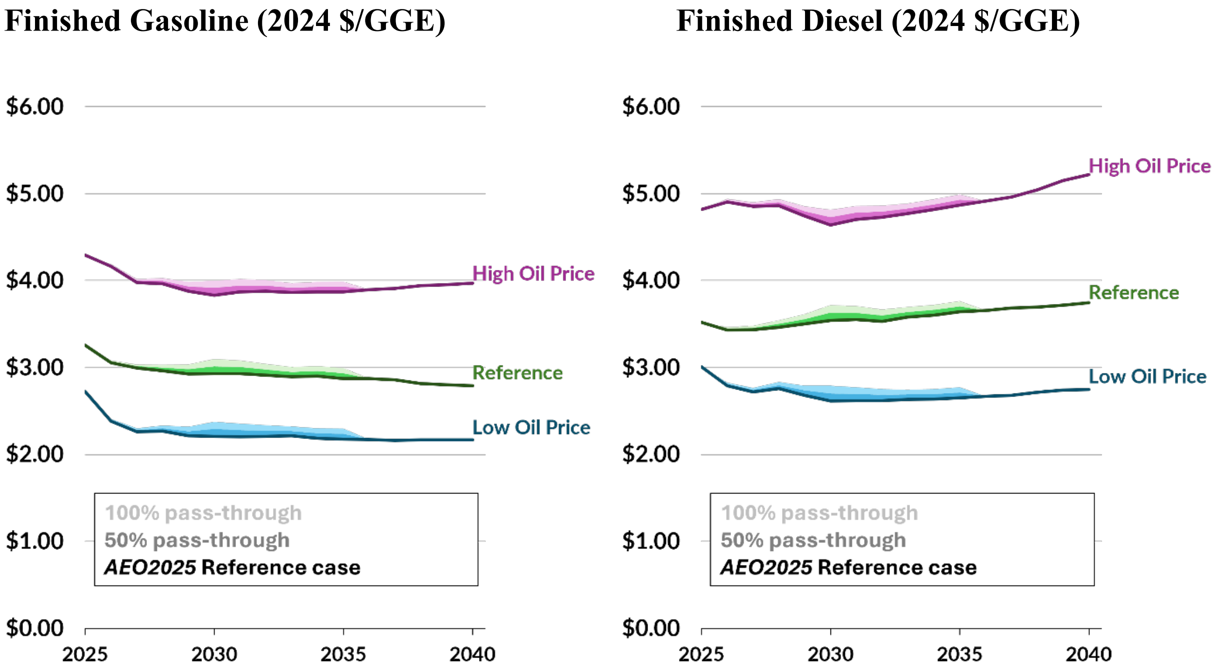
[57] https://atb.nrel.gov/transportation/2024/Hydrogen.

[58] In both the high- and low-cost scenarios for current costs, the lower-bound is for hydrogen produced using steam methane reforming with no carbon capture and storage (SMR, no CCS) from the US Department of Energy's May 2024 Hydrogen Fuel Cell and Technologies Office Multi-Year Program Plan (https://www.energy.gov/sites/default/files/2024-05/hfto-mypp-2024.pdf), and the upper-bound is for hydrogen produced from low-temperature proton-exchange membrane (PEM) electrolysis from NREL's October 2024 Hydrogen Analysis Lite Production Model (https://www.nrel.gov/hydrogen/h2a-lite-download). Across all current cases, assumed delivery costs come from US Department of Energy's May 2024 Hydrogen Program Record for Clean Hydrogen Production Cost Scenarios with PEM Electrolyzer Technology (https://www.hydrogen.energy.gov/docs/hydrogenprogramlibraries/pdfs/24005-clean-hydrogen-production-cost-pem-electrolyzer.pdf?sfvrsn=8cb10889_1).

[59] In the low-cost scenario for future costs, the lower-bound comes from both hydrogen from steam methane reforming with carbon capture and storage (SMR, CCS) and PEM electrolysis and the higher bound comes from SMR, no CCS, all from the US Department of Energy's May 2024 Hydrogen Fuel Cell and Technologies Office Multi-Year Program Plan (https://www.energy.gov/sites/default/files/2024-05/hfto-mypp-2024.pdf), which also provides estimated delivery costs. In the high-cost scenario for future costs, the lower-bound comes from the cost of hydrogen produced from SMR, no CCS and the upper-bound comes from SMR, CCS projected from NREL's October 2024 Hydrogen Analysis Lite Production Model (https://www.nrel.gov/hydrogen/h2a-lite-download), with delivery costs from Bracci, Justin, Mariya Koleva, and Mark Chung. "Levelized Cost of Dispensed Hydrogen for Heavy-Duty Vehicles." National Renewable Energy Laboratory (NREL), Golden, CO (United States), March 5, 2024. https://doi.org/10.2172/2322556.

and diesel. Regulated parties producing, importing, or dispensing such fuels for use in New Mexico must purchase CTFP credits to offset any balance of deficits annually. Under the assumption that sellers of high-CI transportation fuels raise finished gasoline and diesel retail prices to cover CTFP credit expenditures (100-percent PTR), they see no change in profit margins as a result of the policy because they pass its full cost on to consumers in the form of retail price increases. The opposite occurs under 0-percent PTR, in which regulated parties fully absorb program costs in the form of lower profit margins while retail prices are unaffected. Once again, a 50-percent PTR assumption interpolates between these scenarios, with CTFP expenditures borne in equal measure by regulated parties and consumers.

Figure 3. Retail gasoline and diesel prices relative to US EIA AEO2025 oil price scenarios under 0-, 50-, and 100-percent assumed PTR of CTFP credit expenditures to the price of product supplied, 2025-2040 (US $2024 / GGE)



Finished Gasoline (2024 $/GGE)

Finished Diesel (2024 $/GGE)

Sources: Projection cases from the AEO2025 report.[60] Pass-through rate series assume a percentage of credit purchase values added to projected prices. Pass-through rates converted from \$2023 to \$2024 using the US Bureau of Economic Analysis Personal Consumption Expenditures index.

Calculation for the 100-percent PTR assumption for gasoline and diesel prices shown in **Figure 3** follow the same method as that employed by WA-ECY and OR-DEQ, using a projected biofuels blending rate of ethanol and biodiesel in finished gasoline and finished diesel, respectively, with those projections based on observed data. The BCA assumes that regulated parties producing, importing, or dispensing gasoline and diesel for use in New Mexico must fully offset all deficits from finished fuels with credits purchased at each year's average annual credit price. As for the WA-ECY and OR-DEQ calculations, the per-GGE cost of compliance for these fuels uses the energy density and CI values of reference fuel biofuel blends (E10 and Bx1 in the case of WA-ECY / Bx2 in the case of OR-DEQ) each year to calculate deficits per GGE sold. Multiplying this by each year's average credit price produces the annual per-GGE cost of CTFP compliance for each fuel.

The calculations to derive a \$/GGE compliance cost are sensitive to time. As noted in the **Retail Price Impacts** subsection, these calculations account only for each fuel's program-determined CI and energy density, the annual CI standard, and each year's average credit price. From one year to the next, the most important factor affecting the calculated \$/GGE compliance cost is the CI standard and the credit price.

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[60] https://apps.bea.gov/national/pdf/SNTables.pdf#page=4.

To illustrate how this affects outcomes, in Oregon where the 2024 CI standard was 90.21 gCO_2e/MJ for finished (e10) gasoline, regulated parties incurred a deficit per MJ of gasoline of 98.06 – 90.21 = 7.85 gCO_2e/MJ. This deficit, equal to 0.929 kilograms of CO_2e per GGE ($kgCO_2e/GGE$, or 0.000929 $MTCO_2e/GGE$), and an average 2024 credit price of \$80.51/$MTCO_2e$, led to a final cost of 7.48 cents per GGE.[61] By contrast, the 2024 CI standard in Washington state was 97.97 gCO_2e/MJ for finished (e10) gasoline, leading to a deficit of only 98.93 – 97.97 = 0.96 gCO_2e/MJ (or 0.000113 $MTCO_2e/GGE$), and the credit price was only \$45.92/$MTCO_2e$. As a result of both the lower deficit per unit of gasoline and the lower credit market price the final 2024 program cost in Washington was 0.59 cents per GGE,[62] less than one-tenth of Oregon's that year.

Similarly, the BCA's projected per-GGE CTFP costs for gasoline and diesel in New Mexico are highly sensitive to each year's CI standard and credit market prices. The CI standard reductions happen steadily from 2026 through 2035, causing a gradual increase in the deficits generated per unit of gasoline and diesel fuel produced, imported, or dispensed for use in New Mexico.[63] As discussed in testimony from Mr. Drews in Exhibit 76, CTFP credit prices decline gradually at first and then rapidly as fuels that are fleet- rather than credit-dependent satisfy an increasing amount of the program's compliance obligation.

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[61] See **Footnote 20**.

[62] See **Footnote 22**. Note also that the WA result includes an administrative fee imposed by the program, spread over reported program energy.

[63] CI reductions also continue from 2036-2040. However, the growth in credits from EV adoption as well as banked credits from previous compliance periods are sufficient to fully satisfy outstanding compliance obligations over this period, such that there is no demand for additional CTFP credits from regulated parties and the CTFP credit price is zero.

CTFP program costs from 2026-2040 average 6.8 cents per GGE of gasoline and 7.3 cents per GGE of diesel, respectively, assuming a 100-percent PTR (or 3.4 and 3.6 cents per GGE of gasoline and diesel, respectively, assuming a 50-percent PTR). CTFP per-GGE compliance costs peak in 2030 at 16.9 and 17.5 cents per GGE of gasoline and diesel, respectively, assuming a 100-percent PTR (or 8.4 and 8.7 cents per GGE of gasoline and diesel, respectively, assuming a 50-percent PTR).

It is apparent from **Figure 3** that even at the peak program impact with a 100-percent PTR, CTFP program costs would amount to less than one-third of the difference in projected retail gasoline prices between the US EIA AEO2025's Low Oil Price and Reference cases, respectively, and less than one-quarter of the difference between the Reference and High Oil Price cases (for retail diesel, these differences are less than one-fourth and one-fifth, respectively). This underscores the relatively small role that environmental policies like the CTFP play among the factors that ultimately shape gasoline and diesel prices, even under a suite of maximum-impact assumptions. Further, the $0.168/GGE peak program gasoline cost, assuming 100-percent pass through is less than one-sixth of the $1.075/gallon average, annual range of weekly US retail gasoline prices from 1995-2024 (in $2024).[64,65,66]

After 2030, CTFP credit prices fall more rapidly than the deficits per GGE of gasoline and diesel rise due to the declining standard. If some of the BCA's intentionally conservative (high-cost) credit market assumptions do not pan out, these costs could be an over-estimation of the CTFP's ultimate retail price impacts. This analysis leans much more towards over- than under-estimation due to the assumptions noted here and listed in **Appendix B.8** of the BCA.

IX. Targeting GHG Reductions in the CTFP

As noted in the **Cost containment mechanisms** section, NMED chose the maximum CCM credit price for the Revised Proposed New Rule of $270/MTCO$_2$e, based upon the Social Cost of Carbon (SCC) using two-percent discount rate for the first program year of 2026 (in 2026 $US). However, the importance of the SCC to the CTFP extends beyond the maximum credit price for the CCM. It also quantifies the total benefit of reducing GHG emissions, which is the program's primary objective. The credits or deficits that each regulated party incurs are a product of its CI

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[64] Calculated with data from the US Energy Information Administration. "Weekly U.S. Regular All Formulations Retail Gasoline Prices (Dollars per Gallon)." Source key EMM_EPMR_PTE_NUS_DPG. https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMM_EPMR_PTE_NUS_DPG&f=W.

[65] Adjusted from nominal to real 2024$ using the US Bureau of Labor Statistics Consumer Price Index for all Urban Consumers (BLS, CPI-U) for the U.S. Census Bureau's Mountain Region (Series ID CUUR0480SA0) for 2018-2024. Adjustments prior to 2018 made using annual changes in the BLS, CPI-U for all Urban Consumers, US city average (Series ID CUUR0000SA0).

[66] The difference in weekly averages over the course of a year will be less than the difference in daily prices, understating the true degree to which routine price changes exceed projected CTFP program costs, even when assuming a 100-percent PTR.

compared to the energy- and energy economy ratio- (EER-) adjusted quantity of transportation fuel that they replace (gasoline, diesel, or jet fuel, respectively). If a transportation fuel reduces GHG emissions to a degree that is greater than that required by each year's standard then the transportation fuel is credit-generating, and if it reduces GHG emissions to a degree that is less than the CTFS then it is deficit-generating. All credits and deficits under the CTFP are thus directly linked to each fuel's pathway's GHG impact as assessed by the program. Further, the CTFP's requirement that every regulated party fully offset deficits with credits ensures that the overall CI of transportation in New Mexico aligns with the annual CI standard, ensuring that CTFS targets are met each year.[67]

This testimony has examined how the Revised Proposed New Rule's market and regulatory cost containment mechanisms help to minimize any program costs associated with achieving the program's main objective of GHG emission reductions. However, it is important in this discussion to keep in mind the well-founded reasons and supporting body of work for making such GHG reductions the program's primary objective. Many of the communities that would most benefit from the protections afforded by the CTFP's cost containment mechanisms and its cost-limiting provisions to spur competition and innovation are also the most vulnerable to impacts of climate change like drought, heatwaves, reduced snowpack, and wildfires. The CTFP is part of a comprehensive suite of policies that New Mexico has taken to address this. See the testimony of

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[67] If regulated parties do not have enough credits to retire to satisfy their compliance obligation at the end of a compliance market, then they may be subject to enforcement actions. If the regulated party retains any unmet deficits, they shall carry this balance into the next compliance period, with the department able to increase their unmet deficit total by five percent.

Mr. John Koupal for additional detail on climate change impacts in New Mexico and the need for the state's proactive approach towards reducing GHG emissions.

The following sections focus on the BCA's modeling and findings regarding the CTFP's impact on reducing GHG emissions from New Mexico's transportation sector, as well as its effects on air quality, health, employment, and fuel markets in New Mexico.

X. Modeling CTFP Program Impacts

Prior to the CTFP, the EIB ratified in late 2023 the state's adoption through 2032 of NMVES under the New Mexico Administrative Code (NMAC), Title 20, Chapter 2, Part 91 (20.2.91), as permitted under Section 177 of the U.S. Clean Air Act. NMVES will require manufacturers to increase the proportion of zero-emissions vehicles (ZEVs) delivered to dealerships in the state.

A "three-legged stool" dynamic exists for decarbonizing transportation sector emissions in New Mexico and elsewhere. These legs are, respectively, the transportation fleet, vehicle miles traveled (VMT), and fuel mix. Changes to any of these three factors will have a greater or lesser effect depending upon the degree to which they are supported by the two other legs. For example, CTFP can augment ZEV deliveries into New Mexico because it will incentivize the fueling infrastructure that can help make it easier for consumers to buy ZEVs ("transportation fleet leg") and use them for longer and more frequent trips ("VMT leg").

Similarly, NMVES can augment the effects of the CTFP. For example, a reduction in the CI value of transportation fuels used in ZEVs that is incentivized under the CTFP ("fuel mix leg") will reduce overall GHG emissions in New Mexico to a greater degree as a result of greater ZEV penetration into New Mexico's vehicle fleet under NMVES ("transportation fleet leg") and their greater resultant use for on-road travel ("VMT leg").

The mutual co-dependency between the CTFP and NMVES outlined under the "three-legged stool" analogy exists in relation to the use of ZEV vehicles and fuels. In addition, the CTFP can compel decarbonization of New Mexico's vehicle fleet with associated benefits as a standalone policy, in areas that do not overlap with NMVES. Gauging the CTFP's full effect can be difficult because of its overlap with NMVES.

To account for any causal uncertainty associated with attributing impact to the CTFP and NMVES, BRG staff developed and used the Fuel and Credit Markets Model (FCMM) for the BCA in Exhibit 79. BRG used the FCMM to analyze the CTFP's effect under two scenarios: An "NMVES + CTFP" policy suite scenario and a "CTFP-only" scenario. To derive CTFP effects under these two scenarios, the FCMM allowed BRG staff to analyze projections under three different policy assumptions:

1. A "Federal baseline" projection in which neither the NMVES nor the CTFP is enacted and the assumed effective policy is the latest US Environmental Protection Agency (EPA) national standard: The 2024 Multipollutant Rule for light-duty

vehicles (LDVs) and the 2024 Phase 3 Rule for medium and heavy-duty vehicles (MHDVs).[68,69]

2. An "NMVES baseline" in which the NMVES is effective in New Mexico; and
3. A scenario in which New Mexico enacts the CTFP alongside the NMVES.

BRG staff ran the FCMM under three policy projections to determine the CTFP's effect under two scenarios described below and illustrated for GHG reductions in **Figure 4**:

1. An "NMVES + CTFP" policy suite scenario. NMVES + CTFP considers the difference between policy projections (3) and (1). This provides an upper-bound estimate of the CTFP's impact across all model results, because it attributes to the CTFP emissions reductions from its effect as a standalone policy and as a policy that fully supports NMVES as part of the "three-legged stool" as discussed above; and
2. A "CTFP-only" scenario that looks at the program's impact as the difference between policy projections (3) and (2). This provides a lower-bound estimate of the CTFP's effect, because it considers the CTFP as a standalone policy with no consideration of its role in supporting NMVES.

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[68] US Environmental Protection Agency (EPA), Office of Transportation and Air Quality (EPA-OTAQ), "Final Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," Other Policies and Guidance, April 18, 2024, https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-multi-pollutant-emissions-standards-model.

[69] US EPA OTAQ, "Final Rule: Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3," Overviews and Factsheets, March 29, 2024, https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-greenhouse-gas-emissions-standards-heavy-duty.

For the Federal Baseline (policy projection 1) and the NMVES Baseline (policy projection 2), BRG staff ran the FCMM using underlying projections for both VMT and vehicle population with output from Version 5 of the US Environmental Protection Agency (EPA) Motor Vehicle Emission Simulator (MOVES5) model. MOVES5 is a publicly available, peer-reviewed mathematical model that estimates air pollution from vehicles and nonroad equipment.[70] MOVES5 runs use databases developed for each of New Mexico's 33 counties using US EPA National Emissions Inventory (NEI) data. MOVES5 projects VMT and population using growth factors developed by the US Department of Transportation - Federal Highway Administration (US FHWA).[71]

For the Federal Baseline (policy projection 1), BRG staff incorporated results into the FCMM that ERG staff provided using the MOVES5 model default, in which new sales must only meet criteria established under the US EPA Light- and Medium-Duty Multi-Pollutant Rule and Heavy-Duty Greenhouse Gas Emissions-Phase 3 Rule;[72,73] For the NMVES Baseline (policy projection 2), BRG staff used the FCMM to model a scenario that additionally accounts for New

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[70] US EPA. "MOVES5 Introduction & Overview." Webinar, December 18, 2024. https://www.epa.gov/system/files/documents/2024-12/moves5-webinar-2024-12-18.pdf.

[71] US FHWA. "2024 FHWA Forecasts of Vehicle Miles Traveled (VMT)." https://www.fhwa.dot.gov/policyinformation/tables/vmt/vmt_forecast_sum.cfm.

[72] US Environmental Protection Agency. "Final Rule: Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3." Overviews and Factsheets. https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-greenhouse-gas-emissions-standards-heavy-duty.

[73] US Environmental Protection Agency. "Final Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles." Other Policies and Guidance. https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-multi-pollutant-emissions-standards-model.

Mexico's New Motor Vehicle Emission Standards (NMVES) passed in late 2023 under 20.2.91 NMAC, as permitted under Section 177 of the federal Clean Air Act.[74,75]

MOVES5 runs under the NMVES Baseline assumed that the same number of new vehicle sales and VMT by vehicle type would occur as under the Federal Baseline. However, the NMVES Baseline assumed that ZEVs would replace internal combustion engine (ICE) counterparts as a percentage of new vehicle sales as needed for the ZEV percentage of new sales each model year (MY) under the NMVES Baseline to equal NMVES ZEV delivery requirements. The NMVES Baseline further assumed that VMT per vehicle for ZEVs would equal that of the ICE counterparts that they replaced for each vehicle class.

For the CTFP policy projection (policy projection 3), BRG staff ran the FCMM assuming that all GHG reductions under the NMVES Baseline would occur from the consumption of "vehicle-specific fuels" needed to facilitate the use of ZEVs under NMVES. Such fuels (like electricity, hydrogen, and others) are predominantly credit-generating under the CTFP because they have a program carbon intensity (CI) that is below the CTFS each year. This is particularly the case after accounting for their energy economy ratio (EER) when used in ZEV vehicles compared to their ICE counterparts.

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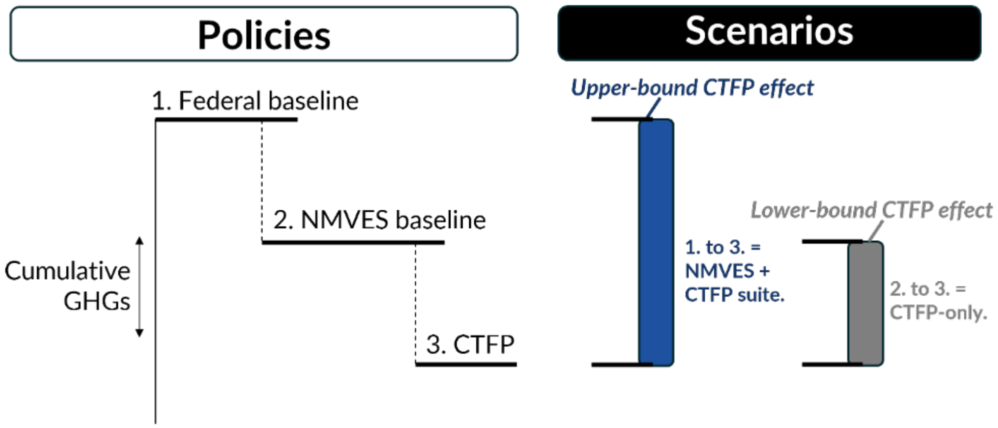
[74] Office of Law Revision Counsel. New Motor Vehicle Emission Standards in Nonattainment Areas. US Code, laws in effect on May 28, 2025. Vol. 42 USC §7507. https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title42-section7507&num=0&edition=prelim.

[75] New Mexico State Records Center and Archives. "NEW MOTOR VEHICLE EMISSION STANDARDS." New Mexico Administrative Code. Title 20, Chapter 2, Part 91. December 31, 2023. https://www.srca.nm.gov/parts/title20/20.002.0091.html.

Using vehicle travel and fuel consumption from MOVES5 runs under the NMVES Baseline (policy projection 2), BRG staff calculated in the FCMM both deficits that occur from the use of deficit-generating fuels and credits from vehicle-specific credit-generating fuels each year under the CTFP (policy projection 3). Additional GHG reductions under the CTFP occur from "drop-in" fuels that can be used in traditional ICE vehicles. BRG staff then determined in the FCMM the additional credits that regulated parties would need to generate from such fuels each year, and models the fuel quantities and credit prices that would be needed from such fuels and other "incremental" credit-generating options to achieve CI targets each year.

Figure 4. Illustrative diagram of the policies and scenarios analyzed for cumulative GHG emissions over a projection period



1. MOVES5 runs with federal Phase-3 Multi-Pollutant Rule
2. MOVES5 runs with NMVES ZEV requirements
3. Fuel markets model applied to NMVES fleet + VMT

Note: Illustrative depiction, does not represent actual quantities.

The CTFP's actual effect on New Mexico transportation sector emissions is likely somewhere between the upper-bound ("NMVES + CTFP") and lower-bound ("CTFP-only") scenarios. It is clear that CTFP will play an important role in supporting NMVES with credits for the buildout of fuel supply equipment (FSE) needed to support using ZEVs for longer trips, paired with credits for the continued supply of fuel from FSE to ensure the longevity and reliability of this infrastructure, and requiring the reinvestment of credit value from residential EV charging into distribution, grid modernization, infrastructure and other transportation decarbonization projects. It is thus likely that the CTFP will play some role in the improvement in outcomes between the Federal Baseline (policy projection 1) and the NMVES Baseline (policy projection 2).

The lower-bound “CTFP-only” scenario attributes none of the difference between policy projections (1) and (2) to the CTFP. Rather, it assumes that this entire impact would occur under NMVES. Effectively, “CTFP-only” ignores any role that the CTFP would have in supporting the other two legs of the three-legged stool from its FSE credits or its reinvestment requirements for credit revenue from residential EV charging. Because the CTFP’s support for the “transportation fleet leg” and the “VMT leg” will almost certainly have an impact, attributing none of the difference between projections (1) and (2) to the CTFP understates the policy’s benefits. These benefits are likely somewhere in between the “CTFP-only” lower-bound and “NMVES + CTFP” upper-bound scenario estimates for New Mexico transportation fuel markets outcomes, GHG and CAP emissions reductions, statewide employment and its overall macroeconomy.

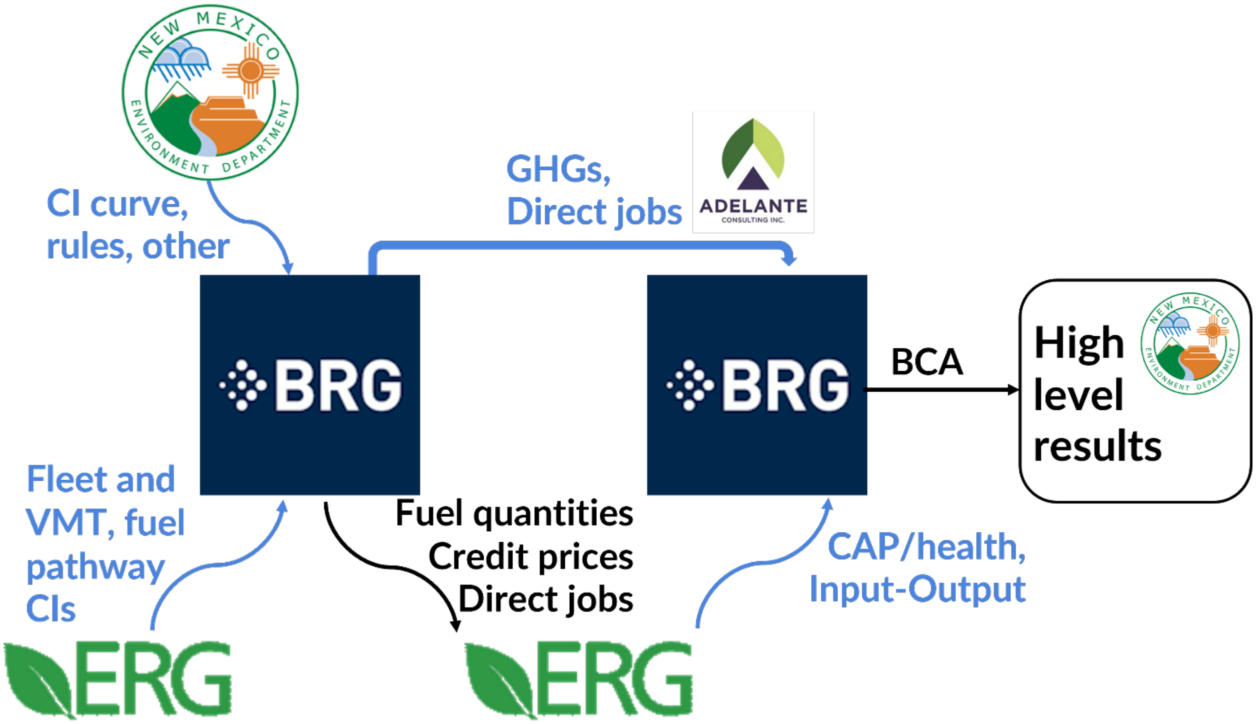
XI. Approach to the BCA and Data Sources

The BCA conducted for the CTFP involved a collaborative approach that included multiple public data sources. Staff from three contractors contributed to developing the BCA – BRG, Eastern Research Group (ERG), and Adelante Consulting. **NMED Exhibit 78** (New Mexico Clean-Transportation Fuel Program Benefit Cost Analysis); **NMED Exhibit 82** (Regulatory

Analysis for NM's CTFP Report (ERG)); **NMED Exhibit 75** (Overview of Anticipated Projects, Jobs, and Benefits Report (Adelante)). Each contractor used rigorous methodologies with data from publicly accessible sources. They have each extensively outlined the approaches that they have taken in their respective testimonies, which provide greater detail on methods for estimation, quantification, and the publications and data sources used. **Figure 3** shows a map of each contractor and NMED's involvement across all steps of the BCA. Primarily, these are:

1. ERG staff's modeling of Fuel Pathway CIs, detailed in Section 3 of the ERG report;
2. ERG staff's modeling of Fleet / VMT projections as detailed in Appendix A of BRG's BCA and Sections 4.1.1 and 4.2.2 of the ERG report;
3. BRG staff's use of the FCMM to model GHG reductions, transportation fuel quantities, credit prices, and other fuel and credit market outcomes, as detailed in Appendix B of BRG's BCA;
4. BRG and Adelante Consulting staff's modeling of direct jobs, detailed in Appendix D.2 of BRG's BCA, the Adelante Report and Chapter 6.2.2 of the ERG report;
5. ERG staff's modeling of criteria air pollutant (CAP) changes and health effects, as detailed in Appendix C of BRG's BCA and Chapters 4 and 5 of the ERG report;
6. ERG staff's use of Macroeconomic or Input-Output (I-O) modeling to determine indirect and induced effects of the CTFP's fuel market, employment, and health impacts, as detailed in Appendix D of BRG's BCA and Section 6 of ERG's report.
7. BRG staff's aggregation of global GHG effects and direct, indirect, and induced state fuel market, employment, and health effects into a final BCA.

Figure 5. Process and entity flow diagram for the Benefits-Cost Analysis



XII. GHG Reductions and Local Benefits

The Benefits-Cost Analysis (BCA) for the CTFP examines the effects of the policy across four key areas of CTFP impact: Fuel markets; Jobs/macroeconomic effects; CAP reduction/health benefits; and GHG emissions.

As noted, there are two different ways to examine the results of this analysis. The first, shown in the first totals row for **Table 1**, is to examine only the additional impact of the CTFP as a standalone policy ("CTFP-only"). The second, shown in the final row of **Table 1**, is to examine the impact of both the CTFP and the NMVES as a policy suite ("NMVES + CTFP"). **Table 1** summarizes results across four key areas: Fuel markets; Jobs/macroeconomic effects; CAP reduction/health benefits; and GHG emissions.

Table 1. Effect of the CTFP as an individual policy and as part of a suite with the NMVES through 2040 (in $US 2024 millions, discounted at a three-percent real discount rate)

	Benefits	**Costs**	**Net**
Fuel Markets[76]	N/A	-$959	-$959
Health Effects[77]	$16	N/A	$16
GHG Emissions	$2,436	N/A	$2,436
Direct Jobs from FSE	$162	N/A	$162
CTFP Total	**$2,614**	**-$959**	**$1,654**
NMVES Total[78]	*N/A*	*N/A*	*$188*
NMVES + CTFP Suite	**N/A**	**N/A**	**$1,842**

The BCA finds that the CTFP's main impact is from GHG reduction benefits of $2.44 billion (in $US 2024) under the CTFP-only scenario. This comes from a tallied 10.5 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) of GHG reductions through 2035. After 2035, the BCA projects that the CTFP becomes "non-binding" because credit prices fall in response to non-incremental credit options and banked credits fully satisfying the program compliance obligations to meet annual CI reduction targets. Most of these credits come from the use of ZEV vehicles. Under CTFP-only, their use is not attributed to the CTFP, despite the policy's role in increasing ZEV access and infrastructure, because they are not directly linked to CTFP credit market

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[76] The fuel market impacts are the 50 percent pass-through scenario that averages the results from the 0 percent and 100 percent passthrough scenarios.

[77] Interpolated average of lower- and upper-bound estimates.

[78] Accounts for indirect and induced consumer effects and baseline of EPA Multi-Pollutant and Phase 3 Heavy-Duty Rules; health benefits averaged**.**

outcomes. As a result, the policy's effect on reducing GHG emissions stops in 2035 under the CTFP-only approach.

Under the NMVES + CTFP scenario, this BCA finds cumulative GHG reductions of 22.4 MMTCO$_2$e through 2040, producing $5.02 billion of benefits. GHG reductions under the CTFP-only and NMVES + CTFP scenarios occur even as projected statewide travel rises throughout the projection period, increasing by 20 percent from 28.3 billion VMT in 2024 to 35.2 billion VMT in 2040.[79] This is due to a combination of less energy needed per VMT and fewer emissions per energy unit because of the two policies. Further, the CTFP is credited with reductions from increased ZEV use due to the policy's supporting role in providing funding streams to improve ZEV fueling infrastructure and vehicle access. This contributes to the CTFP's more robust emissions reduction impact in the NMVES + CTFP scenario.

Such a result is unsurprising considering the CTFP's main objective is to reduce the GHG footprint of New Mexico's transportation sector by lowering the CI of transportation fuel. The GHG reductions under the CTFP even as travel rises highlight how the policy is in the public interest and its necessity for eliminating or otherwise taking action with respect to environmental degradation. Moreover, the CTFP will produce additional benefits that are specific to New Mexico. These include energy independence, diversification of statewide transportation and transportation

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[79] The NMVES + CTFP scenario continues to have material emissions reduction value above the federal baseline due to a larger penetration of ZEVs even after 2035 under the NMVES Baseline policy projection for fleet and VMT that is considered under NMVES + CTFP scenario but not the CTFP-only scenario.

fuel options, greater air quality and health outcomes, and the addition of new jobs and innovations that stimulate local economic development.

Health outcomes and jobs are two key areas where the CTFP creates state-specific benefits. Although the CTFP's specific goal is to reduce the GHG footprint of transportation in New Mexico, the state's changing of transportation fuel mix also has implications for criteria air pollutants (CAP) like oxides of nitrogen (NOx), volatile organic compounds (VOCs), PM2.5, and PM10 emitted by the on-road combustion of transportation fuels in New Mexico.

CAP emission volumes are an important determinant of the CTFP's health effects, since they are linked to the incidence of asthma and other respiratory illnesses. Current New Mexico Department of Health data indicate that one in 10 New Mexicans currently has asthma, and that one seventh will likely be diagnosed in their lifetime.[80] Understanding these health impacts is vital to gauging the character of any degree of injury to health from the CTFP and whether it is in the public interest.

The accompanying testimony from Mr. Koupal fully details how ERG calculated CTFP health benefits from the policy's effect of reducing CAP emissions. In their analysis, ERG found that for the CTFP-only scenario (2026-2035), cumulative benefits range from an estimated $10.9 to $20.7 million (average of $15.8 million, rounded to $16 million in **Table 1**), whereas cumulative benefits of the combined NMVES + CTFP scenario (2026-2040) range from $35.9 to $49.0 million

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[80] New Mexico Department of Health. "Diagnosed Adult Asthma Prevalence: Current Prevalence by Year, Adults Aged 18+, New Mexico and U.S., 2005 to 2021." New Mexico Indicator Based Information System. https://ibis.doh.nm.gov/indicator/view/AsthmaPrevAdult.Current.Year.NM_US.html.

(average of $42.4 million).[81] To quantify these effects, ERG considered how reduced CAP emissions from the policy would mitigate asthma onset and aggravation, cardiovascular disease, reduced lung function, and premature death. Such effects are especially pronounced for vulnerable populations including older adults, children, and pregnant individuals.[82]

The CTFP will further impact the public interest by impacting jobs in New Mexico's transportation fuels markets. The job creation, infrastructure development, and resultant economic activity spurred in the state by the CTFP are key factors to consider in assessing how the CTFP will shape New Mexico's social, economic and cultural landscape. Whereas the infrastructure to supply New Mexicans with fossil fuels like gasoline and diesel is largely in-place, new infrastructure is needed to allow for the provision of alternative fuels. This includes new fuel supply equipment (FSE) used for dispensing electricity, hydrogen, and CNG. It also includes greater sales of biofuels like BD, RD, and higher ethanol blends that could be accommodated at traditional gasoline and diesel pumps, and storage tanks.

New jobs may also be created through the development of infrastructure such as biofuel refineries, pipelines and storage facilities built in-state, as well as anaerobic digesters (ADs) for producing renewable natural gas (RNG). However, to remain consistent with using conservative benefit-cost assumptions, BRG staff did not include any direct jobs from these facilities in the

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[81] See **Footnote 63** for explanation of why the CTFP-only scenario's effects occur through 2035 as compared to 2040 in the NMVES + CTFP scenario.

[82] New Mexico Environmental Public Health Tracking, "NM-Tracking - Asthma," Asthma, May 2025, https://nmtracking.doh.nm.gov/health/breathing/Asthma.html.

BCA's employment estimates. Instead, BRG staff used conservative assumptions in assigning direct FSE credits for the attribution of direct jobs.

The BCA provided in the Report from BRG (*see* Exhibit 79) fully details how BRG staff calculated job benefits from the FSE built with support under the CTFP. In their analysis, BRG staff found that for the "CTFP-only" scenario, the policy resulted in 581 cumulative full-time employees (FTE) from 2026 to 2040, where an FTE represents the employment of one full-time employee for one year. As part of a suite with NMVES (the "NMVES + CTFP" scenario) the program would create a projected 1,566 cumulative FTE for FSE construction, installation, and maintenance. Most FTE are in electrical installation, followed by electrical maintenance and repair, and general construction labor.

To better understand what additional jobs might result from the CTFP beyond those counted in this report, Adelante Consulting conducted extensive research to identify 54 interested parties that produce, import, or dispense transportation fuels in New Mexico, or could potentially do so under the CTFP. Adelante interviewed 30 of the interested parties. In total, Adelante found that 16 interested parties have plans for 19 new projects that are directly related to or supported by the CTFP. These projects include facilities to produce credit-generating fuels like hydrogen, RNG, renewable methanol, ethanol, synthetic fuel including dimethyl ether (DME), and others. Adelante conservatively estimated that these projects could create 274 jobs over the next 15 years. Income from these jobs would reach $20 million annually and $212 million from the start of operations through 2040 (in $US 2024). All of these jobs and resultant income would be additional to those created under the CTFP that are related to FSE infrastructure.[83]

Many interviewed, interested parties with projects noted plans to participate in the program and underscored the importance to their projects that the CTFP be enacted and remain in place. Some companies noted that they chose New Mexico as an investment location specifically in response to CTFP implementation.

The jobs figures and direct benefits considered in the BCA do not account for any of these estimated jobs from Adelante's interviews. One of these is a facility in Portales built and operated by Navitas Global, LLC that will produce whey-based ethanol. This project, leveraging New Mexico Local Economic Development Act (LEDA) funding, will support the creation of 31 new jobs in New Mexico with an estimated annual payroll of $1.9 million and a capital investment up to $42 million.[84] A project that is additional to those discussed in the Adelante report is a facility at the Los Lunas Transfer Station to convert plastic waste into gasoline, diesel, and other transportation fuels for the Village of Los Lunas Solid Waste Department. Dallas-based firm PlastikGas would build the facility and transfer it to the Village for use and could have the resultant

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[83] Adelante Consulting Inc. "Clean Transportation Fuels Program: Overview of Anticipated Projects, Jobs, and Benefits." August 6, 2025. DRAFT REPORT prepared for NMED. Publication pending.

[84] New Mexico Economic Development Department. "Company reviving long-shuttered ethanol plant receives support through New Mexico EDD." Press Release. July 15, 2025. https://edd.newmexico.gov/wp-content/uploads/2025/07/Navitas-LEDA-pr.pdf.

jobs supported by CTFP credit revenue.[85] Both of these projects could receive support from CTFP credit revenue to improve project financial viability.[86]

XIII. Conclusion

The CTFP provides New Mexico with a unique opportunity to take a leadership role in driving down GHG and CAP emissions from its transportation sector. Doing so will allow state to accelerate GHG reductions, in line with its statewide climate targets, while improving health outcomes for New Mexicans and seizing the opportunity to create new jobs and gain a foothold in the fastest-growing segments of the transportation sector economy. Further, it protects New Mexico consumers by spurring the innovation, adoption, and deployment of the transportation fuel infrastructure and technologies that the state needs to fortify its economy against the shocks and volatility that have come to define traditional transportation fuel markets. Importantly, the CTFP does this while leveraging numerous cost containment mechanisms that protect the state's commuters and traditional fuel consumers from program costs, from its focus on market competition among credit generators to specific regulatory provisions like required pledging to the CCM and provisions that allow for program deferral in the event of a forecasted or emergency fuel or credit supply shortage.

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[85] Rodriguez, Kenn. "Los Lunas enters into agreement with PlastikGas." Valencia County News Bulletin. June 12, 2025. https://www.news-bulletin.com/news/los-lunas-enters-into-agreement-with-plastikgas/article_e3e0d11c-c8b9-4743-b565-2e0fd5b8582f.html.

[86] If the Los Lunas Solid Waste Department's vehicles currently use dyed diesel then they would be exempt users through 2028 under Paragraph (2) of Subsection (A) of the Revised Proposed New Rule 20.2.92.102 NMAC. They would thus need to opt-in to the CTFP pursuant to Subsection (C) of the Revised Proposed New Rule 20.2.92.103 NMAC to receive CTFP credit revenue on or before December 31, 2028.

Additionally, methods to estimate the cost of the program on New Mexico's fuel consumers require analysis with a critical lens. Those studies and reports that do assume a cost generally do so as an assertion rather with relationships that they have demonstrated and borne out with rigorous statistical analysis. Often this research contains an acknowledgement that findings may overstate the actual retail effect of CTFP-like programs. Partly this is because findings come from straightforward arithmetic calculations that do not consider how regulated parties might leverage various options to minimize how much the program ultimately costs them. Furthermore, the degree to which regulated parties may pass those compliance costs that they do bear on to retail consumers is complicated by the multiple layers of product transfer from refining, to transportation, to blending, to distribution, and the degree to which suppliers can include credit-generating drop-in fuels in final products as gasoline and diesel blendstocks move through this supply chain.

Although there is clear evidence of retail fuel prices reflecting state and federal fuel taxes, there is limited research on the retail effect of CTFP-like program compliance costs in West Coast states that guide a definitive answer on what pass-through will be. It has proven difficult to fully ascertain or measure PTRs in West Coast states when accounting for region-specific factors that cause fuel prices in these states to diverge from the national average, such that any observed effects appear not to be sufficiently robust to statistical error to fully validate a relationship between these policies and retail prices.

It is thus not possible to say with certainty that PTR will be zero-percent, 50-percent, or 100-percent PTR, so the BCA uses all three rates to analyze program costs and benefits across this range of uncertainty. What is clear across all such cases is that any program effects are overshadowed by geopolitical, logistical, macroeconomic, and sector-specific factors that comprise the main drivers of gasoline and diesel retail price formation. As the BCA notes in Exhibit 79, changes in such factors cause yearly price volatility that is several times that of the CTFP even under a 100-percent assumed PTR. In addition, it is precisely this price volatility that the CTFP can address by helping to increase statewide ZEV uptake and reducing reliance on the traditional transportation fuels that are subject to such fluctuations. Although the BCA conservatively does not quantify the benefit of reduced exposure to such price fluctuations, it does quantify the benefit that the CTFP provides in reducing GHG and CAP emissions and providing jobs to install the ZEV fueling infrastructure supported under the program. It finds that even under low-benefit / high-cost assumptions, the CTFP is clearly beneficial to the state and planet.

Appendix

Table A-1. Summary of PTR studies

-	ε_d^{price} **Short-run**	ε_d^{price} **Long-run**	**PTR, Short-run**	**PTR, Long-run**	**Study type / method**	**Findings**	**Other info**	**To note**
PTR studies								
Kaufmann, 2019	--	--	--	5.9-354%	Cointegrating vector autoregression (CVAR) models for pre- and post-tax gasoline prices	In four (FL, MA, NY, and OH) of the six states evaluated, pass-through rates for retail gasoline exceeded 100% (i.e., retail prices rise more than taxes). In FL, total pass-through rate of taxes on retail gasoline prices were 354%. In WA, in contrast, the pass-through was 5.9% (i.e., prices rise less than taxes).	States chosen based on requisite data availability. CVAR has advantage of separating weakly exogenous variables from endogenous variables and is designed to analyze relations among nonstationary time series.	In WA, the only state in this study with a clean fuel program, pass-through is significantly less than 100% (note that this paper was published before the CFS was implemented in WA).

-	ε_d^{price} Short-run	ε_d^{price} Long-run	PTR, Short-run	PTR, Long-run	Study type / method	Findings	Other info	To note
Marion and Muehlegger, 2011	--	--	109%	--	Panel regression with state-level data.	A one cent increase in the state tax rate increases the retail price by 1.22 cents. 1.09 cents per one cent when using more precise observations at the year *month level (for 23 states for which data is available). 1.04 when including all states by using PADD-level data. No significant differences with long-term lagged model. With high refinery capacity utilization, only 41% of diesel tax is passed through to consumers.	Estimate dependence of pass-through on factors constraining gasoline and diesel supply chains. Consider several factors that alter the elasticity of supply, including within state heterogeneity in gasoline content requirements, refinery capacity utilization, inventory constraints. Unlike diesel, we find that gasoline incidence is largely independent of capacity utilization.	With high refinery capacity utilization, only 41% of diesel tax is passed through to consumers. Unlike diesel, we find that gasoline incidence is largely independent of capacity utilization.

-	ε_d^{price} Short-run	ε_d^{price} Long-run	PTR, Short-run	PTR, Long-run	Study type / method	Findings	Other info	To note
Tsvetanov, 2024	--	--	--	79%	Panel dataset examining effects on retail price from "tax holidays" during periods of high retail prices to determine tax pass-through rate	This study examines geographic variation in pass-through rates, and finds that rates vary spatially based on local factors. Isolated rural areas are likely to have a less competitive environment, leading to less pass-through (of "tax holidays").		Reformulated gas (RFG) / reformulated blendstock for oxygenate blending (RBOB) could restrict elasticity of supply, thus decreasing pass-through rates. However, New Mexico uses conventional blendstock for oxygenate blending (CBOB).
Hurtado, 2023	--	--	--	75-100%	Utilizes unique dataset of fueling station locations and gasoline prices to calculate	Pass-through rate of fuel taxes to consumers varies based on distance from a border with a tax discontinuity: consumers bear 75% of the fuel tax on the high-tax side,	The there are 20 to 30 percent more fueling stations on the low-tax side (confirming greater consumer elasticity with higher taxes).	Accounts for local regulations and policies beyond taxation that change at state boundaries. This work may be relevant to PTR in NM

-	ε_d^{price} Short-run	ε_d^{price} Long-run	PTR, Short-run	PTR, Long-run	Study type / method	Findings	Other info	To note
					pass-through rates	compared to 100% (complete pass-through) on the low-tax side, within 15 miles of the border. In contrast, there is complete pass-through away from the border.		given fueling stations on tribal land within the 15-mile distance used in this study.

Study	ε_d^{price} Short-run	ε_d^{price} Long-run	PTR, Short-run	PTR, Long-run	Study type / method	Findings	Other info	To note
				$\varepsilon_{demand}^{price}$				
Coglianese, et al 2015	-0.37	--	--	--	IV regression with lag/leads and panel data	Including the lead and the lag in the IV regression reduces the cumulative effect of a gasoline tax change to -0.37 – is not statistically significant. Down to -0.29 with indicator for state-month variables in which there is a tax increase of at least 2	Look at 140 events of nominal state tax increases of at least 1 cent. Modify state-level models from other research to account for changes in consumption immediately before and after tax changes by using	

Study	ε_d^{price} **Short-run**	ε_d^{price} **Long-run**	**PTR, Short-run**	**PTR, Long-run**	**Study type / method**	**Findings**	**Other info**	**To note**
						cents. But preferred point estimate of -0.37.	IVs and lag/lead indicators.	
Dahl and Sterner, 1991	-0.31	-0.58	--	--	Literature review	Short-run price elasticity of -0.53, Long-run of -0.8 (equation one). Very inelastic with lagged data (-0.13 for one-period lag, -0.20 for one-year lag) (equation two). -0.31 elasticity when accounting for vehicle stock (equation three).	Over 100 studies. Classify studies by data type and by ten different categories. Find that there is less elasticity with shorter periodicity.	The results from this study back out any changes in elasticity that may be due to vehicle characteristics (about -0.22, from Equation 3)

Study	ε_d^{price} Short-run	ε_d^{price} Long-run	PTR, Short-run	PTR, Long-run	Study type / method	Findings	Other info	To note
Espey, 1998	-0.23	-0.43	--	--	Literature review	Short-run price elasticity estimates for the demand for gasoline range from 0 to -1.36, averaging -0.26 with a median of -0.23. Long-run price elasticity estimates range from 0 to -2.72, averaging -0.58 with a median of -0.43.	Journals, reports, and books, published between 1966 and 1997, covering the time period from 1929 to 1993. 277 estimates of long-run price elasticity, 363 estimates of short- or medium-run price elasticity.	Models that control for fuel efficiency and ownership return much less demand elasticity (particularly ownership). Short-run gasoline demand price responsiveness appears to have declined over time, yet the long-run price elasticity appears to have increased over time. The finding of different elasticity estimates using data prior to 1974 and data after 1974 suggests the need

Study	ε_d^{price} Short-run	ε_d^{price} Long-run	PTR, Short-run	PTR, Long-run	Study type / method	Findings	Other info	To note
								for updated studies and for care to be taken in extrapolating into the future using elasticity estimates from the 1970s or even the 1980s.
Goodwin, 1992	-0.27	-0.73	--	--	Literature review	In Table 1 of study, weighted calculation based on number of studies for time-series and cross-section, respectively.	Unweighted mean value of 120 elasticities of petrol consumption with respect to fuel price is -0.48, compared with earlier values of -0.1 to -0.4. Overall, there is a reasonably clear pattern for long term elasticities to be between 50 percent higher and three times higher than	Results do support the view that pricing (in particular petrol price and public transport fares, but also by extension other prices) has a powerful cumulative effect on the pattern of travel demand.

Study	$\boldsymbol{\varepsilon_d^{price}}$ **Short-run**	$\boldsymbol{\varepsilon_d^{price}}$ **Long-run**	**PTR, Short-run**	**PTR, Long-run**	**Study type / method**	**Findings**	**Other info**	**To note**
							the short term. Short-term defined as less than one year.	
Hughes, Sperling, and Knittel, 2006	-0.17	-0.17	--	--	Log-log regression model	-0.31 to -0.34 in 1975-1980 and from -0.041 to -0.043 in 2001-2006. Shifting between milage from older to newer vehicles was a response that potentially had a material effect on gasoline consumption in 1975-1980, but no longer in 2001-2006. Results however come from Table 7 - partial adjustment models with month dummies.	Focuses on the short-run price and income elasticities of gasoline demand. Study the periods of November 1975 through November 1980 and from March 2001 through March 2006 – two periods of high prices. Log of gasoline consumption as a function of the log of price and income. lnG_(j,t) = β_0 + β_1 ln P_(j,t) + β_2 lnY_(j,t) +ε_j +ε_(j,t).	It may be the case today that U.S. consumers are more dependent on automobiles for daily transportation than during the 1970's and 1980's and as a result, are less able to reduce vehicle miles traveled in response to higher prices. One explanation: suburbanization. Also, overall

Study	ε_d^{price} Short-run	ε_d^{price} Long-run	PTR, Short-run	PTR, Long-run	Study type / method	Findings	Other info	To note
							j=month,t=year; ε_j=seasonal error term,ε_(j,t)=time error term.	improvement in U.S. fleet average fuel economy since the late 1970's and early 1980's may have also contributed to a decrease in the responsiveness of consumers to gasoline prices
Kilian and Zhou, 2024	-0.2	--	--	8.5-48.1%	Variation in pass-through from global oil price shocks to state-level gasoline prices	Elasticity was -0.3 until the end of 2004, and rose to -0.2 in 2015-2016 where it has remained stable.	State-specific pass-through rates (estimated using data from 1989-2008) range from 9% to 65% with a mean of 42%. Processing, distribution, and retail markups account for 90% of the variation in the pass-through rate between states. Consumers in states	

Study	ε_d^{price} **Short-run**	ε_d^{price} **Long-run**	**PTR, Short-run**	**PTR, Long-run**	**Study type / method**	**Findings**	**Other info**	**To note**
							where personal income is lower tend to be more responsible to gasoline price changes. States with lower urban population shares, less commuting by transit, and more registered vehicles per capita have more elastic demand.	
Levin, Lewis, and Wolak, 2016	-0.3	--	--	--	Panel regression with fixed effects, using two-equation frequency of purchase model.	Obtain estimates of gasoline demand elasticity ranging from −0.27 to −0.35. The total demand response to a price shock that lasts longer than a few days exhibits a demand elasticity of around −0.30, nearly identical to the estimates in our baseline purchase model.	Daily gasoline prices and citywide gasoline expenditures for 243 US cities from 2006 through 2009, with extensive fixed-effect controls. Average daily retail prices of unleaded regular gasoline from the AAA Daily Fuel Gauge Report - from the Oil Price	

Study	ε_d^{price} **Short-run**	ε_d^{price} **Long-run**	**PTR, Short-run**	**PTR, Long-run**	**Study type / method**	**Findings**	**Other info**	**To note**
							Information Service (OPIS) station-level prices from fleet credit card transactions and direct feeds from gas stations. Reflect ~70% of all gasoline buyers. In area j on day d: ln(d_(j,d)) = α_j + λ_d + β*ln(p_(j,d)) + ε_(j,d). Have both expenditures and number of transactions in each location-day.	
Morris, 2014	-0.03	--	--	--	EIA report		The price elasticity of motor gasoline is currently estimated to be in the range of -0.02 to -0.04 in the short term, meaning it takes a 25% to 50% decrease in the price of gasoline to	

Study	ε_d^{price} Short-run	ε_d^{price} Long-run	PTR, Short-run	PTR, Long-run	Study type / method	Findings	Other info	To note
							raise automobile travel 1%.	
Spiller, Stephens, and Chen, 2017	--	-0.74	--	--	Confidential household data used to estimate gasoline price elasticities based on a 60-cent tax increase.	Mean elasticities of demand for gasoline are estimated to be -0.74 (median = -0.52), with significant spatial and demographic heterogeneity. Rural and poor households bear the greater share of the burden from increasing taxes. Living far from urban centers in rural areas and having a longer commute are associated with higher elasticity of demand (those same		A revenue recycling policy is proposed to mitigate regressive effects. Data are mostly from the 2009 NHTS; may be impacted by recession effects.

Study	ε_d^{price} Short-run	ε_d^{price} Long-run	PTR, Short-run	PTR, Long-run	Study type / method	Findings	Other info	To note
						households have higher VMT).		
Eitches and Crain, 2016					BLS study	Data from the consumer expenditure survey (CE) suggest that individual households (excluding commercial use) buy as many gallons of gas and travel as many or more miles regardless of the price of gasoline, suggesting that demand for gas is inelastic. While the dollar expenditures for gasoline fluctuated greatly between 2007 and 2009, and, to a		Combined with the car culture of the United States, where most people use an automobile as their primary form of transportation, gasoline is in a subclass of normal goods called "necessity goods." Noting the continuous demand for

Study	ε_d^{price} Short-run	ε_d^{price} Long-run	PTR, Short-run	PTR, Long-run	Study type / method	Findings	Other info	To note
						similar extent, in other time periods, the consumption of gasoline remained rather constant. This pattern also emerges in other periods where gas prices fluctuate. In addition, between 2004 and 2014, the economic climate in the United States changed greatly. [...] [D]espite the economic climate, great changes in price per gallon of gasoline, and the corresponding quarterly variation in dollar expenditures for gasoline, households still consumed the same amount of gasoline. This steady consumption indicates that households did not dramatically change their behavior in		gasoline and the relative stability of the estimated gallons of gasoline bought quarterly between 2004 and 2014, it is difficult to identify what will alter this trend. It seems that a doubling in price per gallon did not alter consumer's consumption habits.

Study	ε_d^{price} **Short-run**	ε_d^{price} **Long-run**	**PTR, Short-run**	**PTR, Long-run**	**Study type / method**	**Findings**	**Other info**	**To note**
						response to changes in gasoline prices. Still, while the estimated number of gallons purchased is inelastic in regards to price, the average number of gallons bought per household has drifted lower over the past 11 years. (See chart 2.) Annual estimated gallons of gasoline purchased had been 816 gallons per household in 2004, before climbing to 844 gallons in 2005, and falling from 2010 onward. In 2014, the estimated average for gasoline consumption a year had fallen to 707 gallons.		

Study	ε_d^{price} **Short-run**	ε_d^{price} **Long-run**	**PTR, Short-run**	**PTR, Long-run**	**Study type / method**	**Findings**	**Other info**	**To note**
$\varepsilon_{supply}^{price}$								
Camp et al, 2020					BLS study	In the first 4 months of 2020, U.S. average gasoline prices declined sharply, bottoming out at $1.95 in April and May, the lowest level since January 2009 Prices increased in June and July, but the July figure of $2.24 remained 15.4 percent lower than the December 2019 level and stayed virtually unchanged in August. As crude oil prices continued to recover and the economy partially reopened, the CPI for gasoline started to rebound in June and July	The study uses the producer price index (PPI) to evaluate the impact of the COVID-19 pandemic on crude oil prices. The PPI measures the average monthly change in selling prices received by crude oil producers. As economic activity slowed sharply across the globe, demand for petroleum and petroleum products plummeted. The	Fuel retailer costs depend heavily on global crude oil prices, and retail firms generally use a “sticky price method” to set prices. As oil prices decrease, retailers hesitate to adopt commensurately lower selling prices because of future market uncertainty. The result is higher margins when crude oil prices

Study	ε_d^{price} Short-run	ε_d^{price} Long-run	PTR, Short-run	PTR, Long-run	Study type / method	Findings	Other info	To note
						– the average price recovered about 30 cents of its 70-cent decline per gallon.	drop in demand, coupled with an unexpected increase in supply, led to a collapse in crude oil prices and subsequent impacts on prices for refined petroleum products and other downstream items, notably gasoline. As economies reopened, the initial price downturn gave way to reduced oil production and some renewed demand. As a result, prices for oil products partially recovered.	fall, as the gap between acquisition and sales prices widens. Likewise, as crude oil prices increase, fuel retailers often are slower to raise selling prices. This dynamic is generally driven by local competition: if a retail price increase is not matched locally, customers will go to competing gas stations. As a result, fuel retailers often post lower margins when oil prices rise.

Study	ε_d^{price} **Short-run**	ε_d^{price} **Long-run**	**PTR, Short-run**	**PTR, Long-run**	**Study type / method**	**Findings**	**Other info**	**To note**
Rubenstein and Conforti, 2015					BLS study	Pass-through delays contribute to the inverse relationship between retail automotive fuel margins and prices for crude oil and retail gasoline. Although pass-through delays are ever-present, they do not explain why price declines are passed along more slowly than price increases. Rising crude oil prices quickly push up wholesale gasoline prices, and as a result, retailers rapidly increase their prices to preserve their narrow margins and maintain profits. Conversely, during periods of declining crude oil prices, some retailers can hold on to higher margins due to limited local competition	The producer price index (PPI) for automotive fuels and lubricants retailing measures the average change in margins that gas stations receive for selling products such as gasoline and motor oil.	Phenomenon of quickly rising retail prices following an increase in wholesale prices but slowly decreasing retail prices when wholesale prices decrease is referred to as "rockets and feathers".

Study	ε_d^{price} Short-run	ε_d^{price} Long-run	PTR, Short-run	PTR, Long-run	Study type / method	Findings	Other info	To note
						and therefore have less incentive to pass along lower prices to consumers		

NMED
EXHIBIT
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EDUCATION

University of New Mexico, Department of Economics
Doctor of Philosophy Candidate, Full-time. Albuquerque, NM. *GPA: 3.75*
Relevant Coursework: Dynamic Optimization Modeling, Energy Systems and Practices, Econometrics, individual research on CCS projects, Dissertation on carbon dioxide enhanced oil recovery and Class VI storage in southeastern New Mexico. Term paper on program evaluation of Reducing Emissions from Deforestation and Forest Degradation (REDD+) projects in Brazil.

University of Chicago Irving B. Harris School of Public Policy
Master of Public Policy, 2010. Graduated with distinction. Chicago, IL. *GPA: 3.50*
Relevant Coursework: Environmental Science and Policy, Economic Development in the Public Sector, Political Economy for Public Policy, Statistics For Public Policy, Program Evaluation, Econometrics, Finance, Cost-Benefit Analysis.

"The Costs and Benefits of Permeable Pavement: An Economic Analysis." Winner, 2009 SustainUS Citizen Science graduate paper competition. Presented to the United Nations Conference on Sustainable Development. Accepted for graduate honors.

Earlham College
Bachelor of Arts, Economics, 2004. Richmond, IN. *GPA: 3.87*

Honors: Phi Beta Kappa, Claude Stinneford Award in Economics, Presidential Achievement Scholarship.

WORK EXPERIENCE

New Mexico Environment Department, Climate Change Bureau **November 2023 – Present**
Climate Change Economist. Santa Fe, NM.
- Contracted and oversaw economic analysis and communications for the Clean Transportation Fuels Standard Act of 2024 and the New Mexico Clean Transposition Fuel Program. Provided economic modeling and testimony for rulemaking efforts.
- Prepared Pass-Through Rates analysis and Testimony presented to the New Mexico Environmental Improvement Board.
- Wrote Workforce Development section of New Mexico's Climate Pollution Reductions Grant application to the U.S. Environmental Protection Agency (EPA). Selected by EPA as a model Workforce framework for use by other states.
- Presented Clean Transposition Fuels Program materials to workforce, Tribal, and community organizations in-person and on statewide webinars. Developed community engagement materials for Governor's Office Cabinet in Your Community events.

Carbon Solutions **December 2021 – October 2023**
Research Associate. Albuquerque, NM.
- Produced Quality Jobs, Narrative, and Project Readiness sections for U.S. Department of Energy CarbonSAFE proposals.
- Developed CO_2NCORD^{PRO} capture cost software with clients including investor-owned utilities and private industry.
- Published reports, including paper on scaling up CCS in the United States for the 16th Greenhouse Gas Control Technologies Conference in Lyon, France: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4274085#.
- Produced company-wide communications such as post highlighting the technical importance of CCUS to achieving the International Energy Agency's Net-Zero Emissions scenario: https://www.carbonsolutionsllc.com/?p=2686.

Sandia National Laboratories **September 2019 – December 2021**
Year Round Economics Intern, Office of Resilience and Regulatory Affairs. Albuquerque, NM.
- Organized intern research efforts for the Western U.S. Carbon Utilization and Storage Partnership (CUSP-West).
- Assisted with economic impact analysis on job market effects from exporting New Mexico's wind and solar generation.
- Collected and analyzed data on business and employment effects of pandemic shutdowns for Covid-19 dashboard.
- Automated processes to monetize the value of avoided daily and hourly outages from investment in grid resilience.

U.S. Bureau of Land Management **December 2015 – July 2019**
Economist, Office of Energy, Minerals, and Realty Management. Washington, DC.
- Published Regulatory Impact Analyses quantifying the costs and benefits of proposed and final rules for four major departmental energy initiatives, and a Socioeconomic Impact Study for lifting of the federal coal leasing moratorium.
- Hired, supervised, and evaluated staff on revisions to the BLM Energy, Minerals, and Realty management homepage.
- Built, documented, and publicly presented 10-year revenue model for the Office of Management and Budget. Developed and presented new forecasts for the Federal Accounting Standards Advisory Board.
- Led efforts to determine the appropriate discount factor for Long-Term Funding Mechanisms to pay for water treatment of mine tailings. Supported final decisions on financial capacity of operators on the Trans-Alaska Pipeline System.

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U.S. Energy Information Administration **August 2012 – December 2015**

Industrial Economist, Office of Petroleum, Natural Gas, and Biofuels Analysis. Washington, DC.

- Translated Office of Petroleum, Natural Gas, and Biofuels Analysis (PNGBA) work into Today in Energy (TIE) reports.
- Represented PNGBA on the TIE management team. Worked with authors on content clarity, accuracy, and public appeal.
- Published market research via TIE and the Natural Gas Weekly Update (NGWU). Coordinated media inquiry responses.
- Led efforts to publish modeling results and analysis for PNGBA sections of the 2014 and 2015 Annual Energy Outlook (AEO) publications, and reports modeling the impact of U.S. crude oil export restrictions.
- Prepared report and presentation for U.S. Secretary of Energy Ernest Moniz on options for processing increased U.S. light, tight crude oil production. Delivered EIA presentation to the Bakken Flaring Alternatives & Gas Capture 2014 conference.

Maryland Department of Budget and Management **September 2010 – August 2012**

Economist and Budget Analyst, Office of Budget Analysis. Annapolis, MD.

- Served as department's Economist, generating annual revenue forecast and tax expenditures report. Additionally charged with budgetary and operational oversight for multiple state agencies.
- Analyzed agency operational and performance data provided via Managing for Results, Maryland's statewide strategic planning and performance initiative. Assessed the relevance of chosen metrics for gauging each agency's effectiveness in serving Maryland voters. Recommended new metrics when appropriate.
- Coordinated with multiple agencies to publish the FY 2013 Tax Expenditures Report for the State of Maryland.
- Served as departmental representative to the Governor's StateStat Office and Revenue Monitoring Committee.

RW Ventures **January 2010 - August 2010**

Research Consultant, part-time. Chicago, IL.

- Analyzed neighborhood and property data to reduce regressivity of assessed valuation regression models.
- Researched and proposed energy and transportation infrastructure policy reforms.

Cook County Assessor's Office **June 2009 - August 2009**

Affordable Housing Analyst. Chicago. IL.

- Led project to gather, analyze, and model property and neighborhood data of affordable market housing properties.
- Presented findings and recommendations for reducing property tax regressivity to Cook County Assessor Jim Houlihan.

Mergermarket Group **January 2008 - August 2008**

Financial Reporter. New York, NY.

- Reported Latin American corporate and sovereign debt for *Financial Times* subsidiary.
- Built network of traders, analysts, and company executives to produce actionable intelligence on fixed-income financial instruments for infrastructure projects in developing countries.

Business News Americas **September 2006 - October 2007**

Financial Reporter. Santiago de Chile.

- Covered water, waste and infrastructure sectors in Mexico, Central America and the Caribbean for a proprietary online financial newswire. Interviewed high-level government and private-sector officials on major infrastructure projects.

Global English Advance **August 2005 - August 2006**

Professor of Business English. Santiago de Chile. Taught English courses to Chilean business professionals.

High Road Upper School **September 2004 - June 2005**

Teaching Assistant. Beltsville, MD. Educated special needs students for a public charter high school.

COMPUTER SKILLS MS Word, MS Access, Excel, MS Visual Basic for Applications, SPSS, STATA, EViews, QGIS, ArcGIS, SAS (Intermediate), IMPLAN, National Energy Modeling System, SimCCS.

LANGUAGE SKILLS Fluent in English and Spanish, intermediate Portuguese. TESOL Certificate.

MEMBERSHIPS Engineers Without Borders, WaterReuse, U.S. Association for Energy Economics, Energy Toastmasters.

PERSONAL RESEARCH Presentations evaluating options for oil and gas produced water reuse to the Ground Water Protection Council Underground Injection Control conferences (2018 and 2019), University of Tulsa International Petroleum Environmental Conference (2018), and University of New Mexico Center for Water and the Environment (April 12, 2019).

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EXHIBIT
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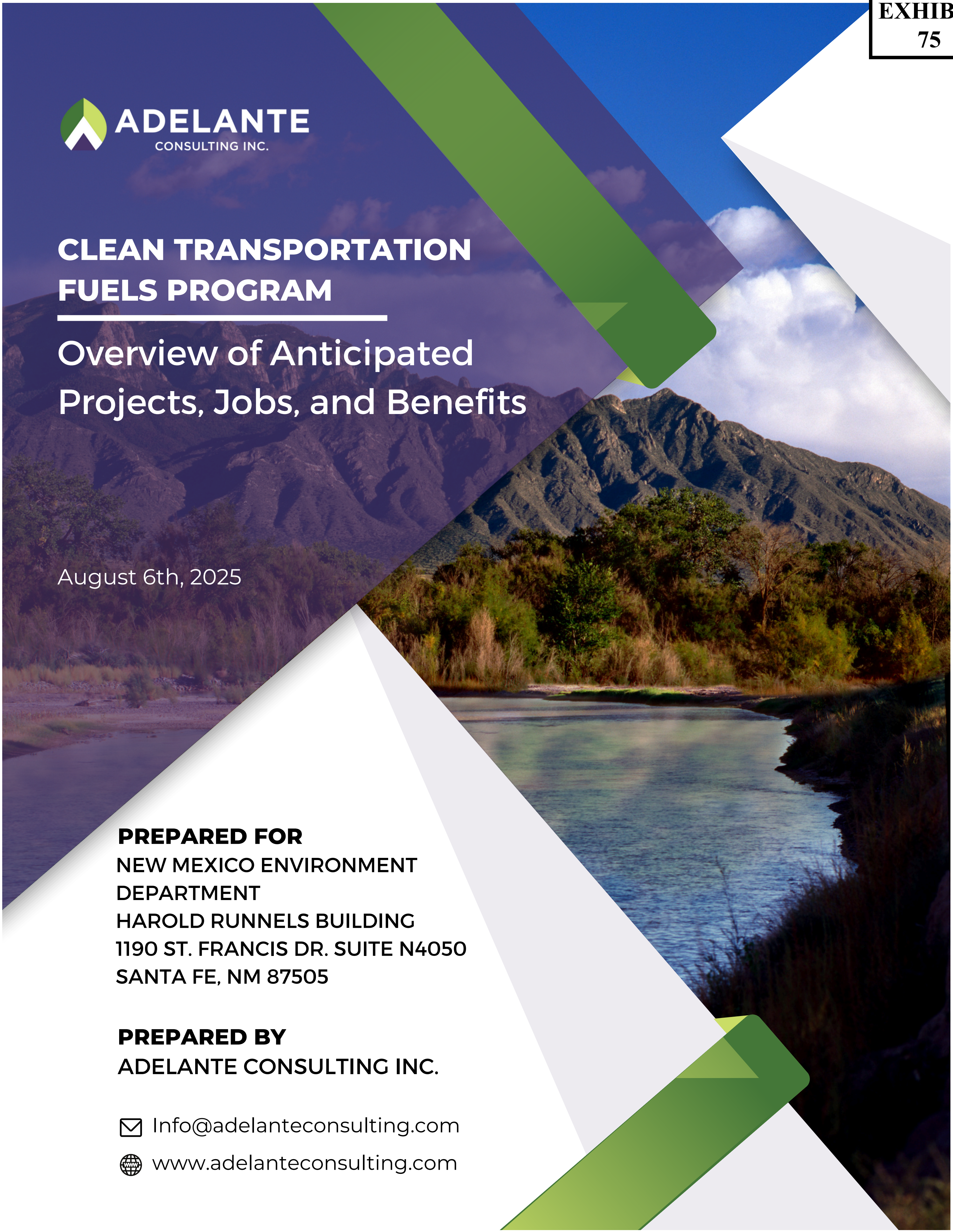

ADELANTE
CONSULTING INC.

CLEAN TRANSPORTATION FUELS PROGRAM

Overview of Anticipated Projects, Jobs, and Benefits

August 6th, 2025

PREPARED FOR
NEW MEXICO ENVIRONMENT DEPARTMENT
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New Mexico Environment Department

Clean Transportation Fuels Program: Overview of Anticipated Projects, Jobs, and Benefits

Prepared for:

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August 6, 2025

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Abbreviations and Acronyms

CCUS - Carbon Capture, Utilization and Sequestration
CI - Carbon Intensity
CNG - Compressed Natural Gas
CO_2 - Carbon Dioxide
CO_2e - Carbon Dioxide Equivalent
CTFS - Clean Transportation Fuels Standard
CTFP - Clean Transportation Fuels Program
DAC - Direct Air Capture
DME - Dimethyl Ether
EDUs - Electrical Distribution Utilities
EV - Battery Electric Vehicle
FSE - Fuel Supply Equipment
FTE - Full Time Employee
GHG - Greenhouse Gas
kWh - Kilowatt Hour
L - Liter
LCFS - Low-Carbon Fuel Standard
LNG - Liquified Natural Gas
NM - New Mexico
NMGC - New Mexico Gas Company
NO_x - Nitrogen Oxides
NREL - National Renewable Energy Laboratory
$PM_{2.5}$ - Particulate Matter with a Diameter of 2.5 Micrometers or Less
PNM - Public Service Company of New Mexico
REIA NM - Renewable Energy Industries Association of New Mexico
RNG - Renewable Natural Gas
SO_x - Sulphur Oxides
VOC - Volatile Organic Compounds
ZEV - Zero-Emission Vehicle

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Executive Summary

Adelante staff conducted research and interested party interviews to estimate the potential job creation opportunities that New Mexico's Clean Transportation Fuel Program (CTFP) could provide in the state. Adelante created estimates of fuel production and import projects spurred by the program, as well as a variety of types of directly attributable and supported jobs (excluding those related to fuel supply equipment). The Berkeley Research Group estimated fuel supply equipment jobs in a separate report. Adelante also conducted research to review the public, environmental, and social benefits of the proposed CTFP in New Mexico.

Adelante utilized information from 30 interviews of direct interested parties, prior reports, and public data sources to create estimates of projects, non-fuel supply equipment (FSE) jobs, and the value of those jobs. In total, Adelante found that 16 interested parties have plans for 19 new projects that are directly related to or supported by the CTFP. These projects include hydrogen, renewable natural gas (RNG), renewable methanol, ethanol, and synthetic fuel production including dimethyl ether (DME); carbon capture, utilization, and sequestration (CCUS); and decarbonization projects in the petroleum refining process including the utilization of waste heat to power. Counties where these potential projects will be located include Lea, Quay, Eddy, Taos, Bernalillo, Hidalgo, Chaves, Roosevelt, San Juan, and Torrance counties.

As a result of these interviews and research, Adelante conservatively estimated that 274 non-FSE jobs could be directly attributed to or supported by the CTFP over the next 15 years. The estimated economic impact in income from these jobs is $20.2 million annually and $212 million from the start of operations through 2040. Adelante drew the estimate of 274 jobs from 10 interested parties and this estimate compares favorably with Adelante's previous estimate of 378 direct non-FSE jobs from a 2022 report.[1] Some clean fuels production assets identified in the 2022 report remain available for use in future potential projects. Additional

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[1] Adelante prepared reports in 2021 and 2022 to evaluate the Clean Transportation Fuel Standard that considered not only capital investment but also the value of direct, indirect, and induced jobs that could be created by the regulation. Feedstock and resource summaries were created to forecast the potential that different geographic areas in New Mexico have to support one or more types of clean fuels projects. See Adelante Consulting, Inc., *New Mexico Clean Fuel Standard Economic Impact Analysis*. (New Mexico Environment Department, 26 January 2022). https://www.env.nm.gov/wp-content/uploads/2022/02/New_Mexico_Clean_Fuel_Standard_Economic_Impact_Analysis-Jan_26_2022.pdf (Accessed 2025-04-30).

interested party interviews indicated that the CTFP will create further jobs; therefore, New Mexico may still attain the previous estimate of 378 direct jobs.

In other jurisdictions that have adopted low carbon fuel standards, in addition to reducing the life cycle emissions of greenhouse gases (GHGs) from transportation fuel, those fuel standards have improved air quality. Thus the CTFP in New Mexico should garner the same benefits. The economic benefit of air quality improvement is over $1 billion in other states with similar programs, and New Mexico could see a similar impact.[2,3,4] The CTFP may also improve water quality, although previous studies indicate a potential increase in nitrogen and phosphorus levels in groundwater, lakes, and streams. The CTFP may lead to an increase or decrease in water usage depending on the type of fuel being produced.

Social benefits of the CTFP include supporting low-income and underserved communities in New Mexico in accessing clean transportation and affordable energy. New Mexico's proposed CTFP rule mandates that 50% of participating utilities' and automakers' net revenues shall fund projects that benefit these communities. The CTFP will also expand career opportunities for engineers, scientists, technicians, and service providers, in addition to helping create an environment that encourages ongoing investment in clean energy infrastructure. For fossil fuel legacy communities in the northwest and southeast of New Mexico, the CTFP is likely to help diversify regional and rural economies and support them in becoming more resilient to the volatile global fossil fuel markets.

Table 1. Summary of All Identified Projects

Interested Party	Interested Party Category	Number of Projects (non-FSE)	Anticipated Job Creation (non-FSE)	Anticipated Project Type (non-FSE)	Facility Location
Blue Pony Energy	Producer	1	81-100 FTEs	Hydrogen production	Lea County
Interested Party E	Producer	1	Not provided	RNG	Lea County

---

[2] California Air Resources Board. *CARB Updates the Low-Carbon Fuel Standard to increase access to cleaner fuels and zero-emission transportation options.*

[3] Y. Li, G. Wang, C. Murphy, & M.J. Kleeman. Modeling Expected Air Quality Impacts of Oregon's Proposed Expanded Clean Fuels Program. *Atmospheric Environment* 296 (2023). https://doi.org/10.1016/j.atmosenv.2023.119582 (Accessed 2025-04-30).

[4] BRG Energy & Climate. *Clean Fuel Standard Cost Benefit Analysis Report*.

				Production Facility	
Interested Party H	Producer	1	25 FTEs	Hydrogen, RNG, and fuel cell production	Quay County
Interested Party I	Producer	2	0 FTEs	Waste heat to power in petroleum refining process	Eddy and Lea Counties
Kit Carson Electric Cooperative	Producer	1	10 FTEs	Hydrogen production	Taos County
MAXX Energy	Producer	2	45 FTEs	Hydrogen production	Bernalillo and Hidalgo Counties
Oberon	Producer	1	30-40 FTEs	Renewable methanol, DME and hydrogen production	Location known but not shared
Interested Party X	Producer	1	2-5 FTEs	RNG production	Chaves County
Interested Party DD	Producer	1	15-20 FTEs	Natural gas to gasoline production	Lea, Eddy, Chaves, or Roosevelt County (Permian Basin)
Infinium	Producer	1	35-40 FTEs	Synthetic Fuel Production	Not provided
Interested Party P	Producer	2	Not provided	Hydrogen Power Plant & Production	San Juan County & Lea County

				Facility	
Interested Party Z	Producer	1	Not provided	Electric Natural Gas Production Facility	Not provided
Avangrid, Inc	Producer	1	Not Available	Hydrogen Production	San Juan/ Torrance County
Mozart Devco	Producer	1	Not Available	Hydrogen Production	North central NM
Navitas	Producer	1	31 FTEs	Renewable Ethanol	Roosevelt County
CapturePoint	Carbon Management	1	Not Available	Carbon Capture & Sequestration	Lea County
Totals		**19**	**274***[*]*		

[*] Total of minimum number of anticipated jobs if a range was provided.

Part 1: Estimation of In-State CTFP Production and Import Projects

Introduction

This section provides an estimate of the scope and scale of potential in-state clean transportation fuel production and importation projects in New Mexico related to or supported by the CTFP. Adelante drew these estimates from direct interested party interviews, prior reports, and public data sources. Adelante assessed these opportunities by location, fuel type and clean fuel production methods, and considered anticipated impacts on statewide and local job quality.

Adelante contacted fifty-four interested parties for interviews, and completed 30 interviews. Adelante gathered additional information from publicly available sources for identified potential interested parties who were unable to participate in interviews.

Data Summary

Adelante and the New Mexico Environment Department created a list of potential interested parties.[5] While the main focus of this report is non-FSE projects and related jobs, several identified interested parties did reference potential fuel supply equipment projects and jobs, and therefore, the report notes and includes any potential FSE projects and jobs referenced by interested parties for informational purposes.

- **Total interested parties identified:** 54
- **Total interviews completed:** 30
- **Interviewed interested parties with identified projects:** 9
- **Interviewed interested parties with early-stage projects:** 3
- **Non-interviewed interested parties with identified projects:** 3
- **Additional projects identified through supplemental research:** 1
- **Key project types (non-FSE):** Hydrogen, ethanol, RNG, methanol, natural gas to gasoline, waste heat to power, synthetic fuels including DME, and CCUS.

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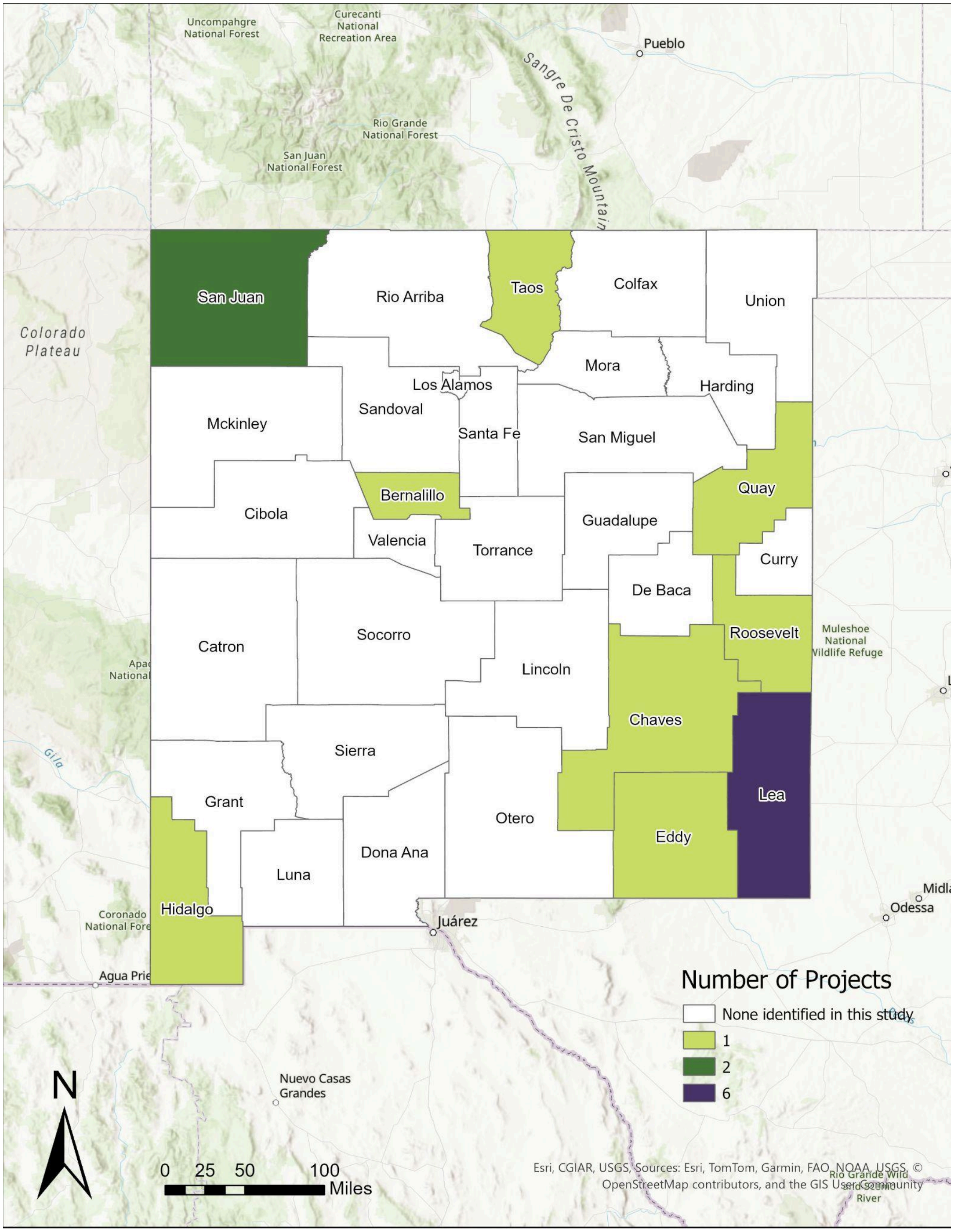
[5] All interviewed entities have been anonymized unless given express permission to share potential project information.

Figure 1. Proposed Projects Connected to Promulgation of CTFP as of August 2025



**This map includes 15 identified and early-stage non-FSE projects from nine interviewed and three non-interviewed interested parties. This map does not include identified or early-stage projects from four interested parties that were unable to provide a county-level location of their anticipated project at this time.*

The project details presented in this report were based on information provided by interested parties as well as publicly available research at the time of data collection. Inclusion of these details does not imply verification, endorsement, or assurance of project completion.

Findings: Interviewed Interested Parties

Interviewed Interested Parties: Identified Non-FSE Projects

Adelante gathered the insights below through direct interested party interviews and focused on current and proposed clean transportation fuel projects across New Mexico. These projects have taken concrete steps along the planning phase, e.g., a site has been selected, anticipated job creation numbers are available, and/or preliminary infrastructure planning or permit planning has commenced. Interested parties in this category reflect a wide range of technologies including hydrogen, renewable natural gas, ethanol, methanol, and synthetic fuel; and emerging carbon removal technologies. For many interested parties, the CTFP is the catalyst driving exploration of new opportunities in New Mexico. For others, it provides critical support and policy alignment that helps advance projects that were already under consideration or development prior to the program's introduction. Of the 30 interviews conducted, 9 interested parties stated they are planning a new project associated with the CTFP in New Mexico, as shown in *Table 2*.

Table 2. Interviewed Interested Parties: Identified Non-FSE Projects

Interested Party Interviewed	Interested Party Category	Number of Projects (non-FSE)	Anticipated Job Creation (non-FSE)	Anticipated Project Type (non-FSE)	Facility Location
Blue Pony Energy	Producer	1	81-100 FTEs	Hydrogen production	Lea County
Interested Party E	Producer	1	Not provided	RNG Production Facility	Lea County
Interested	Producer	1	25 FTEs	Hydrogen,	Quay

Party H				RNG, and fuel cell production	County
Interested Party I	Producer	2	0 FTEs	Waste heat to power in petroleum refining process	Eddy and Lea Counties
Kit Carson Electric Cooperative	Producer	1	10 FTEs	Hydrogen Production	Taos County
MAXX Energy	Producer	2	45 FTEs	Hydrogen production	Bernalillo and Hidalgo Counties
Oberon	Producer	1	30-40 FTEs	Renewable methanol, DME and hydrogen production	Location known, but not shared
Interested Party X	Producer	1	2-5 FTEs	RNG production	Chaves County
Interested Party DD	Producer	1	15-20 FTEs	Natural gas to gasoline production	Lea, Eddy, Chaves, or Roosevelt County (Permian Basin)

Project Overviews

Blue Pony Energy, a hydrogen production company, is actively exploring a project in Lea County, New Mexico. The company anticipates creating 81–100 full-time positions and has expressed a strong commitment to hiring locally, aiming to provide stable, long-term employment in a region historically shaped by cyclical job markets. The company is considering New Mexico in large part due to the state’s emerging CTFP. Access to rail infrastructure was also a key factor in selecting the region.[6]

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[6] Blue Pony Energy. [Interview]. (4 March 2025).

An RNG provider, Interested Party E, is closely monitoring the rollout of the CTFP as it considers future expansion in the state. The company currently operates eight fueling stations across New Mexico, and expressed strong interest in scaling its presence once the program is fully implemented by adding additional fueling stations. The CTFP enhances the competitiveness of RNG by allowing it to better compete with diesel on price. Their existing stations currently serve refuse trucks, transit fleets, and heavy-duty vehicles, and the company sees an opportunity for growth as clean fuel adoption increases. They also highlighted the potential for broad local economic benefits, including partnerships with dairy farms supplying biomethane, as well as opportunities for local contractors involved in road improvements, digester construction, and station development.[7] Additionally, a joint venture partner with Interested Party E announced in a press release in May 2024 that an RNG production facility will be under development in Lea County, New Mexico. The company expects the project to be completed in 2026.[8,9]

Interested Party H, a science and engineering organization based in Quay County, New Mexico, is engaged in research and development across multiple clean energy technologies, including fuel cells (fueled by methanol or ethanol), solar cells, anaerobic digestors, and catalytic reactors. The company currently employs three individuals. The organization has partnered with another science and engineering organization and is actively working to retrofit a former idled ethanol plant facility, a site originally identified in Adelante's 2022 report as a potential candidate for redevelopment into a cellulosic ethanol plant.[10] Their project focuses on anaerobically digesting local manure, whey wastewater, and effluent wastewater to produce cost-effective organic fertilizer for regional farmers, while simultaneously capturing and purifying methane, hydrogen, and carbon dioxide for clean fuel production. Photovoltaics will power the fuel production process. Once operational, the project anticipates creating approximately 25 permanent jobs, with a focus on local hiring. The project anticipates initial operations to generate around 9 megawatts of energy, with the potential to scale up over time. The company plans to participate in New Mexico's CTFP. The facility is currently being retrofitted.[11]

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[7] Interested Party E. [Interview]. (27 February 2025).

[8] Maas Energy Works, *Renewable Energy Projects*. (2024). https://www.maasenergy.com/projects (Accessed 2025-04-30).

[9] Interested Party E. [Interview].

[10] Adelante Consulting, Inc., *New Mexico Clean Fuel Standard Economic Impact Analysis*.

[11] Interested Party H. [Interview]. (21 March 2025).

Interested Party I, one of New Mexico's oil and gas producers, with significant operations in the Permian Basin, is exploring opportunities to integrate expansions that align with the CTFP. With facilities in Eddy and Lea counties and a workforce of approximately 500 employees, the company anticipates maintaining stable employment and production levels while integrating innovative technologies into its operations. Notably, it has deployed a 90-acre solar photovoltaic system to power its hybrid solar compression station that would otherwise be driven by natural gas engines. In addition, they plan to utilize additional measures like waste heat to power at both sites in Eddy and Lea counties. The company emphasized the importance of ensuring the CTFP remains adaptable to accommodate emerging technologies and evolving decarbonization strategies.[12]

Kit Carson Electric Cooperative (KCEC) is a member-owned electric distribution cooperative serving Taos, Colfax, and Rio Arriba Counties in northern New Mexico. In recent years, KCEC has been actively developing a hydrogen project aimed at providing long-duration energy storage and fueling solutions for heavy-duty vehicles in Taos County, including in the communities of Questa, Taos Pueblo, and Picuris Pueblo. KCEC indicated during an interview that they plan to participate in the CTFP once the hydrogen project becomes operational.[13] The project will develop in several phases. Phase I will focus on creating hydrogen facilities co-located with renewable energy infrastructure, using solar energy to drive hydrogen production and utilizing reclaimed wastewater from the shuttered Chevron Questa molybdenum mine and Superfund site.[14] According to an August 2023 Intermediate Feasibility Study led by the National Renewable Energy Laboratory (NREL) with participation from KCEC and Chevron, Phase I ("Facility A") will be a long-duration storage project supporting the local energy network and creating approximately 10 permanent jobs at the Chevron Tailing Facility. Phase II ("Facility B") will involve establishing a heavy-duty fuel cell vehicle fueling station at the former mine site that KCEC estimates will support approximately 1.25 permanent jobs.[15] In January 2025, KCEC announced that it would receive $231 million in federal funding through the USDA Rural Utilities Service (New ERA

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[12] Interested Party I. [Interview]. (12 March 2025).

[13] Kit Carson Electric Cooperative. [Interview]. (7 March 2025).

[14] Kit Carson Electric Cooperative. *Kit Carson Electric Cooperative Selected as Finalist for $95.6 Million Award from Empowering Rural America (New ERA) Program through the U.S. Department of Agriculture (USDA) Rural Utilities Service for Innovative Green Hydrogen Energy Project in New Mexico*. (2024). https://kitcarson.com/wp-content/uploads/2024/09/KCEC-ERA-Award-.pdf (Accessed 2025-04-30).

[15] Kit Carson Electric Cooperative. *Green Hydrogen Energy Production in Questa: Intermediate Feasibility Study Results*. (2023). https://kitcarson.com/electric/electric-info/green-hydrogen-energy-production-in-questa/ (Accessed 2025-04-30).

Program) to advance the hydrogen project.[16] Construction of the project is expected to create approximately 350 temporary construction jobs. KCEC leadership has emphasized their commitment to robust community engagement, including consultations with Chevron regarding the use of reclaimed wastewater and ongoing outreach to impacted communities.

Maxx Energy is advancing plans to develop hydrogen production using renewable energy infrastructure and existing fueling infrastructure across New Mexico, with a focus on supporting long-haul, zero-emission freight transportation. The company is proposing two hydrogen production facilities and six fueling stations, strategically located along the I-40 and I-10 corridors. Bernalillo, Guadalupe, Cibola, Doña Ana, and Hidalgo counties are under consideration for both fueling stations and production facilities. A few of these sites are well-positioned to contribute to the Houston to Los Angeles (H2LA) Corridor, also known as the I-10 Hydrogen Corridor, a regional initiative to establish a zero-emission freight transportation route supported by a network of hydrogen fueling stations and related infrastructure for heavy-duty vehicles.[17] The goals of the H2LA Corridor closely align with the CTFP, which incentivizes low-carbon fuel deployment and could help accelerate hydrogen infrastructure development along these critical freight corridors. Maxx Energy anticipates hiring approximately 25 employees initially, with plans to scale up to 105 full-time positions. Staffing projections include about 10 employees per facility, with an estimated workforce of 60 FSE employees and 45 non-FSE employees.[18]

Oberon Fuels, a renewable fuels company specializing in renewable methanol, dimethyl ether (DME), hydrogen, and low-carbon LPG, is actively exploring project opportunities in New Mexico, driven in large part by the state's CTFP. The company is currently conducting feasibility studies on several sites, with plans to develop at least one production facility in the state. The facility is expected to support 30–40 full-time employees, with a commitment to prioritizing local hiring. In addition to onsite operations, the company highlighted that collecting and transporting feedstocks will create further job opportunities in logistics and supply chain roles. New Mexico's location offers strategic advantages, positioned

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[16] Kit Carson Electric Cooperative. *KCEC USDA RUS New ERA $231 Million Announcement*. (2025). https://kitcarson.com/wp-content/uploads/2025/01/KCEC-USDA-RUS-New-ERA-231-Million-.pdf (Accessed 2025-04-30).

[17] B. Sowa. *Houston to Los Angeles (H2LA) – Interstate 10 Hydrogen Corridor Project*. (GTI Energy, 2024). https://www1.eere.energy.gov/vehiclesandfuels/downloads/2024_AMR/TI163_Sowa_2024_o.pdf (Accessed 2025-04-30).

[18] Maxx Energy. [Interview]. (21 February 2025).

between California and Texas, where clean fuels are in high demand, and with proximity to ports for fuel distribution, making it a highly viable site for expansion.[19]

Interested Party X, a renewable energy company specializing in the conversion of agricultural and industrial waste, along with renewable biomass feedstocks, into RNG and sustainable co-products, is currently operating in New Mexico. The company currently has five employees and anticipates expanding its workforce by an additional two to five positions. Future growth could involve either increasing production at its existing facility in Chaves County or developing a new facility elsewhere in the state.[20]

Interested Party DD, a clean fuels company specializing in syngas-to-liquid conversion, is exploring future operations in New Mexico, drawn by the state's CTFP. The company's process converts a variety of feedstocks including biomass, municipal solid waste, and natural gas into gasoline or methanol. While it is not currently active in New Mexico, the company plans to operate in New Mexico with the development of a production facility in the future, with potential sites in Lea, Eddy, Chaves, or Roosevelt counties. Once operational, the facility would support approximately 15–20 full-time employees. The company is committed to reducing greenhouse gas emissions from oil fields by utilizing natural gas that might otherwise be flared or vented.[21]

Identified Projects: Fuel Supply Equipment

Nuvve Holding Corp., specializing in grid modernization and vehicle-to-grid (V2G) technology, has established a New Mexico-based subsidiary, Nuvve New Mexico LLC, to support the execution of a recently awarded contract with the State of New Mexico.[22] This regional branch will oversee project implementation and serve as the company's in-state presence. Nuuve views the CTFP as a valuable incentive, because it offers an additional revenue stream that helps lower the total cost of ownership for electrified fleets and makes EV adoption more financially viable. The company plans to participate in the CTFP once its infrastructure is in

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[19] Oberon Fuels. [Interview]. (25 February 2025).

[20] Interested Party X. [Interview]. (4 April 2025).

[21] Interested Party DD. [Interview]. (7 March 2025).

[22] Nuvve Holding Corp. *Nuvve Awarded State of New Mexico Contract to Accelerate EV Infrastructure and Renewable Energy Development*. (2025). https://investors.nuvve.com/news-releases/news-release-details/nuvve-awarded-state-new-mexico-contract-accelerate-ev (Accessed 2025-04-30).

place, with project locations anticipated in both rural and urban areas. Currently, the New Mexico office employs one staff member in Bernalillo County, with plans to add an additional employee to the New Mexico office in the near term, with potential to grow the team as projects advance. Nuvve New Mexico LLC will partner with local engineering, procurement, and construction firms to complete physical infrastructure buildout.[23]

Interested Party V, an electric vehicle manufacturer, recently announced plans to expand its fast-charging network in New Mexico, with two stations now confirmed, one in Bernalillo County and another in McKinley County. The company emphasized that the CTFP would directly improve the economics of operating and scaling its charging infrastructure in the state. In addition to supporting emissions reduction goals, the program could create new opportunities for local economic participation. For example, independently owned gas stations and convenience stores could serve as host sites for chargers, allowing them to earn revenue and potentially access clean fuel credits, bringing localized benefits to communities while supporting broader clean transportation goals.[24]

Interested Party AA, a large electric vehicle manufacturer, plans to actively participate in New Mexico's CTFP through the expansion of its fast-charging network. Nine new stations are currently in development across the state over the next year. The company noted that the CTFP accelerates its rollout timeline by improving the financial viability of charger deployment, reducing reliance on utilization rates or vehicle sales thresholds when planning new locations. While only one service technician is currently based in New Mexico, the growing charger network is expected to create additional jobs, with a focus on hiring local repair technicians to support operations. The company also highlighted broader economic ripple effects: charger sites are typically co-located with convenience stores and retail areas, where increased traffic and 5–25 minute dwell times can boost business for host sites.[25]

Interviewed Interested Parties: Early-Stage Projects

Several interested parties have expressed that the start of a CTFP has caused them to consider New Mexico for a project or begin early conceptual project

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[23] Nuvve New Mexico LLC. [Interview]. (23 April 2025).
[24] Interested Party V. [Interview]. (17 March 2025).
[25] Interested Party AA. [Interview]. (7 March 2025).

planning; however, these entities were not far enough along in the process to provide a project location or an estimate of anticipated jobs that their project would create, nor had they planned for infrastructure or permit needs at the time of the interview. Three interested parties were planning early-stage non-FSE projects.

Table 3. Interviewed Interested Parties: Non-FSE Early-Stage Projects

Interested Party Interviewed	**Interested Party Category**	**Number of Projects (non-FSE)**	**Anticipated Job Creation (non-FSE)**	**Anticipated Project Type**	**Facility Location**
Infinium	Producer	1	35-40 FTEs	Synthetic Fuel Production	Not provided
Interested Party P	Producer	2	Not provided	Hydrogen Power Plant & Production Facility	San Juan County & Lea County
Interested Party Z	Producer	1	Not provided	Electric Natural Gas Production Facility	Not provided

Project Overviews

Interested Party J, a local economic development organization in northwest New Mexico, is actively advancing several hydrogen-related initiatives aimed at positioning the region as a clean energy and transportation innovation hub. Working with a private consultant, the group has developed plans for a multi-fuel commercial fueling station, including hydrogen, that could support regional trucking and logistics, with plant designs already in place. While recent federal funding decisions, including non-selection as a hydrogen hub, have introduced some uncertainty, having detailed project concepts ready is an advantage. In parallel, the organization is developing an autonomous vehicle testing track facility for large vehicles, with the proposed hydrogen station envisioned as a complementary asset. Broader plans include a hydrogen power plant and hydrogen-powered industrial park centered around a decommissioned generating station, both of which remain promising if supportive federal incentives including the Clean Hydrogen Production Tax Credit among others in the Inflation Reduction Act[26] are maintained.[27]

Infinium produces ultra-low carbon synthetic fuels, gas-to-liquid conversion solutions, and patented technology platforms designed to support the rapidly evolving energy industry. The company is actively exploring opportunities in New Mexico in anticipation of the CTFP, though a specific site has not yet been identified. Ideally, a future facility would be located near the Kinder Morgan pipeline and have access to direct renewable energy inputs, such as wind or solar electricity. Infinium's production sites operate 24/7 and typically support 35–40 full-time employees, with hundreds of additional jobs created during construction. The company also emphasized the potential value of local engineering services and fabrication capabilities to support the development of large-scale, heavy industrial equipment required for its facilities.[28]

Interested Party P, an energy infrastructure developer focused on decarbonization for utility and industrial customers across the western U.S., currently has two sites in New Mexico, one in San Juan County and another in Lea County, both primarily focused on energy generation. As part of a broader clean energy strategy, the

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[26] U.S. Department of Energy. *Financial Incentives for Hydrogen and Fuel Cell Projects.* (2023). https://www.energy.gov/eere/fuelcells/financial-incentives-hydrogen-and-fuel-cell-projects#:~:text=Clean%20Hydrogen%20Production%20Tax%20Credit,detailed%20in%20the%20following%20table (Accessed 2025-05-20).

[27] Interested Party J. [Interview]. (11 March 2025).

[28] Infinium. [Interview]. (7 March 2025).

company is incorporating clean hydrogen, which could serve not only electricity needs but also fuel transportation applications in the future. New Mexico's strategic location offers a strong advantage, with the ability to produce hydrogen cost-effectively and export it to high-demand markets like California.[29]

Interested Party Z, a clean fuels company specializing in hydrogen and synthetic fuels, is conducting early feasibility studies for a potential project in New Mexico. The company produces hydrogen using renewable energy and then combines it with recycled CO_2 to create a drop-in fuel known as e-NG (electric natural gas), which can be used immediately in existing infrastructure by industrial, shipping, and transportation customers. New Mexico's established downstream infrastructure and its strong policy focus on clean energy leadership make the state an appealing location compared to other regions. The company is conducting early feasibility studies for a small plant in New Mexico, and they believe development would involve a significant number of construction jobs and a smaller permanent workforce once operational. The company also sees opportunities for local supply chain participation, depending on in-state manufacturing capacity, including roles for tank and pipe manufacturers, electricians, and energy services professionals.[30]

Interviewed Interested Parties: Observational Interested Parties & Potential Future Participants

Several interviewed interested parties noted that they do not currently anticipate new projects or workforce changes related to the CTFP, but are actively monitoring its development for future opportunities. Several entities also expressed interest in participating as a fuel end-user. Additionally, research entities and trade associations were interviewed and, although they are not direct project developers, they did detail opportunities for New Mexico to explore.

Producers

As referenced in Adelante's 2022 report, Dominion Energy was exploring an RNG project in New Mexico, centered on capturing methane from dairy operations with approximately 10,000 head of cattle, located less than 10 miles from an existing natural gas pipeline.[31] While the project showed early promise, the company confirmed in February 2025 that it no longer has current or future plans for RNG

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[29] Interested Party P. [Interview]. (5 March 2025).
[30] Interested Party Z. [Interview]. (26 February 2025).
[31] Adelante Consulting, Inc., *New Mexico Clean Fuel Standard Economic Impact Analysis*.

development in the state.[32] However, the area still holds potential for other clean fuels projects, given its proximity to agricultural waste resources and existing energy infrastructure.

Interested Party Y is a national energy company with operations in over 40 states providing propane, heating oil, and refined fuels, and marketing natural gas and electricity in deregulated markets. With a workforce of nearly 3,300 employees and approximately 700 service locations, the company serves around 1 million residential, commercial, industrial, and agricultural customers across the country. In New Mexico, their current operations focus on the retail sale of propane for a wide range of end uses, including home heating, commercial and agricultural applications, industrial processes, and motor vehicle fuel. As of last year, they served about 7,300 customers in the state with a team of 35 employees composed of service technicians, delivery drivers, and customer service representatives. In California, the company has invested in RNG production with LCFS carbon intensity (CI) scores as low as -300, and supplies renewable propane with a CI score around 30 to customers operating fleet vehicles. Because renewable propane is a drop-in replacement for conventional propane, it requires no changes to existing vehicles or infrastructure offering an immediate, low-barrier pathway to emissions reductions. Many school buses and forklifts already operate on propane, making this a high-impact opportunity for sector-specific decarbonization. Although there are no current plans to develop a fuel production facility in New Mexico, the implementation of the CTFP could make the state a more attractive investment location. Should production move forward, it would likely result in job creation to support expanded operations. More broadly, the company anticipates increasing its use of clean fuels across its business.[33]

End-Users

BNSF is a freight operation company that operates 32,500 miles of rail in the United States. The company fuels a major portion of its operations at its Belen, New Mexico location, where it uses approximately 1.2 billion gallons of diesel annually. In 2023, the company supported 1,332 jobs in the state and is now actively exploring a transition to renewable diesel, a cleaner-burning alternative that reduces particulate and GHG emissions, improves combustion efficiency, and lowers maintenance costs. While current in-state production of renewable diesel cannot yet meet BNSF’s demand, this shortfall highlights a significant opportunity

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[32] Dominion Energy. [Interview]. (20 February 2025).

[33] Interested Party Y. [Interview]. (25 February 2025).

for growth. The implementation of the CTFP, along with increased fuel throughput and the associated shift toward cleaner alternatives could drive incremental job growth and expand rail activity statewide.[34]

Interested Party M, a mineral extraction and processing operation based in Eddy County, New Mexico employs approximately 300 people and could play a role in supporting the biofuel supply chain particularly by providing inputs to ethanol producers. The company did have concerns that the CTFP could negatively impact their workforce. However, the company has expressed openness to adopting alternative fuels such as renewable diesel, provided the cost is on par with dyed diesel, which powers most of their heavy equipment.[35,36] Based on the proposed CTFP rule, dyed fuel is exempt from generating deficits through December 31st, 2028.[37]

Union Pacific Railroad, a major freight rail operator with a national footprint, plays a vital role in the U.S. supply chain, connecting 23 states across the western two-thirds of the country. In New Mexico, Union Pacific Railroad operates 618 miles of track and maintains key infrastructure, including an intermodal facility and refueling station in Doña Ana County. It provides essential rail services to multiple commercial and industrial customers across the state. Currently, the company supports 301 direct employees and 178 contractors in New Mexico, and expects those workforce numbers to remain steady in the near term. Looking ahead, the company has signaled its intent to become a significant end-user of clean fuels.[38]

Interested Party CC, a delivery company with nearly 2,000 employees in New Mexico, has made substantial progress in decarbonizing its fleet by shifting from diesel to RNG. In 2024 alone, this transition displaced approximately 1.6 million gallons of diesel in the state.[39] A CTFP would help accelerate these efforts by lowering the cost of clean fuels and supporting further expansion of the company's RNG-powered fleet. They also expressed strong interest in higher ethanol blends for gasoline, noting that their gasoline use in the state is comparable to their RNG consumption. The company is particularly drawn to RNG

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[34] BNSF. [Interview]. (6 March 2025).
[35] Interested Party M. [Interview]. (14 March 2025).
[36] "Dyed Diesel" is off-road diesel not intended to be used for vehicles driven on the road and is used for heavy equipment and does not have state and federal taxes. https://www.ricochetfuel.com/blog/dyed-diesel-fuel-vs-regular-diesel-whats-the-difference/
[37] New Mexico Environment Department. *Discussion Draft Rule Regarding the Clean Transportation Fuel Program*. (2024). https://service.web.env.nm.gov/urls/mdXHJqrs (Accessed 2025-04-30).
[38] Union Pacific Railroad. [Interview]. (21 March 2025).
[39] Interested Party CC. [Interview]. (13 March 2025).

sourced from landfills and municipal systems. Broader access to low-carbon fuels, like renewable diesel, which is currently limited to states with clean fuel standards would be a critical asset in helping the company meet its carbon reduction goals. They have made it clear that their strategy embraces a full range of alternative fuels, including RNG, compressed natural gas (CNG), and EVs. They emphasized that a successful CTFP should maximize flexibility and provide robust incentives across all technologies allowing producers and users alike to adopt the solutions that best match their operational and environmental needs.

FSE

Interested Party D, an EV charging company with a national footprint, designs, manufactures, and sells both charging hardware and networked software, while also operating the communication network that connects each station. The company typically does not own the charging stations; it sells them to site hosts and commercial customers. Currently, there are over 500 of their commercial charging stations operating in New Mexico, alongside a growing number of residential chargers. While the company only has a small direct workforce in the state, 1 or 2 employees, it maintains a strong local presence through a network of channel partners. These local electricians and distributors stock equipment in warehouses across New Mexico and support charger installation and maintenance. The company anticipates that charger deployment in New Mexico will accelerate once the CTFP is in place. As EV adoption increases so will the demand for charging infrastructure. This demand will likely drive growth in the local installer and distributor network as well.[40]

Trade Organizations & Research Entities

Interested Party A, a national organization involved in state-level carbon removal policy and advocacy, emphasized New Mexico’s strong potential as a hub for carbon removal technologies, including direct air capture (DAC). While DAC may not be included in the initial phase of the CTFP, the organization sees the program as an important incentive that could help attract future projects to the state provided permitting processes can keep pace. They noted that New Mexico's unique geography and climate, combined with access to renewable energy and storage potential, position it well for large-scale DAC deployment. During the interview, they referenced the Spiritus pilot facility at Nambé Pueblo as a model project and underscored the need for the CTFP to remain flexible and open to crediting emerging technologies, as California’s LCFS allows DAC projects

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[40] Interested Party D. [Interview]. (7 March 2025).

worldwide to generate credits.[41] The organization also pointed to recent research highlighting New Mexico's long-term potential in this sector. A 2023 study by the Rhodium Group ranks New Mexico as having the second-highest projected mid-century (2050) deployment and economic opportunity for DAC in the U.S. By 2050, this could translate to between 17,400 and 75,540 temporary construction jobs tied to DAC plant capital investment and between 18,800 and 81,650 permanent jobs in DAC plant operations, depending on deployment scale.[42] Capital investment jobs include construction trades workers, executives and business operations, machinery installers, maintenance and repairers, engineers, metal workers and assemblers, production occupation and more. DAC plant operations jobs include metal workers, executives and business operations, machinery installers, maintenance and repairers, engineers, production occupation, freight movers and more. The study used IMPLAN's state-level economic model for the employment analysis. Additionally, a case study by ICF Resources analyzing a large-scale pyrolyzer production facility for Charm Industrial in Colorado estimated the creation of 62,000 jobs by 2040, offering a possible parallel for New Mexico if similar facilities are developed.[43] The organization also noted that pipeline infrastructure would be a critical enabler for DAC-related growth.

Interested Party F is a national clean fuels trade association that represents the full value chain of biodiesel, renewable diesel, and alternative jet fuel (sometimes referred to as sustainable aviation fuel) bringing together producers, feedstock suppliers, and fuel distributors.[44] According to the association, one former New Mexico-based member, has maintained engagement and is already participating in California's LCFS, positioning them well to benefit from a similar market structure in New Mexico. The presence of an in-state producer is especially important for fostering local supply, economic activity, and resilience in the clean fuels sector. Several members of the association, including a major freight rail operator, have taken active steps to engage with the New Mexico Environment Department, aligning their corporate sustainability goals with increased renewable

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[41] Interested Party A. [Interview]. (11 March 2025).

[42] W. Jones, E.G. O'Rear, H. Kolus, M. Gaffney, M. Adeyemo, N. Dasari, B. King, & J. Sohal. *Direct Air Capture Deployment and Economic Opportunity: State-by-State*. (Rhodium Group, 2024). https://rhg.com/research/direct-air-capture-deployment-and-economic-opportunity-state-by-state/ (Accessed 2025-04-30).

[43] ICF Resources, L.L.C. *Economic Impacts of Charm Industrial's Carbon Removal Technology*. (2023). https://a.storyblok.com/f/124722/x/145a45e124/economic-impacts-of-charm-investments-final-report-08-25-23.pdf (Accessed 2025-04-30).

[44] Alternative jet fuel is an alternative fuel made from non-petroleum feedstocks that reduce emissions from air transportation. Potential feedstocks include, but are not limited to, the food and yard waste portion of municipal solid waste, woody biomass, fats/greases/oils, and other feedstocks.

fuel use. Although the rail company currently fuels at a nearby industrial hub just outside El Paso, it has the capacity to distribute clean fuels into New Mexico, enhancing in-state availability and supporting broader market growth. Other association members, including companies with operations in the Midwest and Gulf Coast, have expressed serious interest in expanding into New Mexico. The state's strong commitment to clean fuels sends a clear market signal. Additionally, New Mexico offers valuable feedstock opportunities, with ranching operations that can supply tallow and dairies that generate manure, both useful inputs for renewable fuel production. The trade association sees emerging potential among businesses like truck stops, hotels, and casinos, which may be well-positioned to offer renewable fuels at retail sites.[45]

Interested Party K, a national biofuel trade association, noted that New Mexico is likely to remain a net importer of bioethanol. To strengthen in-state infrastructure and market access, the group recommended a state-level version of the Higher Blends Infrastructure Incentive Program, which helps offset the cost of upgrading equipment for the production, storage, and distribution of higher-blend biofuels.[46] They also emphasized the importance of targeted incentives for alternative jet fuel, given its growing role in decarbonizing the transportation sector. As an example of potential economic impact, a similar initiative in Indiana, where $15 million was invested in a biofuel tax credit was projected to generate a $104 million increase in state GDP.[47] Critical infrastructure priorities include upgrading fuel terminals, ensuring compatibility of underground storage tanks and dispensing equipment with biofuels, and expanding storage and distribution capacity. These upgrades would not only support fuel availability but also create additional jobs across engineering, construction, and maintenance sectors.[48]

Policy Recommendation
Implement a state-level version of the Federal Higher Blends Infrastructure Incentive Program

Interested Party O, a national research laboratory based in New Mexico, is actively advancing biofuels research aimed at converting domestic biomass and waste

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[45] Interested Party F. [Interview]. (24 February 2025).
[46] U.S. Department of Agriculture, Rural Development. *Higher Blends Infrastructure Incentive Program*. (n.d.). https://www.rd.usda.gov/HBIIP (Accessed 2025-04-30).
[47] J. M. Urbanchuk. *Impact of HB 1127 Biofuels Tax Credit on the Indiana Economy*. (ABF Economics, 2025).
[48] Interested Party K. [Interview]. (07 March 2025).

carbon resources into affordable, sustainable energy and bioproducts. According to a senior scientist at the lab, New Mexico holds significant untapped potential for project development and job growth across multiple clean fuel pathways. For example, marginal lands and wastewater could be used to grow energy crops creating new agricultural opportunities and allowing experienced agricultural workers to transition into the clean energy workforce. Anaerobic digesters could be deployed more widely to convert organic waste into biogas, which can be blended into existing natural gas pipelines with minimal infrastructure changes. Pyrolysis, a technology with limited deployment in the state, could be used to convert waste wood into biofuels while helping reduce wildfire risk, an approach noted in Adelante's 2022 report. Interested Party O is also leading an alternative jet fuel project that showcases the state's potential to lead in next-generation fuel technologies, opening the door for future projects, partnerships, and specialized jobs in clean fuel production.[49]

Interested Party R, an oil and gas trade association, is actively engaged in offering input on the proposed CTFP through a dedicated working group. The trade association representative interviewed indicated that thus far, Interested Party R is not aware of any expected impacts to the existing workforce of its member companies.[50]

Interested Party U, a New Mexico-based technology development firm traditionally focused on research and development for the U.S. Department of Defense has recently expanded its collaborations to include researchers and small businesses working on a range of clean fuel technologies. These efforts span electrolytic hydrogen, DAC, fuel cell innovation, biomethane production, and converting plastic waste into energy. The company is particularly focused on helping bring clean fuel innovations that are currently outside the state into New Mexico. They emphasized that New Mexico could serve as an ideal testbed for a clean fuels program, one that could serve as a national model. Given its abundant energy resources, the state is well-positioned to become a clean fuel exporter.[51]

Interested Party W, an independent nonprofit organization focused on reducing global greenhouse gas emissions through energy system transformation, highlighted New Mexico's unique position in the clean fuels landscape. Strategically located between two federally supported hydrogen hubs, one in

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[49] Interested Party O. [Interview]. (07 March 2025).

[50] Interested Party R. [Interview]. (07 April 2025).

[51] Interested Party U. [Interview]. (17 March 2025).

Texas and one in California, New Mexico has a long-standing history as an energy-producing state, which could make it an effective proving ground for clean fuel initiatives that might later scale to other regions. According to the organization, workforce development is a key need for advancing hydrogen and synthetic fuels, particularly training for new refueling technologies and safety protocols. As electrification increases, there will also be growing demand for mechanics trained to service electric vehicles. The nonprofit sees significant opportunity for local business participation in the clean fuels supply chain, such as hosting EV chargers at commercial properties like grocery stores. They also pointed to the role of backstop aggregators, which could help capture unclaimed credits from the CTFP and reinvest that value into local communities ensuring broader economic and social benefits from program participation.[52]

Findings: Non-Interviewed Interested Parties

In addition to insights gathered through direct interested party interviews, Adelante included potential clean transportation fuel projects identified through public records, company announcements, and previous research to capture relevant insights and maintain an up-to-date understanding of identified interested parties and their activities.

Non-Interviewed Interested Parties: Publicly Identified Potential Projects

While these entities did not participate in interviews for this report, available information indicated their varying levels of project planning or investment aligned with the goals of the CTFP. These findings help round out the broader landscape of in-state production and infrastructure opportunities and reflect the evolving interest and activity across sectors.

Table 4. Non-Interviewed Interested Parties: Publicly Identified Non-FSE Projects

Interested Party	Interested Party Category	Number of Projects (non-FSE)	Anticipated Job Creation (non-FSE)	Anticipated Project Type	Facility Location
Avangrid,	Producer	1	Not	Hydrogen	San

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[52] Interested Party W. [Interview]. (19 March 2025).

Inc			Available	Production	Juan/Torrance County
Mozart Devco	Producer	1	Not Available	Hydrogen Production	North-central NM
Navitas	Producer	1	31 FTEs	Renewable Ethanol	Roosevelt County

* The project is attributed to KCEC to prevent double-counting.

Project Overviews

Avangrid, Inc., a national energy services and delivery company, has proposed a hydrogen production facility in the Navajo Nation, spanning San Juan and Torrance Counties. While the project was initially submitted under the Western Inter-States Hydrogen Hub (WISHH) proposal and was not selected for U.S. Department of Energy funding, Avangrid has publicly reaffirmed its commitment to advancing green hydrogen development in the region.[53]

Chevron operates oil and natural gas fields across the midcontinental U.S., with significant activity in Colorado, Texas, and New Mexico, particularly within the Permian Basin. As of October 2024, the company announced plans to increase production in the region, aiming to reach 1 million barrels of oil-equivalent per day in the Permian Basin by 2025.[54] The company has several initiatives to decarbonize their oil and gas operations including replacing natural gas-powered compressors with solar powered alternatives and has lowered the carbon intensity of emissions associated with its hydraulic fracturing equipment.[55,56] The company also states that they have a competitive advantage to already operate in a lower carbon policy environment referencing New Mexico's CTFP and other states' low-carbon fuel standards.[57] As discussed in detail above in connection with

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[53] Office of the Governor of New Mexico. *Governor, New Mexico Partners Remain Committed to Hydrogen Hub Following DOE Award Announcement*. (2023). https://www.governor.state.nm.us/2023/10/13/governor-new-mexico-partners-remain-committed-to-hydrogen-hub-following-doe-award-announcement/ (Accessed 2025-04-30).

[54] Chevron Corporation. *Energy Production is Growing in New Mexico*. (2024). https://www.chevron.com/newsroom/2024/q4/energy-production-is-growing-in-new-mexico (Accessed 2025-04-30).

[55] Chevron Corporation. *Energy Production is Growing in New Mexico*.

[56] Chevron Corporation. *Solar Field Powers Up Lower Carbon Operations. (2023). https://www.chevron.com/newsroom/2023/q3/solar-field-powers-up-lower-carbon-operations (Accessed 2025-06-20).*

[57] Chevron Corporation. Advancing energy progress: 2023 Climate change resilience report. (2023). *https://www.chevron.com/-/media/chevron/sustainability/documents/climate-change-resilience-report.pdf#page=47 (Accessed 2025-06-20).*

KCEC, Chevron participated in an Intermediate Feasibility Study in 2023 in partnership with KCEC and NREL, to explore hydrogen production at its former molybdenum mine site in Questa. The project would produce hydrogen through electrolysis, with energy provided by solar installations, and includes plans for a long-duration energy storage facility and a hydrogen fueling station to support local heavy-duty vehicle operations. As of the date of the KCEC interview, development efforts are continuing, with KCEC recently securing federal funding to advance project construction. Chevron's involvement reflects its broader commitment to supporting clean fuels and carbon reduction initiatives alongside traditional energy operations.

Mozart Devco is a clean energy company specializing in the development of commercial-scale hydrogen infrastructure. In public comments submitted during the rulemaking process for New Mexico's Advanced Clean Cars II and Advanced Clean Trucks II programs in September 2023, the company announced plans to launch fuel-grade hydrogen production in north-central New Mexico through its wholly owned in-state subsidiary.[58] Production is expected to begin in the fourth quarter of 2025, initially supporting a fleet of three hydrogen fuel cell electric buses, with infrastructure capacity in place to scale up and serve 30 fuel cell electric buses. In addition to public transit, the hydrogen produced will be suitable for other zero-emission vehicles, including heavy-duty trucks and passenger cars. According to the company, the facility is designed with significant scalability ultimately capable of supporting a public transit system with up to 3,000 fuel cell electric buses as demand grows. No public updates on project progress have been released since the initial public comments.

Navitas is advancing a clean fuel project in Roosevelt County that converts dairy manufacturing waste, specifically whey, into high-quality, eco-friendly ethanol with future potential for alternative jet fuel. In early 2025, the company presented its plans to both the Roosevelt County Commission and the Portales City Council, outlining its intent to repurpose the long-idled Abengoa ethanol plant.[59,60] On

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[58] Mozart Devco. *New Mexico's Advanced Clean Cars and Advanced Clean Trucks II public comments.* (2023). https://scs-public.s3-us-gov-west-1.amazonaws.com/env_production/oid349/did200058/pid_206796/assets/merged/2r0sinsprcg_document.pdf?v=11977 (Accessed 2025-04-30).

[59] G. McGee. Roosevelt Officials Hear of Proposed Industrial Projects. *The Eastern New Mexico News*. (26 March 2025). https://www.easternnewmexiconews.com/story/2025/03/26/news/roosevelt-officials-hear-of-proposed-industrial-projects/230444.html (Accessed 2025-04-30).

[60] City Channel Portales. *City of Portales Council Meeting 1/21/2025*. Youtube. (22 January 2025). https://www.youtube.com/watch?v=GGropzE2-v4 (Accessed 2025-04-30).

March 18, 2025 Navitas reported to Roosevelt County Commissioners that the project would bring about 45 new jobs, with hiring beginning in April 2025.[61] On July 15, 2025 the New Mexico Economic Development Department reported that Navitas was awarded New Mexico Local Economic Development Act funding for the creation of 31 new jobs with an annual payroll of $1.9 million and a capital investment up to $42 million.[62] For job estimation purposes, the most up to date estimation was expected to be the most accurate. Navitas has emphasized a commitment to local hiring and enthusiasm with the project's unusual proximity to feedstock sources. Curry and Roosevelt Counties are home to 61 dairies and 123,000 Milk Cows.[63,64] The site also features existing infrastructure, including a rail spur and equipment that can be retrofitted for clean fuel production. The company's process produces ethanol but also generates purified, drinking-quality water, compressed CO_2, and high-protein livestock feed. Ethanol produced at the facility will be distributed to markets like Albuquerque, with capacity projections ranging from 5 to 10 million gallons annually, and protein feed production expected to reach 4 to 8 million pounds per year.[65] Navitas is actively engaging with major players in the alternative jet fuel space, including LanzaJet, BASF, Petron Scientech Inc., and Honeywell UOP, and views the New Mexico location as strategic for growth. Benefits include the presence of nearby dairy producers, available infrastructure, the CTFP, and designation as a New Markets Tax Credit eligible area.[66] The company has already partnered with key interested parties such as Leprino Foods, Glanbia, Dairy Farmers of America, US Venture, Murex, Southwest, and BioFeedstocks.

Findings: Project Updates

The following section provides updates on clean fuel projects and interested parties first identified in Adelante's 2022 report that have yet to be addressed in the report thus far. Since the initial publication, the following projects have either been completed, shifted direction, scaled back, or explored new partnerships.

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[61] G. McGee. Roosevelt Officials Hear of Proposed Industrial Projects.

[62] New Mexico Economic Development Department. Company reviving long-shuttered ethanol plant receives support through New Mexico EDD. *EDD Press Releases*. (15 July 2025) https://edd.newmexico.gov/pr/company-reviving-long-shuttered-ethanol-plant-receives-support-through-new-mexico-edd/ (Accessed 2025-07-22).

[63] Clovis/Curry County Chamber of Commerce. *Ag 50*. (n.d.). https://www.clovisnm.org/ag-50/ (Accessed 2025-04-30).

[64] New Mexico State University. *New Mexico Dairy Key Indicators.* (2025). https://dairy.nmsu.edu/documents/dairy-status_jan25.pdf (Accessed 2025-05-20).

[65] City Channel Portales. *City of Portales Council Meeting 1/21/2025*.

[66] New Mexico Finance Authority. *New Markets Tax Credit Program.* *https://www.nmfinance.com/business-financing/new-markets-tax-credits/ (Accessed 2025-06-20).*

This update captures the latest publicly available information and interested party input to reflect how New Mexico's clean fuel landscape has evolved.

BayoTech, a New Mexico-based research and product development company headquartered in Bernalillo County, provides hydrogen production, transportation, and storage solutions. As highlighted in Adelante's 2022 report, BayoTech partnered with the New Mexico Gas Company (NMGC) to establish a localized hydrogen production "hub", a small-scale, on-site hydrogen generation unit, located on NMGC property in Bernalillo County.[67,68] According to NMGC's 2024 Integrated Resource Plan, the utility has conducted tests blending up to 20% hydrogen with natural gas in a closed system, although no decisions have yet been made about integrating hydrogen into the customer distribution network.[69] This pilot work underscores the early-stage potential for hydrogen blending in New Mexico's gas infrastructure. Additionally, the CTFP could spur BayoTech to deploy other localized production "hubs" in the state to produce hydrogen for fuel. BayoTech also expanded its presence in the state by opening a 15,000-square-foot headquarters near Balloon Fiesta Park in October 2022.[70] From this facility, the company monitors and operates its growing network of compact hydrogen hubs.

HF Sinclair operates two complex refining facilities in Eddy and Lea Counties, and employs approximately 575 individuals in New Mexico. The refinery in Eddy County also produces renewable diesel. As noted in Adelante's 2022 report, HF Sinclair was constructing a Pre-treatment Unit (PTU) and Renewable Diesel Unit (RDU) at the Eddy County facility.[71] The company completed construction of the PTU and RDU at the site later that same year. The PTU enables flexibility in feedstock sourcing, reducing reliance on any single input and allowing the use of

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[67] Adelante Consulting, Inc., *New Mexico Clean Fuel Standard Economic Impact Analysis*.

[68] BayoTech, Inc. *BayoTech and New Mexico Gas Company Partner to Build State's Largest Clean Hydrogen Production Hub*. (2021). https://bayotech.us/bayotech-and-new-mexico-gas-company-partner-to-build-states-largest-clean-hydrogen-production-hub/ (Accessed 2025-04-30).

[69] New Mexico Gas Company. *2024 Integrated Resource Plan for the Planning Period of 2024–2033 in Compliance with 17.7.4.9 NMAC*. (2024). https://www.nmgco.com/userfiles/files/NMGC's%202024%20Integrated%20Resource%20Plan%20for%20the%20Planning%20Period%20of%202024-2033%20in%20Compliance%20with%2017.7.4.9%20NMAC.pdf (Accessed 2025-04-30).

[70] K. Robinson-Avila. Bayotech to run national hydrogen plants from ABQ Hub. *Albuquerque Journal*. (7 October 2022). https://www.abqjournal.com/news/local/article_0ba8c96a-c269-5062-a1d2-369141bca841.html (Accessed 2025-04-30).

[71] Adelante Consulting, Inc., *New Mexico Clean Fuel Standard Economic Impact Analysis*.

lower-cost, lower-carbon intensity materials such as unrefined soybean oil, animal fats, and distillers corn oil. According to HF Sinclair, the RDU processes up to 9,000 barrels per day, converting these renewable feedstocks into high-quality renewable diesel that is chemically equivalent to petroleum diesel but generates 50% or fewer net greenhouse gas emissions.[72] In an interview, BNSF Railway noted that the current in-state renewable diesel supply does not meet their operational demand, highlighting a potential opportunity for HF Sinclair to expand production capacity and further support clean fuel adoption in New Mexico.[73] HF Sinclair also provided public input on the proposed CTFP rule.

Adelante's 2022 report noted that Natural Chem Group was expected to occupy the former Abengoa ethanol plant in Roosevelt County. However, those plans ultimately did not materialize. The facility is now being redeveloped by Navitas, which plans to convert dairy processing waste into ethanol, with future potential for alternative jet fuel as described in the previous subsection "Non-Interviewed Interested Parties with Publicly Identified Potential Projects." The company expects to produce 5–10 million gallons of ethanol annually and generate 4–8 million pounds of protein feed, while creating approximately 31 local jobs.[74,75] The project also features a circular production model that produces purified water, compressed CO_2, and livestock feed as co-products.

There have been no significant updates on the status of Renewable Energy Group (REG)'s unfinished biodiesel production facility in Curry County, NM. REG, which was acquired by Chevron in 2022, has not publicly announced any progress on completing the facility.[76] However, the company continues to operate a biodiesel terminal in the area, which has been in service since July 2012. While construction on the production facility remains incomplete, the site still presents a potential opportunity for future development and expansion of biodiesel production in eastern New Mexico.

Marathon Petroleum Corporation (MPC) is an integrated downstream energy company that operates the largest refining system in the United States. Through

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[72] HF Sinclair Corporation. *Operations – Facilities – U.S. – Artesia / Lovington, NM*. (2024). https://www.hfsinclair.com/operations/facilities/us/artesia-lovington-nm/default.aspx (Accessed 2025-04-30).

[73] BNSF. [Interview]. (06 March 2025).

[74] City Channel Portales. *City of Portales Council Meeting 1/21/2025*.

[75] New Mexico Economic Development Department. *Company reviving long-shuttered ethanol plant receives support through New Mexico EDD*.

[76] Chevron Renewable Energy Group. *Our Company*. (n.d.). https://www.regi.com/about/our-company (Accessed 2025-04-30).

its majority-owned midstream subsidiary, MPLX LP, the company also manages extensive gathering, processing, and transportation infrastructure for crude oil and refined products.[77] In New Mexico, MPC previously operated an oil refinery in Gallup in McKinley County, which was closed in 2020.[78] Currently, the company maintains four midstream oil terminals and a pipeline operated through MPC/MPLX. While there are no publicly announced plans for new projects in the state, the decommissioned Gallup refinery could present a future opportunity for redevelopment into a clean fuels production site, similar to the conversion of an MPC petroleum refinery located in Martinez, CA, to production of renewable diesel.[79]

Supplemental Findings: Additional Projects

In addition to the original list of interested parties identified for this report, supplemental research and interested party interviews revealed additional companies and projects relevant to New Mexico's emerging clean fuels landscape. This section highlights these newly identified activities, including projects from companies that were not part of the original interested party outreach but whose work could meaningfully contribute to clean fuel production, distribution, or infrastructure development in the state. These findings offer a broader view of market momentum, investment interest, and emerging opportunities that could further support the goals of the CTFP.

Table 5. Additional Projects Identified Through Supplemental Research

Interested Party	Interested Party Category	Number of Projects (non-FSE)	Anticipated Job Creation (non-FSE)	Anticipated Project Type	Facility Location
Capture Point	Carbon Management	1	Not Available	Carbon Capture & Sequestration	Lea County

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[77] Marathon Petroleum Corporation. *About Us*. (n.d.), https://www.marathonpetroleum.com/About/ (Accessed 2025-04-30).

[78] B. Wakayama. Oil Refinery in Gallup Closing Indefinitely. *KRQE News.* (04 August 2020). https://www.krqe.com/news/new-mexico/oil-refinery-in-gallup-closing-indefinitely/ (Accessed 2025-04-30).

[79] Marathon Petroleum Corporation. *Marathon Seeks Permits for Martinez Renewable Diesel Project.* (n.d.). https://www.marathonpetroleum.com/Newsroom/Company-News/Marathon-seeks-permits-for-Martinez-renewable-diesel-project/#:~:text=In%20line%20with%20its%20companywide,gas%20emissions%20by%20approximately%2060%25 (Accessed 2025-04-30).

Carbon Capture Projects

Carbon Capture, Utilization & Sequestration

CapturePoint specializes in CCUS, offering a range of services including carbon capture system design and installation, construction and management of dedicated carbon dioxide pipelines, modernization and operation of carbon dioxide-enhanced oil recovery projects, and permanent deep underground carbon storage. The company also provides carbon management solutions for energy diversification projects, direct air capture, and other large-scale industrial initiatives. As of April 2025, CapturePoint is operating, developing, or evaluating eight regional carbon management sites across the United States, including a project in southeastern New Mexico. In Lea County, CapturePoint holds rights to approximately 17,500 acres of deep underground storage space and is assessing the economic feasibility of using the site to provide carbon management services. If developed, the project would aim to collect and permanently sequester carbon dioxide emissions from industrial sources across the surrounding region.[80]

Direct Air Capture

During an interview with Interested Party A, a national organization involved in state-level carbon removal policy and advocacy, the interested party referenced a pilot project led by Spiritus Technologies, focused on DAC technology. A facility, located on Nambé Pueblo, is scheduled to become operational in the second half of 2026 and will have the capacity to capture approximately 1,000 tons of carbon dioxide per year.[81] The project includes a 10,300-square-foot warehouse under a six-year lease. Spiritus currently employs 10 individuals and plans to expand its workforce to 40 new full time employees, with roles including technicians to operate the pilot plant, engineers, skilled laborers, and field practitioners.[82] Looking ahead, Spiritus is planning to scale up its facilities similar to its Orchard One project in Wyoming, and has received funding to do so from the New Mexico Local Economic Development Act, the Job Training Incentive Program, a Science and Technology Business Startup Grant, and an Advanced Energy Award.[83] DAC

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[80] CapturePoint LLC. *Our Projects*. (n.d.). https://capturepointllc.com/projects (Accessed 2025-04-30).

[81] New Mexico Economic Development Department. Local Climate Solutions Company Awarded EDD Funding. *EDD Press Releases*. (9 July 2025) https://edd.newmexico.gov/pr/local-climate-solutions-company-awarded-edd-funding/ (Accessed 2025-07-23).

[82] New Mexico Economic Development Department. Local Climate Solutions Company Awarded EDD Funding.

[83] Spiritus. *Spiritus Secures New Mexico Facility on Nambé Pueblo Land*. (2024). https://www.spiritus.com/single-news/spiritus-secures-new-mexico-facility-on-nambe-pueblo-land (Accessed 2025-04-30).

and similar technologies will be considered under a rulemaking for project-based crediting intended to start in 2030.

Terminal Infrastructure Projects for Clean Fuels

Although no interested parties interviewed for this project identified active terminal developments, the expansion of terminal infrastructure for hydrogen, renewable diesel, alternative jet fuel, and other clean fuels could be helpful to fully scale New Mexico's low-carbon transportation economy. Terminals serve as hubs for the storage, blending, and distribution of fuels to end-users, including fleet operators, fueling stations, and industrial customers.

As adoption of alternative fuels grows under programs like the CTFP, need may increase for specialized infrastructure such as hydrogen-compatible storage systems, renewable diesel distribution terminals, and multi-fuel blending facilities. Building new terminals or repurposing existing petroleum infrastructure presents a major opportunity for new private investment, public-private partnerships, and associated local job creation for the projects. Additionally, expanded terminal capacity could enhance supply chain reliability ensuring that clean fuels can be delivered efficiently and cost-effectively across the state.

Expansion of terminal infrastructure for hydrogen, renewable diesel, and alternative jet fuel is widely recognized as essential to scaling clean fuel adoption. National studies and input by the U.S. Department of Energy, National Renewable Energy Laboratory, and Clean Fuels Alliance America emphasize that new or upgraded terminals are necessary to safely store, blend, and distribute low-carbon fuels at a commercial scale. California's experience implementing the LCFS further demonstrates that terminal flexibility and investment were key drivers of clean fuel market growth.[84,85,86,87]

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[84] U.S. Department of Energy, Hydrogen and Fuel Cell Technologies Office. *Hydrogen Delivery*. (n.d.). https://www.energy.gov/eere/fuelcells/hydrogen-delivery (Accessed 2025-04-30).

[85] K. Moriarty & A. Kvien. National Renewable Energy Laboratory. *U.S. Airport Infrastructure and Sustainable Aviation Fuel*. (National Renewable Energy Laboratory, 2021). https://docs.nrel.gov/docs/fy21osti/78368.pdf (Accessed 2025-04-30).

[86] Clean Fuels Alliance America. *NBB Response USDA Higher Blends Infrastructure Incentive Program*. (2020). https://cleanfuels.org/wp-content/uploads/nbb-response-usda-higher-blends-infrastructure-incentive-program-rfi.pdf (Accessed 2025-04-30).

[87] California Air Resources Board. *2024 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development*. (2024). https://ww2.arb.ca.gov/sites/default/files/2024-12/AB-126-Report-2024-Final.pdf (Accessed 2025-04-30).

Electricity as a Fuel

As New Mexico transitions to cleaner transportation options, electricity is poised to play a critical role as a transportation fuel. As EV adoption increases, electricity demand is expected to rise significantly, stimulating additional investment in clean energy generation infrastructure.[88] Increased energy demand from the transportation sector can incentivize new investments in renewable energy generation, supporting job growth in construction, operations, and maintenance of solar, wind, and emerging geothermal facilities, as well as job growth for broader utility infrastructure upgrades that will be needed. New Mexico already hosts numerous large-scale solar and wind projects, and the potential for expanded geothermal development adds another opportunity for clean energy diversification. Additionally, expanded deployment of EVs stimulates local job creation in fuel supply equipment jobs including the installation, maintenance, and servicing of EV chargers.[89] By promoting greater EV deployment and broader low-carbon transportation options through the inclusion of electricity as an opt-in fuel that can generate credits, the CTFP will support the conditions necessary for continued investment in renewable electricity generation infrastructure.

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[88] National Renewable Energy Laboratory. *Electrification Futures Study: Scenarios of Electric Technology Adoption and Power Consumption for the United States*. (2018). https://docs.nrel.gov/docs/fy18osti/71500.pdf (Accessed 2025-04-30).

[89] U.S. Bureau of Labor Statistics. *Charging into the future: the transition to electric vehicles*. (2023). https://www.transportation.gov/rural/ev/toolkit/ev-benefits-and-challenges/community-benefits (Accessed 2025-04-30).

New Mexican Jobs Estimate (Non-FSE)

Introduction

Adelante estimated New Mexican jobs that may be directly attributed to or supported by the CTFP using information derived from interested party engagement and industry research, excluding jobs related to FSE. This section highlights the types of jobs that could be created or supported by the CTFP and their economic impact. Adelante anticipates that the CTFP will create or support a minimum of 274 jobs in-state with a total annual income of $20.2 million. This section draws significantly on 30 interviews that were conducted with relevant organizations from the transportation fuel sector, in addition to drawing on reports from California, Minnesota, Oregon, and Washington. California, Oregon, and Washington have clean fuels programs and studies were completed in Minnesota, where a bill was introduced in the 2025 legislative session.

Overview

Types of Jobs

The table below provides a non-exhaustive list of the types of jobs that could be created by the CTFP in New Mexico. These job types are drawn from interviews and related reports. The jobs fall into the following categories: construction, collecting waste-based feedstocks, CNG, liquified natural gas (LNG), RNG, hydrogen production plants, third party verification, and CTFP management.

Table 6. Non-FSE Job Categories and Types

Job Category	Job Type
Construction	Importing Fuel (Pipeline Construction)
Construction	Constructing Production Plant
Collecting Waste-Based Feedstocks	Waste Collection & Handling Roles (Organic Waste Collector, Landfill Gas technician, Dairy & Livestock waste manager, Wastewater treatment operator, agricultural residue collector)

Collecting Waste-Based Feedstocks	Transportation & Logistics Roles (feedstock transport driver, vacuum truck operator, logistics coordinator)
Collecting Waste-Based Feedstocks	Processing & Pre-treatment roles (pre-treatment technician, waste sorting operator, Fat, Oil, and Grease (FOG) Processor
Collecting Waste-Based Feedstocks	Environmental & Regulatory Compliance Roles (Environmental Compliance Officer, Sustainability Manager, Regulatory Affairs Specialist)
CNG, LNG, RNG, Hydrogen Production Plants	Engineering & Technical Roles (Process Engineer, Chemical Engineer, Mechanical Engineer, Electrical Engineer, Instrumentation & Control Engineer, Civil/structural engineer, Cryogenics Engineer (LNG), Environmental Engineer)
CNG, LNG, RNG, Hydrogen Production Plants	Operations & Production Roles (Plant operator, Hydrogen Purification Technician, Gas Processing Technician, LNG Liquefaction Technician, Hydrogen Storage & Compression Technician, CNG/RNG compression Technician, Quality Control Specialist, Tank & Storage Technician (LNG), organic waste feedstock manager (RNG)
CNG, LNG, RNG, Hydrogen Production Plants	Maintenance & Safety Roles (Maintenance Technician, Safety & Compliance Officer, Hydrogen/gas Leak Detection Specialist, Welding & Piping Technician, cryogenic safety specialist (LNG))

CNG, LNG, RNG, Hydrogen Production Plants	Logistics & Distribution Roles (Hydrogen/CNG transport driver, pipeline engineer, supply chain coordinator)
CNG, LNG, RNG, Hydrogen Production Plants	Administration & Research Roles (Project Manager, Regulatory Affairs Specialist, Financial Analyst, Research Scientist)
Third Party Verification	Reviewer Roles

Estimated Job Creation from Identified and Early-Stage Projects, Interviewed and Non-Interviewed Interested Parties

Interviews conducted with interested parties and additional research indicated that New Mexico can conservatively expect 274 jobs to be created in New Mexico due to or supported by the CTFP. Adelante expects the number of contractor and part-time employees to be significant when considering the construction jobs related to building facilities; however, Adelante did not include these numbers due to the focus on full-time employees. Numerous other interviewees indicated that the CTFP would likely lead to additional hiring but were unable to provide specific numbers at this time.

Table 7. Estimated Full-Time Jobs Connected to Promulgation of CTFP

Interested Party	Anticipated Job Creation (non-FSE)	Facility Location
Blue Pony Energy	81 FTE	Lea County
MAXX Energy	45 FTE	Bernalillo, Hidalgo Counties
Interested Party H	25 FTE	Quay County
Oberon Fuels	30 FTE	No location
Infinium	35 FTE	No location
Interested Party X	2 FTE	Chaves County

Interested Party DD	15 FTE	Lea County
Kit Carson Electric Cooperative	10 FTE	Taos County
Navitas	31 FTE	Roosevelt County
Total	274 FTE	

The estimated economic impact in income from the estimated full-time jobs connected to the CTFP is $20.2 million annually and $212 million from the start of operations through 2040. When projecting the total economic impact through 2040, the annual economic impact was assumed to remain constant as the estimated jobs are expected to be long-term, full-time positions. An estimated start of operations year was only available from Blue Pony Energy, Interested Party DD, Kit Carson Electric Cooperative, and Navitas. All other interested parties that provided estimated jobs were assumed to have a start of operations in 2030, although it is ultimately unknown when these parties will begin operations in New Mexico. All dollar values are in 2024 USD. Estimation methods can be found in Appendix C.

Table 8. Estimated Economic Impact of Full Time Jobs Connected to Promulgation of CTFP

Interested Party	**Facility Type**	**Estimated Jobs Created Related to the CTFP**	**Estimated Annual Economic Impact**	**Estimated Start of Operations**	**Total Economic Impact from Start of Operations through 2040**
Blue Pony Energy	Hydrogen Production	81 FTE	$4.78M	2030	$52.6M
MAXX Energy	Hydrogen Production	45 FTE	$3.11M	2030	$34.2M
Interested Party H	Hydrogen, RNG, and fuel cell production	25 FTE	$1.82M	2030	$20.1M

Oberon Fuels	Renewable methanol, DME and hydrogen production	30 FTE	$2.37M	2030	$26.1M
Infinium	Synthetic Fuel Production	35 FTE	$2.42M	2030	$26.6M
Interested Party X	RNG production	2 FTE	$146,000	2030	$1.6M
Interested Party DD	Natural gas to gasoline production	15 FTE	$1.09M	2030	$12.0M
Kit Carson Electric Cooperative	Hydrogen Production	10 FTE	$691,000	2028	$8.98M
Navitas	Renewable Ethanol	31 FTE	$1.9M	2026	$28.5M
Total			$20.2M		$212M

Figure 2. Location of Jobs Connected to Promulgation of CTFP by County as of August 2025

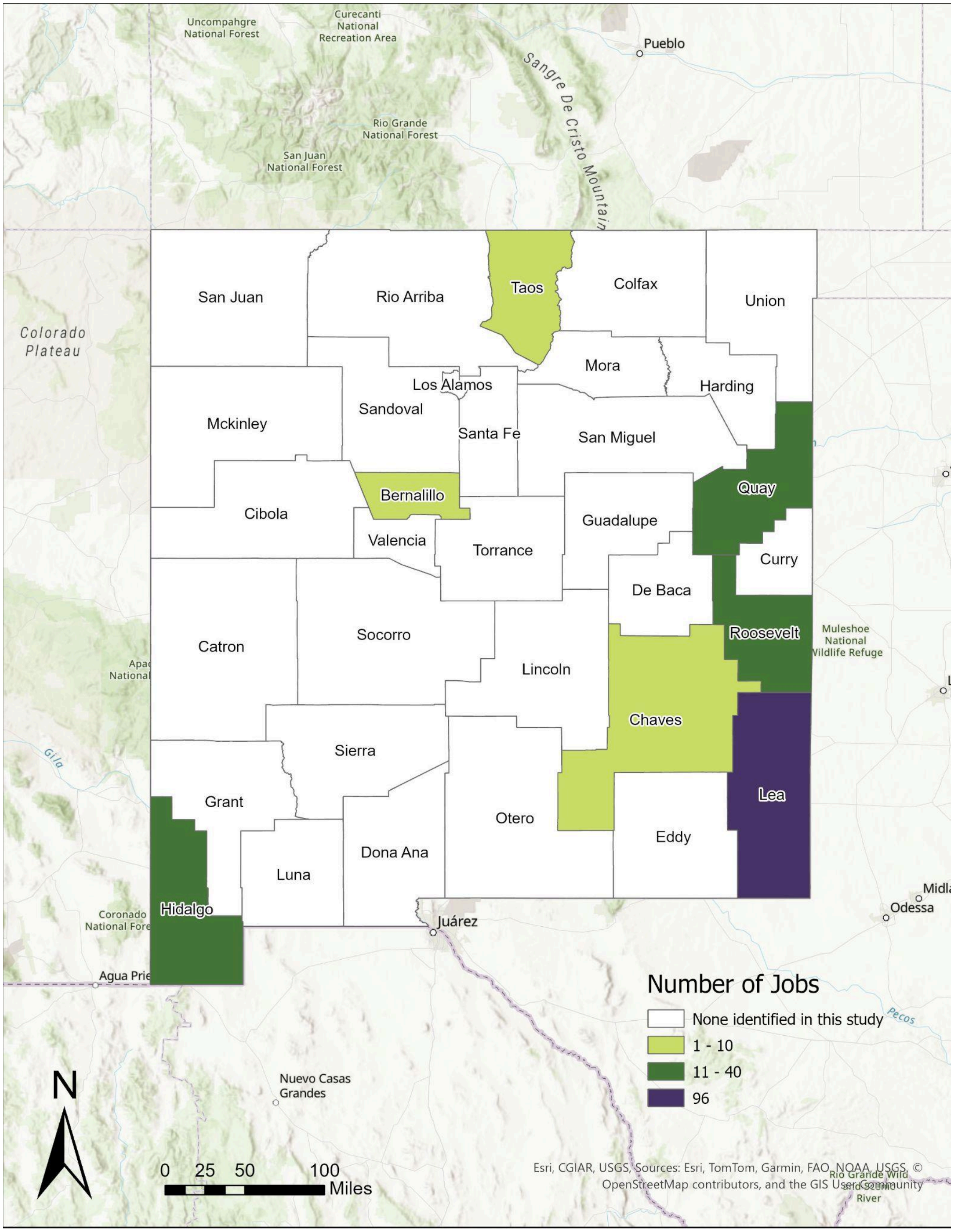

Figure 2 includes 209 out of 274 anticipated non-FSE full time jobs coming from identified and early-stage projects from interviewed and non-interviewed interested parties; 65 expected jobs from two interviewed interested parties did not have a provided location and are therefore not included in the map.

Additionally, 7 different interested parties currently employ 5,020 non-FSE full time employees collectively. In some cases, interested parties are expecting their number of employees to increase by a yet undetermined amount. One interested party stated that they were expecting to see a slight decrease in their number of full-time employees due to the CTFP, but were unsure of the exact number.

Table 9. Current Number of Employees for Related Interested Parties

Interested Party	Current Number of Employees
BNSF	1,332
Interested Party I	500
Interested Party M	300 (expecting a decrease due to the CTFP)
Union Pacific	301 FTE, 178 contractors
Interested Party CC	1,977
Interested Party Y	35
HF Sinclair	575
Total	5,020

While not included in Tables 7 through 9 because the CTFP does not currently include specific rules around project-based credits, Spiritus Technologies is leading a pilot project focused on DAC technology on Nambé Pueblo scheduled to become operational in the second half of 2025. Spiritus currently employs 10 individuals and plans to expand its workforce to 40 new full-time employees, with roles including technicians to operate the pilot plant, engineers, skilled laborers, and field practitioners.

Evidence from Similar Rules

Drawing on experience and studies from other states, the CTFP will likely lead to an increase in jobs in the long-run. Research in Minnesota highlighted that over the first 10 years 7,500 jobs could be created building alternative energy capacity and infrastructure. Additionally, “over 1,200 jobs could be created in harvesting, transporting, and processing transportation fuels”.[90] The study authors also found that the increase in jobs in the ethanol sector would substantially offset the expected slight decrease in oil refining jobs.[91] Minnesota introduced bill HF 2847 on March 26th, 2025 providing for a clean transportation standard; however, the bill did not pass this legislative session.[92]

Additionally, in Oregon the conclusions of a macroeconomic analysis indicated that investing in natural gas and electricity infrastructure would increase in-state job growth.[93] Research from Washington indicated that the first 4-8 years of a clean fuel standard would lead to a slight decrease in net job impact for direct jobs. This would occur over the first 4 years in the least-cost scenario, and over the first 8 years in the accelerated reduction scenario. However, over the long-term the clean fuel standard would increase the net job impact for direct jobs, with modeling indicating an increase of 36 direct jobs over the first 15 years in the least-cost scenario, and an increase of 24 direct jobs over the same time period in the accelerated reduction scenario.[94]

Regarding the disruption of jobs and how to ease the transition, experience from California indicates that jobs related to vehicle maintenance and conventional fueling infrastructure may be disrupted; however, “new jobs will be created in areas like clean vehicle manufacturing and in electric and hydrogen fueling infrastructure. Many will be high-quality jobs and accessible without a college degree.”[95] California’s experience also demonstrates that job skills related to vehicle maintenance would be transferable, and that policies would need to

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[90] H. Garret-Peltier, *The Employment Impacts of a Low-Carbon Fuel Standard for Minnesota*. (Political Economy Research Institute, University of Massachusetts, Amherst, 2012). https://peri.umass.edu/publication/the-employment-impacts-of-a-low-carbon-fuel-standard-for-minnesota (Accessed 2025-04-30).

[91] Garret-Peltier. *The Employment Impacts of a Low-Carbon Fuel Standard for Minnesota.*

[92] Koegel; Long; Pursell; Kraft; Rehrauer. *HF 2847 Status in the House for the 94th Legislature (2025 - 2026)*. https://www.revisor.mn.gov/bills/bill.php?b=House&f=HF2847&ssn=0&y=2025 (accessed 2025-08-06).

[93] Oregon Department of Environmental Quality. *Oregon Clean Fuels Program: Program Review.* (2022). https://www.oregon.gov/deq/ghgp/Documents/CFP-ProgramReview.pdf (Accessed 2025-04-30).

[94] BRG Energy & Climate. *Clean Fuel Standard Cost Benefit Analysis Report*. (Washington Department of Ecology, 2022). https://ecology.wa.gov/getattachment/22790fe6-fc3a-414d-b3ba-036af0975258/20220512CfsCba.pdf (Accessed 2025-04-30).

[95] A. L. Brown; D. Sperling; B. Austin; JR DeShazo; L. Fulton; T. Lipman, et al. *Driving California’s Transportation Emissions to Zero.* (UC Office of the President: University of California Institute of Transportation Studies, 2021). http://dx.doi.org/10.7922/G2MC8X9X Retrieved from https://escholarship.org/uc/item/3np3p2t0 (Accessed 2025-04-30).

support workers by creating just employment pathways into ZEV-related industries.[96]

In 2022 Adelante Consulting conducted an economic impact analysis quantifying projects and jobs that could be created due to or supported by the CTFP in New Mexico. This analysis estimated that the CTFP could create 1,641 permanent jobs with a value of $470 million in wages between 2024 and 2030. The analysis also estimated 2,300 temporary construction jobs. Of the 1,641 permanent jobs, 673 were estimated as direct, head-of-household jobs. The remaining 968 were estimated as indirect jobs. Of the 673 direct, head-of-household jobs, 295 were FSE-related and 378 were non-FSE jobs.[97] For the purposes of this report, Adelante compared the findings from this 2025 analysis to the 378 non-FSE jobs. Adelante drew these estimates from organizations that had committed to projects and associated employment numbers, in addition to estimates related to facilities that could be repurposed due to the CTFP.

The Renewable Energy Industries Association of New Mexico (REIA NM) provides greater context on the growth and current employment numbers of the clean fuels and clean vehicles sectors in New Mexico. Their 2024 factsheet indicates that the clean vehicles sector employed 1,073 workers in 2023 and grew by 9.5% that year, making it the second fastest growing clean energy sector in New Mexico after clean fuels. The clean fuels sector grew by 16.5% from 2022 to 2023, but remains the smallest clean energy sector in the state with 171 total jobs.[98]

Reports carried out in other states indicate that a CTFP may lead to long-term growth in direct jobs. The estimates vary from increases in the thousands to more conservative increases in the thirties over a 15 to 20-year time span. Job estimates significantly increase when also considering temporary employment related to the construction of related facilities. These reports did not indicate that a CTFP would lead to a long-term decrease in direct jobs within a given state.

Adelante conservatively estimates that 274 direct jobs may be created due to or supported by the CTFP over a 15-year timeline. Adelante estimates that these jobs have an annual value of $20.2 million and a value of $212 million from the start of operations through 2040. These numbers align with the range seen across

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[96] Brown et al., *Driving California's Transportation Emissions to Zero.*

[97] Adelante Consulting, Inc. *New Mexico Clean Fuel Standard Economic Impact Analysis*.

[98] E2. *Clean Jobs New Mexico 2024*. (2024). https://e2.org/reports/clean-jobs-new-mexico-2024/ (Accessed 2025-04-30).

estimates from other states. The estimated 378 non-FSE direct jobs created by quick start projects in Adelante's 2022 report could still be attainable based on the conservative estimate of 274 direct jobs that were identified from 10 interested parties in 2025. Additionally, Adelante's 2022 report identified a facility that could generate 30 permanent jobs as a repurposed biodiesel facility and a refinery that had laid off 220 employees as another potential CTFP-related project. The report also highlighted the potential for four hydrogen package plants, similar to BayoTech's small hydrogen hubs, to be established in New Mexico that would generate an additional 32 jobs. The research for this report indicates a likelihood that a number of other interviewees and relevant organizations are expected to contribute additional jobs associated with the CTFP that were not captured in Adelante's 2022 report.

Only one interviewee predicted that the CTFP could lead to a decrease in their full-time employees due to their dependence on dyed diesel. Six related organizations confirmed that they are not expecting to see a decrease in their employment numbers. The conservative estimate that 274 non-FSE direct jobs will be created due to or supported by the CTFP is significant given the 1,073 and 171 workers employed in the clean vehicles and clean fuels sectors respectively in New Mexico in 2023.[99]

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[99] E2. *Clean Jobs New Mexico 2024*.

Part 2: Public and Environmental Effects

Introduction

The in-state non-FSE CTFP projects discussed in Part 1 of this report are likely to have a variety of impacts on local public health, the environment, and animal and plant life. While these impacts were not directly quantified for this report, previous studies provide evidence for improvements in environmental and social outcomes.

Benefits Review

Air Quality

Greenhouse gas emissions from the transportation sector accounted for 20% of total New Mexico greenhouse gas emissions in 2021, making it the second-largest contributor to New Mexico's total GHG emissions. Transportation is second only to the oil and gas industry, which accounted for 41% of New Mexico's GHG emissions in 2021.[100] The CTFP, as well as the specific projects mentioned in Part 1 of this report, are expected to reduce New Mexico's GHG emissions by reducing the carbon intensity of transportation fuels as outlined in the rule and as evidenced by GHG emissions reductions observed in other jurisdictions with similar programs.[101]

In California, the carbon intensity of transportation fuels has decreased by 15.34% since the introduction of their low carbon fuel standard in 2011.[102] Transportation GHG emissions have decreased by 12% or 19.2 million metric tons of carbon dioxide equivalent (CO_2e) from 2011 through 2022. Industrial GHG emissions have decreased by 15% or 13.1 million metric tons of CO_2e from 2011 through 2022.[103] In Washington, the clean fuel standard reduced GHG emissions by about 1.4 million metric tons of CO_2e in 2023, which is equivalent to the annual emissions of 339,055 gasoline-powered vehicles, as well as the number of credits generated in

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[100] Energy and Environmental Economics. *New Mexico Greenhouse Gas Emissions Inventory and Forecast.* (2021). https://service.web.env.nm.gov/urls/UbsMeZjN (Accessed 2025-04-30).

[101] New Mexico Environment Department. *Discussion Draft Rule Regarding the Clean Transportation Fuel Program*.

[102] California Air Resources Board. *LCFS Data Dashboard*. (2025). https://ww2.arb.ca.gov/resources/documents/lcfs-data-dashboard?keywords=2025 (Accessed 2025-04-30).

[103] California Air Resources Board. *California Greenhouse Gas Emission Inventory 2024 Edition*. (2024). https://ww2.arb.ca.gov/sites/default/files/2024-09/nc-2000-2022_ghg_inventory_trends_figures.xlsx via https://ww2.arb.ca.gov/ghg-inventory-data (Accessed 2025-04-30).

2023.[104] In Oregon, the clean fuels program has reduced GHG emissions by 11.5 million metric tons of CO_2e from 2016 through 2023 as measured by the number of credits generated from 2016 through 2023.[105] Reductions in GHG emissions due to the CTFP in New Mexico will aid in mitigating the impacts of climate change such as warming temperatures, extreme weather events and shifting ecosystems as similar programs have in California, Washington and Oregon.

Criteria air pollutants are also emitted throughout fossil fuel lifecycles. The general fossil fuel life cycle consists of extraction of crude oil, refinement, storage, transportation, and combustion of the resulting fuel. Extraction, or production, of crude oil is largely associated with methane emissions, a greenhouse gas, in addition to nitrogen oxides (NO_x) and volatile organic compounds (VOCs).[106] In the petroleum refining process, the air pollutants emitted include sulphur oxides (SO_x), NO_x, particulate matter, VOCs, NH_3, CO, H_2S, and trace metals.[107] The storage of petroleum emits VOCs and methane.[108] The transportation process, which can include pipeline, truck or rail transportation, leads to emissions of VOCs, NO_x, CO as well as greenhouse gases CO_2, methane, and nitrous oxide.[109,110] Finally, the combustion of transportation fossil fuels emits SO_2, NO_x, particulate matter, and greenhouse gases CO_2, methane and nitrous oxide.[111] Transitioning to alternative and more renewable fuels can mitigate criteria air pollutant and GHG emissions at each step of the transportation fuel life cycle.

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[104] Department of Ecology State of Washington. *2023 Annual Cost of the Clean Fuel Standard*. (2024). https://apps.ecology.wa.gov/publications/documents/2414044.pdf (Accessed 2025-04-30).

[105] Oregon Department of Environmental Quality. *Oregon Clean Fuels Program: 2023 Annual Cost of the Clean Fuels Program*. (2023). https://www.oregon.gov/deq/ghgp/Documents/2023avgCost.pdf (Accessed 2025-04-30).

[106] B. McDonald, J. He, C. Harkins, J. de Gouw, N. Elguindi, R. Duren, J. Gilman, E. A. Kort, C. E. Miller, J. Peiscl, G. Petron, & C. Thompson. *A Review of U.S. Oil and Gas Methane and Air Pollutant Emissions*. (The Magazine for Environmental Managers, 2023). https://csl.noaa.gov/pubs/EM202309McDonald.pdf (Accessed 2025-04-30).

[107] F. M. Adebiyi. Air Quality and Management in Petroleum Refining Industry: A Review. *Environmental Chemistry and Ecotoxicology* 4 (2022): pp. 89–96, https://doi.org/10.1016/j.enceco.2022.02.001 (Accessed 2025-04-30).

[108] United States Environmental Protection Agency. *Pressurized Storage Tank*. (2024). https://www.epa.gov/natural-gas-star-program/pressurized-storage-tank (Accessed 2025-04-30).

[109] U.S. Environmental Protection Agency. Chapter 5: Petroleum Industry. *AP-42: Compilation of Air Emissions Factors from Stationary Sources*. 5th ed. (2008), pp. 5.2-1 - 5.2-17. https://www.epa.gov/sites/default/files/2020-09/documents/5.2_transportation_and_marketing_of_petroleum_liquids.pdf (Accessed 2025-04-30).

[110] U.S. Environmental Protection Agency. *Transportation Sector Emissions*. (2025). https://www.epa.gov/ghgemissions/transportation-sector-emissions (Accessed 2025-04-30).

[111] J. Inumaru, T. Hasegawa, H. Shirai, H. Nishida, N. Noda, and S. Ohyama. 1 - Fossil fuels combustion and environmental issues. *Advances in Power Boilers* 2 (2021): pp. 1–56. https://doi.org/10.1016/B978-0-12-820360-6.00001-1 (Accessed 2025-04-30).

If the alternative fuel is not blended with a fossil fuel, there is no extraction stage of the fuel life cycle for alternative fuels.[112] Alternative fuel projects that will eliminate the extraction stage and the associated emissions include Maxx Energy's hydrogen production, Mozart Devco's hydrogen fuel cell electric buses, Navitas' dairy processing waste to ethanol production, and Interested Party H's cellulosic ethanol plant. No extraction is needed to create hydrogen when it is made via electrolysis using renewable electricity. While fuel cells may need components that require extraction to create, if hydrogen by way of electrolysis is used as the fuel, then the fuel itself does not have an extraction stage. Ethanol made from either dairy processing waste or cellulose does not have an extraction stage of the life cycle as both fuel sources are wastes. Renewable natural gas made from dairy methane also does not have an extraction stage. Some proposed alternative fuel projects will still include an extraction stage, such as hydrogen made from natural gas, as well as renewable energy-powered alterations to the petroleum production process.

The refining or conversion process varies substantially by the fuel being produced and the fuels used to power the refining or conversion process. For petroleum, there are opportunities to reduce criteria air pollutant and GHG emissions throughout the refining process by using renewable fuels to power the refining process.[113] For example, Interested Party I has a hybrid solar compression station that would otherwise be driven by natural gas engines. They also plan to use waste heat to power, which captures heat that would otherwise be discarded from the refining process and converts it to electricity. Green hydrogen production is an energy-intensive process, making the source of the electricity used to power the electrolysis a large factor in its life cycle emissions.[114] The conversion process for hydrogen occurs within the fuel cell and only produces water vapor and heat, but the type of hydrogen used to power the fuel cell is also a large factor in its life cycle emissions.[115] The refining and conversion of ethanol made from either dairy processing waste or cellulose still generates emissions, primarily from fossil fuels and high CI electricity used to power the process, as well as chemical inputs, but

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[112] F. Liu, M. Shafique, & X. Luo. Literature Review on Life Cycle Assessment of Transportation Alternative Fuels. *Environmental Technology & Innovation* 32 (2023): pp. 103343, https://doi.org/10.1016/j.eti.2023.103343 (Accessed 2025-04-30).

[113] S. Griffiths, B. K. Sovacool, J. Kim, M. Bazilian, and J. M. Uratani. Decarbonizing the oil refining industry: A systematic review of sociotechnical systems, technological innovations, and policy options. *Energy Research & Social Science* 89 (2022): pp. 102542. https://doi.org/10.1016/j.erss.2022.102542 (Accessed 2025-04-30).

[114] U.S. Department of Energy. *Hydrogen Production: Electrolysis.* (n.d.). https://www.energy.gov/eere/fuelcells/hydrogen-production-electrolysis (Accessed 2025-04-30).

[115] U.S. Department of Energy, Alternative Fuels Data Center. *Fuel Cell Electric Vehicle Emissions.* (n.d.). https://afdc.energy.gov/vehicles/emissions-hydrogen (Accessed 2025-04-30).

again, the use of renewable energy to power the conversion process can mitigate these emissions.[116] While renewable natural gas from dairy methane actively repurposes methane that would otherwise be emitted into the atmosphere, there are emissions associated with the refining process from dairy manure to renewable natural gas.[117]

The primary emissions associated with the storage of petroleum derivatives are VOCs and methane. Hydrogen storage technologies include liquid hydrogen and metal hydride tanks. Liquid hydrogen storage emits the least amount of hydrogen, which can increase the concentration of greenhouse gases in the atmosphere.[118,119] Biomass losses in storage directly increase emissions before processing of cellulosic ethanol. Storage of dry bales indoors or under cover minimizes emissions.[120] Methane leakage is a concern with renewable natural gas storage, although, as with petroleum storage, monitoring and leak prevention practices can mitigate these leaks and fugitive emissions.[121] In New Mexico, the Methane Waste Rule requires oil and gas operators to capture 98% of their natural gas by December 31, 2026.[122]

Transportation and distribution are a large source of GHG and criteria air pollutant emissions within the fossil fuel life cycle. Transportation emissions depend first on the type of transportation: truck, rail, pipeline or other transportation. For truck and rail transportation, the fuel used to power them determines the emissions associated with their use. Distribution emissions for gasoline include air toxics like benzene, hexane, toluene, xylene, ethylbenzene, naphthalene and more, all

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[116] G. Cooper. The Truth About Ethanol and Carbon Emissions. *Renewable Fuels Association.* [Blog]. (04 October 2022). https://ethanolrfa.org/media-and-news/category/blog/article/2022/10/the-truth-about-ethanol-and-carbon-emissions (Accessed 2025-04-30).

[117] J. Han, M. Mintz, & M. Wang. *Waste-to-Wheel Analysis of Anaerobic-Digestion-Based Renewable Natural Gas Pathways with the GREET Model.* (Argonne National Lab, 2011). https://doi.org/10.2172/1036091 (Accessed 2025-04-30).

[118] G. Kubilay Karayel, N. Javani, & I. Dincer. A comprehensive assessment of energy storage options for green hydrogen. *Energy Conversion and Management* 291 (2023): 117311. https://doi.org/10.1016/j.enconman.2023.117311 (Accessed 2025-04-30).

[119] R. Derwent, P. Simmonds, S. O'Doherty, A. Manning, W. Collins, & D. Stevenson. Global environmental impacts of the hydrogen economy. *International Journal of Nuclear Hydrogen Production and Applications* 1, no. 1 (2006): pp. 57–67, https://doi.org/10.1504/IJNHPA.2006.009869 (Accessed 2025-06-16).

[120] I. Emery, J. B. Dunn, J. Han, & M. Wang. Biomass Storage Options Influence Net Energy and Emissions of Cellulosic Ethanol. *BioEnergy Research* 8, no. 2 (2015): pp. 590–604. https://doi.org/10.1007/s12155-014-9539-0 (Accessed 2025-04-30).

[121] U.S. Environmental Protection Agency. *Renewable Natural Gas: Facility Operation Best Practices to Create a More Climate-Friendly Project.* (n.d.). https://www.epa.gov/system/files/documents/2022-11/RNG_Operations_Guide.pdf (Accessed 2025-04-30).

[122] New Mexico Energy, Minerals and Natural Resources Department. *Methane Waste Rule*. https://www.emnrd.nm.gov/ocd/methane-waste-rule/ (Accessed 2025-06-16).

examples of VOCs.[123] Renewable fuels like cellulosic ethanol can reduce the carbon intensity of distribution relative to fossil fuels.[124] Pipeline transportation, in addition to truck and rail transportation, can lead to leaks which emit VOCs and air toxics for fuels like gasoline, diesel and ethanol.

Combustion of renewable fuels is, in the majority of cases, less emissions-intensive than combustion of fossil fuels. Renewable diesel, for example, emits less total particulate matter than fossil fuel-based diesel. Renewable diesel also has greater combustion efficiency than fossil fuel-based diesel.[125] BNSF Railway, a transportation fuel end-user, indicated they plan to engage with the CTFP by purchasing and using renewable diesel in their railcars. Interested Party CC, another transportation fuel end-user, already has a large natural gas fleet in New Mexico, displacing about 1.6 million gallons of diesel in 2024.[126] The use of renewable natural gas as a replacement for diesel substantially reduces combustion emissions of NOx, particulate matter, trace hydrocarbons and GHG emissions, specifically methane.[127] Biofuels like ethanol generally produce fewer particulates, sulfur dioxide and air toxics emissions when burned than fossil fuels. Biodiesel when compared to petroleum diesel emits may emit slightly higher amounts of nitrogen oxides at combustion while reducing other emissions.[128]

In addition to direct air quality benefits from alterations of transportation fuel production pathways, a CTFP can influence air quality in more indirect ways as well. One interview with a transportation fuel end-user suggested that a CTFP in New Mexico would lead to incremental workforce growth in the fuel supply sector, thereby increasing rail movement in the state. Increased rail movement in New Mexico may take long-haul trucks off the roads, as one rail car can hold three to

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[123] E.A. Heidari, M. Sarkhosh, H. Alidadi, A.A. Najafpoor, H. Esmaily, & E. Shamsara. Assessing VOC emissions from different gas stations: impacts, variations, and modeling fluctuations of air pollutants. *Scientific Reports* 14: 16617 (2024). https://doi.org/10.1038/s41598-024-67542-4 (Accessed 2025-06-16).

[124] M. Wang, J. Han, J. B. Dunn, H. Cai, & A. Elgowainy. Well-to-wheels energy use and greenhouse gas emissions of ethanol from corn, sugarcane and cellulosic biomass for US use. *Environmental Research Letters* 7: 4 (2012). https://doi.org/10.1088/1748-9326/7/4/045905 (Accessed 2025-06-17).

[125] F.M. Adebiyi. Air quality and management in the petroleum refining industry: A review. *Environmental Chemistry and Ecotoxicology* 4 (2022): pp. 89-96. https://doi.org/10.1016/j.enceco.2022.02.001 (Accessed 2025-04-30).

[126] Interested Party CC. [Interview]. (13 March 2025).

[127] U.S. Environmental Protection Agency. *Transportation Sector Emissions*. (2025). https://www.epa.gov/ghgemissions/transportation-sector-emissions (Accessed 2025-04-30).

[128] U.S. Energy Information Administration. *Biofuels explained: Biofuels and the environment.* (2022). https://www.eia.gov/energyexplained/biofuels/biofuels-and-the-environment.php#:~:text=These%20evaporative%20emissions%20contribute%20to,emissions%20before%20blending%20with%20ethanol.&text=Burning%20biofuels%20results%20in%20emissions,2 (Accessed 2025-04-30).

four truckloads of freight. Taking long-haul diesel trucks off the roads improves air quality via reduced GHG and criteria air pollutant emissions.

Water Use and Water Quality

The projects spurred by the CTFP are likely to have an impact on the quantity of water use and water quality. Fossil transportation fuel production uses water in multiple stages of the life cycle, primarily extraction and refining. One estimate of water withdrawal to produce gasoline from conventional petroleum sources is 13 liters (L) of water per liter of gasoline.[129] Estimates of water consumption to produce gasoline range from 1.4 to 10 liters per liter of gasoline, depending on if indirect supply-chain water uses are included.[130] A 2016 study estimated the electric vehicle withdrawal rate to be 53 L/kWh and 2.2 L/kWh consumption for the average grid mix in the United States, making electricity a more water intensive fuel than gasoline under the EPA formula where 33.7 kWh is equivalent to 1 gallon of gasoline.[131] Renewable electricity derived from solar and wind energy uses much less water than the average grid mix in the United States in 2016, and electricity in New Mexico via PNM is set to be fully renewable by 2040.[132,133] Diesel produced from conventional crude oil has a life cycle water consumption between 4.1 and 7.4 L of water/L of fuel, while biodiesel derived from irrigated biomass has a life cycle water consumption of 2.7 to 22,600 L of water/L of fuel.[134] The latter range depends primarily on location and the ratio of rainfed to irrigated biomass, although biodiesel produced from irrigated biomass in New Mexico would likely be on the higher end of this

Biodiesel from Irrigated Biomass

None of the interviewed producers are planning to produce biodiesel from irrigated biomass.

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[129] L. Wang, W. Shen, H.C. Kim, T. J. Wallington, Q. Zhang, and W. Han. Life cycle water use of gasoline and electric light-duty vehicles in China. *Resources, Conservation and Recycling,* 154 (2020). https://www.sciencedirect.com/science/article/abs/pii/S0921344919305348#:~:text=We%20found%20life%20cycle%20water,et%20al.%2C%202012) (Accessed 2025-04-30).

[130] Wang et al. Life cycle water use of gasoline and electric light-duty vehicles in China.

[131] Wang et al. Life cycle water use of gasoline and electric light-duty vehicles in China.

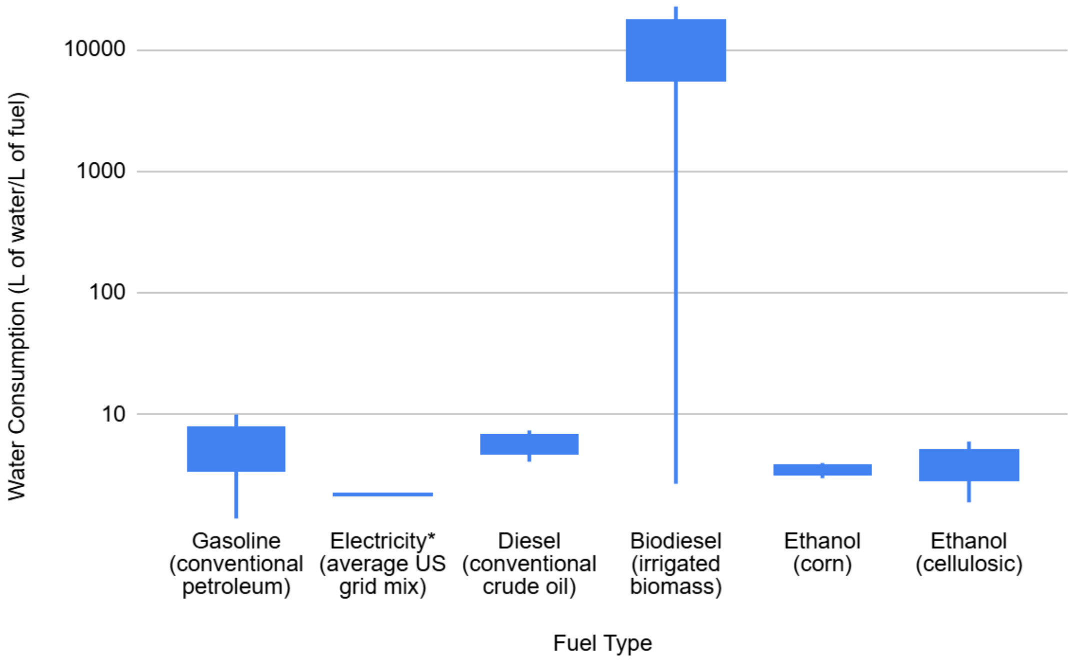
[132] Y. Jin, P. Behrens, A. Tukker, & L. Scherer. Water use of electricity technologies: A global meta-analysis. *Renewable and Sustainable Energy Reviews* 115 (2019). https://doi.org/10.1016/j.rser.2019.109391 (Accessed 2025-04-30).

[133] PNM. *Our Commitment*. (n.d.). https://www.pnm.com/our-commitment (Accessed 2025-03-15).

[134] M.D. Staples, H. Olcay, R. Malina, P. Trivedi, M. N. Pearlson, K. Strzepek, S. V. Paltsev, C. Wollersheim, & S R. H. Barrett. Water consumption footprint and land requirements of large-scale alternative diesel and jet fuel production. *Environmental Science & Technology* 47:21 (2013): pp. 12557–12565. https://pubs.acs.org/doi/10.1021/es4030782 (Accessed 2025-04-30).

range due to the desert climate throughout much of the state. This estimate alone could explain why none of the interviewed producers are planning to produce biodiesel from irrigated biomass. Ethanol derived from corn uses between 3 and 4 gallons of water per gallon of ethanol produced.[135] Cellulosic ethanol can require between 1.9 and 6 gallons of water per gallon of ethanol produced, depending on the process.[136] Figure 3 shows all water consumption ranges by fuel type. No matter the fuel, the life cycle water use depends heavily on the exact production process used; therefore, efficient production leads to efficient water use. Reducing energy consumption, alternative distillation technologies, and forced air cooling instead of water all provide opportunities for water savings in multiple alternative fuel life cycles.

Figure 3. Water Consumption by Fuel Type



∗Electricity is in L of water/kWh

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[135] A. Aden. *Water Usage for Current and Future Ethanol Production.* (Southwest Hydrology, 2007). https://ethanolrfa.org/file/1795/waterusagenrel-1.pdf (Accessed 2025-04-30).

[136] A. Aden. *Water Usage for Current and Future Ethanol Production.*

Transportation fuel production also has been shown to cause changes to water quality. Produced water, the largest waste stream from oil and gas extraction, contains organics, salts, metals, and radioactive materials. While many contaminants are removed downstream of discharge due to volatilization, biodegradation and sorption to sediment, concentrations of many inorganic contaminants can increase downstream due to water evaporation.[137] Electricity, if sourced from fossil fuels, can lead to the discharge of similar contaminants as produced water in addition to thermal pollution.[138] Ethanol produced from corn can cause water quality issues from the discharge and runoff from fertilizer and pesticide use.[139] Little information was available on the impact of ethanol produced from wood waste on water quality. For renewable natural gas from dairy methane, the digestate product of the biodigesters that convert manure to methane concentrates nitrogen and phosphorus. Therefore, if the digestate is then used as a fertilizer, the nitrogen and phosphorus can become more mobile in the environment leading to algal blooms and groundwater contamination.[140] The primary water quality concern for alternative and renewable fuels generation is increased fertilizer and pesticide runoff and groundwater contamination, whereas fossil fuel water quality concerns include a variety of organic and inorganic contaminants that have known impacts on human health.

Animal and Plant Life

Fossil and alternative fuels production have varying impacts on animal and plant life. New construction of any production facility may cause habitat fragmentation and loss of habitat for animals, and vegetation clearing and soil compaction for

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[137] M.C. McLaughlin, T. Borch, B. McDevitt, N. R. Warner, & J. Blotevogel. Water quality assessment downstream of oil and gas produced water discharges intended for beneficial reuse in arid regions. *Science of The Total Environment* 713 (2020). https://doi.org/10.1016/j.scitotenv.2020.136607 (Accessed 2025-04-30).

[138] United States Environmental Protection Agency. *About the U.S. Electricity System and its Impact on the Environment.* (2025). https://www.epa.gov/energy/about-us-electricity-system-and-its-impact-environment#:~:text=from%20the%20grid.-,Environmental%20Impacts%20of%20the%20Electricity%20System,environment%20can%20affect%20human%20health (Accessed 2025-04-30).

[139] S. K. Hoekman, A. Broch, & X. V. Liu, Environmental implications of higher ethanol production and use in the US: A literature review. Part I–Impacts on water, soil, and air quality. *Renewable and Sustainable Energy Reviews* 81: Part 2 (2018): pp. 3140-3158. https://doi.org/10.1016/j.rser.2017.05.050 (Accessed 2025-04-30).

[140] J. L. Campos, D. Crutchik, O. Franchi, J. P. Pavissich, M. Belmonte, A. Pedrouso, A. Mosquera-Corral, & A. Val del Rio. Nitrogen and phosphorus recovery from anaerobically pretreated agro-food wastes: A review. *Frontiers in Sustainable Food Systems* 2:91 (2019). https://doi.org/10.3389/fsufs.2018.00091 (Accessed 2025-04-30).

plants.[141,142] The likely and early-stage projects in New Mexico, mentioned in Part 1 of this report, that will not require new facility construction include the use of a former ethanol plant in Quay County to anaerobically digest manure and effluent wastewater as a part of the clean fuel production process, a clean hydrogen project at the old Chevron molybdenum mine with Kit Carson, and ethanol from dairy processing waste production at the former Abengoa ethanol plant. All of these projects are utilizing existing infrastructure and abandoned production facilities to produce low-CI fuels while avoiding further habitat disruption. Many of the other likely and early-stage projects mentioned in Part 1 of this report will require new construction, which can destroy natural habitats, displace wildlife, fragment ecosystems and introduce invasive species to the area.[143] Conservation methods include surveying the area prior to construction to identify species of impact and creating plans to protect or recreate lost habitats. For example, one interviewed producer has a solar PV system on 90 acres of land to provide renewable energy to their production facility. They encountered push-back from entities with grazing leases on some of that land, but some of the potential negative impacts on the local plant life could be mitigated with agrivoltaics or the co-location of solar and agriculture on the same land. Efficiently using land for transportation fuel production is essential to minimizing negative impacts on plant and animal life. One study characterized the amount of alternative diesel fuel produced per land area between 490 and 4,200 L of fuel/hectare, under assumptions of rainfed and irrigated biomass cultivation.[144] Keeping the production of fuel per land area high for any transportation fuel pathway can minimize encroachment on plant and animal habitats.

Public Health

Changes in air quality, water quality and land use all impact public health outcomes. Proximity to GHG and criteria air pollutant emissions sources directly impacts health. An analysis by Berkeley Research Group for the Washington Clean

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[141] Clevenger, A.P. & Huijser, M.P. Wildlife Populations and Road Corridor Intersections. *Wildlife Crossing Structure Handbook Design and Evaluation in North America.* (Federal Highway Administration, 2011). https://www.fhwa.dot.gov/clas/ctip/wildlife_crossing_structures/ch_2.aspx (Accessed 2025-04-30).

[142] King County, Washington. Chapter 11 - Construction Impacts and Mitigation Measures. *FEIS.* (n.d). https://your.kingcounty.gov/dnrp/library/wastewater/wtd/construction/Planning/RWSP/FEIS/chap11.pdf (Accessed 2025-04-30).

[143] Canadian Wildlife Federation. How Building a House Impacts Wildlife. *Connecting With Nature.* [Blog]. (23 January 2020). https://blog.cwf-fcf.org/index.php/en/how-building-a-house-impacts-wildlife/#:~:text=The%20light%20from%20ongoing%20construction%20can%20disrupt,also%20attract%20wildlife%20to%20an%20unsafe%20area (Accessed 2025-04-30).

[144] Staples et al. Water consumption footprint and land requirements of large-scale alternative diesel and jet fuel production.

Fuel Standard found that for counties with high populations living near high-traffic roadways, the health benefits of reduced pollution would be most directly attributable to reduced fossil fuel combustion.[145] Health benefits of reduced GHG and criteria air pollutant emissions include reduced cardiovascular and respiratory hospitalizations, asthma emergency room visits, fewer cases of acute child bronchitis and fewer onsets of dementia. Public health benefits of fewer inorganic contaminants in water sources include fewer lung diseases, cardiovascular and central nervous system diseases, and bladder and kidney cancers.[146]

The positive impacts of near-term US decarbonization largely involve better air quality, leading to gains in human health, labor productivity, and agriculture. Climate benefits, in contrast, are mostly seen beyond 2050.[147] Public health benefits of decarbonization are also near-term. The incidence of premature deaths due to air pollution follows the national NO_x emissions trend.[148] Relative to ozone, particulate matter with a diameter of 2.5 micrometer or less ($PM_{2.5}$) has a 3 times greater effect on premature deaths, and relative to heat, $PM_{2.5}$ has a 10x greater impact on premature deaths in 2020.[149] The likelihood of finding compounds resulting from transportation fuel production at levels that pose risk to humans through ingestion of drinking water in North America is low.[150] Although, targeted monitoring and assessment of specific contaminants needs to be emphasized in future research. Land use changes as a result of clean transportation fuel programs, which impact plant and animal life, will have overlapping public health impacts with air and water quality changes that may arise from a clean transportation fuel program.

The economic benefits of avoided hospitalizations and deaths from improved air quality are in the billions. In California, the Air Resources Board estimates $5

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[145] BRG Energy & Climate. *Clean Fuel Standard Cost Benefit Analysis Report*.

[146] S. Madhav. Water Pollutants: Sources and Impact on the Environment and Human Health. In Pooja, D., Kumar, P., Singh, P., & Patil, S. (eds). *Sensors in Water Pollutants Monitoring: Role of Material.* (Springer, 2019), pp.43-62. https://doi.org/10.1007/978-981-15-0671-0_4 (Accessed 2025-04-30).

[147] D. Shindell, M. Ru, Y. Zhang, & A. Glick. Temporal and spatial distribution of health, labor, and crop benefits of climate change mitigation in the United States. *Proceedings of the National Academy of Sciences*, 118:46 (2021). https://doi.org/10.1073/pnas.2104061118 (Accessed 2025-04-30).

[148] Shindell et al., Temporal and spatial distribution of health, labor, and crop benefits of climate change mitigation in the United States.

[149] Shindell et al., Temporal and spatial distribution of health, labor, and crop benefits of climate change mitigation in the United States.

[150] L. Ritter, K. Solomon, P. Sibley, K. Hall, P. Keen, G. Mattu, & B. Linton. Sources, pathways, and relative risks of contaminants in surface water and groundwater: a perspective prepared for the Walkerton inquiry. *Journal of Toxicology and Environmental Health* 65:1 (2002): pp. 1-142. https://pubmed.ncbi.nlm.nih.gov/11809004/ (Accessed 2025-04-30).

billion in savings from avoided health outcomes between 2024 and 2046.[151] There is an estimated annual public health savings of $80M/yr for Oregon's expanded clean fuels program.[152] The value of reduced mortality from Washington's clean fuel standard is between $1.8 and $3.8 billion.[153] Based on these estimates for other jurisdictions with clean transportation fuel standards, New Mexico could save billions of dollars in avoided hospitalizations and deaths.

Benefits Review: Conclusions

While the CTFP directly aims to reduce transportation fuel life cycle emissions, water use, water quality, animal and plant life, as well as public health are also likely to be impacted by the transition to low-CI fuels. Air quality improvements are expected as evidenced by results from other states with programs similar to the CTFP. Water use may increase or decrease depending on the fuel. Water quality may generally improve in the transition to low-CI fuels, but nitrogen and phosphorus levels may increase. Any opportunity to repurpose current infrastructure in the transition to low CI fuels will prevent encroachment on plant and animal habitats. The economic benefits of improved air quality are upwards of $1 billion in avoided hospitalizations and deaths.[154,155,156]

Social Benefits

Low-Income & Underserved Communities

The CTFP offers the potential to deliver environmental, economic, and social gains across a range of communities, helping to ensure the transition to cleaner fuels is inclusive, equitable, and economically beneficial. Low-income and underserved communities in New Mexico face disadvantages that may be improved by the promulgation of a CTFP. Longstanding barriers limit equitable access to clean transportation, affordable energy, and new economic opportunities.

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[151] California Air Resources Board. *CARB Updates the Low-Carbon Fuel Standard to increase access to cleaner fuels and zero-emission transportation options.* (2024). https://ww2.arb.ca.gov/news/carb-updates-low-carbon-fuel-standard-increase-access-cleaner-fuels-and-zero-emission (Accessed 2025-04-30).

[152] Li et al. Modeling Expected Air Quality Impacts of Oregon's Proposed Expanded Clean Fuels Program.

[153] BRG Energy & Climate. *Clean Fuel Standard Cost Benefit Analysis Report*.

[154] California Air Resources Board. *CARB Updates the Low-Carbon Fuel Standard to increase access to cleaner fuels and zero-emission transportation options.*

[155] Li et al. Modeling Expected Air Quality Impacts of Oregon's Proposed Expanded Clean Fuels Program.

[156] BRG Energy & Climate. *Clean Fuel Standard Cost Benefit Analysis Report*.

Disadvantaged communities have limited access to EVs due to upfront costs and a lack of publicly available charging infrastructure and electrical infrastructure to support chargers.[157] New Mexico's rural communities have even less access than their urban counterparts to EVs, low-carbon fuels, and clean transportation infrastructure. Urban residents of these communities are also disproportionately exposed to pollution from heavy-duty truck traffic, increasing rates of asthma, cardiovascular disease, and other serious health conditions.[158]

Many tribal nations in New Mexico face disproportionately high energy burdens–the percentage of household income spent on energy costs.[159] While the statewide average energy burden is approximately 3%, it, for example, rises to 6% for Zuni Pueblo and 8% for the Jicarilla Apache Nation.[160] High energy burdens impact household financial stability. Fragmented land ownership, limited access to clean energy financing, and bureaucratic hurdles have constrained the ability of tribes to exercise energy sovereignty. Although recent federal policies, such as direct access to clean energy tax credits, and state policies, such as exemption from competition for community solar interconnection permits, offer new opportunities, significant policy support and technical assistance will still be needed to ensure equitable participation.

Potential Mechanisms for CTFP Social Benefits

The CTFP may help address some of the longstanding barriers to full participation in the clean energy and transportation transition faced by low-income, tribal, and underserved communities.

California, Oregon, and Washington each have equity metrics built into their respective clean fuels programs. In 2022, California implemented an equity-based framework that requires opt-in electrical distribution utilities (EDUs) to spend up to 75% of the revenue from holdback credits, which are base credits remaining after contributing to their "Clean Fuel Reward" Program, to support transportation electrification projects that benefit disadvantaged, low-income, and rural

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[157] Brown et al. *Driving California's Transportation Emissions to Zero.*
[158] Brown et al. *Driving California's Transportation Emissions to Zero.*
[159] Intermountain West Energy Sustainability & Transitions. *On the road to carbon neutrality in the Intermountain West.* (2023). https://iwest.org/wp-content/uploads/2023/11/I-WEST_Detailed-Report.pdf (Accessed 2025-04-30).
[160] Intermountain West Energy Sustainability & Transitions. *On the road to carbon neutrality in the Intermountain West.*

communities. The Clean Fuel Reward (CFR) Program requires opt-in EDUs receiving base credits for residential EV charging to contribute a minimum percentage of those credits toward establishing a statewide point-of-purchase EV incentive. The Clean Fuel Reward program provides an upfront incentive for purchasing or leasing a new EV in California.[161,162] Oregon implemented an Incremental Aggregator that uses revenue from the sale of unclaimed incremental credits to equitably distribute benefits and address the needs and interests of environmental justice communities.[163] Washington requires electric utilities to use a portion of the credit revenue in communities with the most air pollution, and they designated a backstop aggregator that reinvests the revenue from unclaimed credits from electric charging into transportation electrification in communities with the most air pollution.[164]

Similarly, New Mexico's CTFP also has built in equity mechanisms. New Mexico's proposed rule requires that EDUs use 100% of revenue generated from the sale of program credits (less administrative costs) to support transportation decarbonization and electrification projects.[165] Importantly, at least 50% of this revenue must be directed toward projects that benefit low-income and underserved communities.[166] This structure ensures that credit revenue will be reinvested into expanding EV charging access, supporting affordable EV ownership, and funding electrified public transit options in the communities that have historically been underserved by traditional transportation systems.

Experience from California, Oregon, and Washington shows that clean fuel programs often deliver significant secondary benefits, including reductions in air pollution, expanded transportation choices, and economic growth in clean

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[161] California Air Resources Board. *LCFS Electricity and Hydrogen Provisions*. (n.d.). https://ww2.arb.ca.gov/resources/documents/lcfs-electricity-and-hydrogen-provisions#:~:text=Holdback%20Credit%20Equity%20Projects,%2Dincome%2C%20and%20rural%20communities (Accessed 2025-04-30).

[162] K. Chatterjee. *Low-Carbon Fuel Standard Changes to Accelerate California Transportation Electrification*. (2024). https://energycenter.org/thought-leadership/blog/low-carbon-fuel-standard-changes-accelerate-california-transportation#:~:text=As%20part%20of%20the%202024%20amendments%20to,and%20used%20medium%2D%20and%20heavy%2Dduty%20(MD/HD)%20EVs.&text=As%20part%20of%20the%202024%20amendments%20to,of%20holdback%20funds%20to%20support%20equity%20projects (Accessed 2025-04-30).

[163] Oregon Department of Environmental Quality. *Incremental Aggregator and the Equity Advisory Committee*. (n.d.). https://www.oregon.gov/deq/ghgp/cfp/Pages/iaEAC.aspx (Accessed 2025-04-30).

[164] Department of Ecology State of Washington. *Benefits of the Clean Fuel Standard.* (n.d.). https://ecology.wa.gov/air-climate/reducing-greenhouse-gas-emissions/clean-fuel-standard/benefits (Accessed 2025-04-30).

[165] New Mexico Environment Department. *Discussion Draft Rule Regarding the Clean Transportation Fuel Program.* p. 34.

[166] New Mexico Environment Department. *Discussion Draft Rule Regarding the Clean Transportation Fuel Program.* p. 34.

technology sectors.[167] It is expected that New Mexico's CTFP will create similar ripple effects. Investments in EV infrastructure, cleaner heavy-duty vehicle fleets, and public transit electrification can reduce the disproportionate pollution burdens faced by disadvantaged communities, improving local air quality and public health outcomes. These investments, funded by credit sales, could help fill any funding gaps from delayed or dismantled federal charging infrastructure programs.

Investments in sustainable industries create high-wage jobs accessible to a wide range of workers. Clean energy and transportation sectors offer career opportunities not only for engineers and scientists, but also for technicians, skilled construction workers, and service providers supporting job creation and economic diversification.[168] As shown in Figure 2, the CTFP is likely to create jobs primarily in rural counties. The greatest number of projects were identified in Lea County. Approximately 16% of Lea County's employees work in the Mining, Quarrying, and Oil & Gas Extraction industries, 10.6% work in Retail Trade, and 9.44% work in Construction.[169] If these projects tied to the promulgation of the CTFP come to fruition, they could help diversify the county's industry base, and the same could hold true for the other counties with projects under consideration.

The CTFP can also help support conditions necessary for continued investment in clean energy infrastructure with electricity as a transportation fuel. In this context, clean energy infrastructure refers to renewable energy generation projects such as solar farms, wind installations, and community-scale geothermal systems, as well as grid modernization initiatives like energy storage systems, microgrids, and upgraded transmission lines designed to integrate and deliver renewable energy more efficiently. Increased demand for EVs and other low-carbon technologies is likely to drive the need for expanded renewable energy generation and grid modernization as more and more energy is electrified, creating opportunities for projects that improve clean energy access for low-income and tribal communities. Tribal nations in New Mexico, such as Picuris Pueblo, have already demonstrated

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[167] G. Pacyniak, A. Husselbee, & C. Lynch. *Clean Fuel Standard Directed Benefit Mechanisms to Promote Equity*. (UNM School of Law, 2024). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4879942 (Accessed 2025-04-30).

[168] Rounds Consulting Group. *Economic Brief: Advancing Arizona's Economic Base Through High-Wage Job Creation in Sustainable Industries*. (2021). https://www.nature.org/content/dam/tnc/nature/en/documents/TNC_AZT_RoundsReport_Final.pdf (Accessed 2025-04-30).

[169] United States Census Bureau. C24010: SEX BY OCCUPATION FOR THE CIVILIAN EMPLOYED POPULATION 16 YEARS AND OVER - Census Bureau Table. (2021). https://data.census.gov/table/ACSDT5YSPT2021.C24010?q=Hong+Lea+O.+Attorney (Accessed 2025-04-30).

leadership in advancing local clean energy initiatives.[170] Programs like the CTFP, by stimulating clean fuel markets and indirectly encouraging renewable energy investment, may provide pathways for tribes whose economies grew around oil and gas extraction to diversify.

Regional Needs & Benefits

In New Mexico's northwest and southeast regions, oil and gas development have been central pillars of the economy over the last century due to the presence of the San Juan and Permian basins, respectively. Challenges identified specifically in these fossil fuel legacy communities include diversifying the regional economies and creating high-wage or similar-wage jobs. The two basins differ in their needs and current challenges.[171] Additionally, the increase in jobs from wind and solar development is not enough to replace jobs and tax revenue, which is lower per unit of energy generated.[172]

In the pursuit of a circular economy, the CTFP provides new revenue streams for a number of potential business models. The CTFP encourages the production of biodiesel and renewable diesel, providing new revenue streams (credits) for waste oil and organic waste businesses. The CTFP's credits for biomass based pathways may encourage better post-fire forest health practices, if post-fire material or thinned hazardous fuels are used as a feedstock for biomass energy generation.

Alternative fuels and the proliferation of EVs ultimately provide more choices for consumers, broadening options and addressing a wider variety of needs. There are economy-wide benefits to lower-cost fuels, including electricity, because the money saved by paying less or nothing at the pump tends to be spent more in local economies on local goods, services, and employment as opposed to otherwise going out of state. This effect is even more pronounced in disadvantaged communities because the indirect income and employment benefits of EV adoption benefit these communities disproportionately. In 2024, the national average cost of gasoline was $3.09 per gallon, whereas the national

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[170] Intermountain West Energy Sustainability & Transitions. *On the road to carbon neutrality in the Intermountain West.* https://media.rff.org/documents/I-WEST-Phase-One-Final-Report.pdf

[171] D., Raimi & Z. Whitlock. *Can Federal Efforts Help Build Economic Resilience in New Mexico's Oil and Gas Communities? (*Resources for the Future, 2023). https://media.rff.org/documents/Report_23-11_uoIQCqj.pdf (Accessed 2025-04-30).

[172] Raimi et al. *Can Federal Efforts Help Build Economic Resilience in New Mexico's Oil and Gas Communities?*

average equivalent for an EV was $1.41 per eGallon, less than half the cost of gas.[173]

EV adoption stimulates local job growth from skilled and less-skilled workers in the form of demand for the installation and maintenance of EV chargers, as well as increasing local energy demand thereby increasing investment and demand for new energy generation capacity. These benefits hold true even if a state does not have any EV/battery manufacturing capacity.

A diversified transportation fuel portfolio within a state enhances its resilience to the volatility inherent in global fossil fuel markets. Reliance solely on internal combustion engine vehicles means consumers and the economy are vulnerable to crude oil price shocks, limiting the available response to higher gas prices to reducing vehicle miles traveled (VMT).[174] Conversely, the availability of electric vehicles and alternative liquid fuels, including E85 and renewable diesel, provides a mechanism to attenuate the adverse impacts of such price escalations. Furthermore, the diversification of the local fuel supply chain offers long-term economic benefits by mitigating potential losses associated with sustained periods of suppressed crude oil prices.

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[173] K. Kirk. Gasoline is cheap right now - but charging an EV is still cheaper. *Yale Climate Connections*. (08 January 2024). https://yaleclimateconnections.org/2024/01/gasoline-is-cheap-right-now-but-charging-an-ev-is-still-cheaper/#:~:text=How%20much%20does%20EV%20charging,of%20the%20price%20of%20gasoline (Accessed 2025-04-30).

[174] T.P. Wenzel. *Elasticity of Vehicle Miles of Travel to Changes in the Price of Gasoline and the Cost of Driving in Texas.* (Ernest Orlando Lawrence Berkeley National Laboratory, 2018). https://eta-publications.lbl.gov/sites/default/files/_lbnl-2001138.pdf (Accessed 2025-04-30).

Conclusions

Adelante's research and interviews indicated that 16 interested parties have plans for 19 new projects that are directly related to or supported by the CTFP. Nine interviewed interested parties indicated they have projects underway, three interviewed interested parties indicated they had early-stage project planning underway, three non-interviewed interested parties had publicly announced projects, and additional research uncovered one additional publicly announced project. A number of Interested Parties are also monitoring the progress of the program, illustrating strong early interest. Project types identified through interested party engagement and supplemental research are diverse and include hydrogen production, ethanol, renewable natural gas development, renewable methanol, and synthetic fuels including DME. These projects are also geographically dispersed, with anticipated activity in several counties including Lea, Quay, Eddy, Taos, Bernalillo, Guadalupe, Cibola, Hidalgo, Chaves, Roosevelt, San Juan, and Torrance expanding the economic benefits beyond urban centers into rural areas.

Adelante's analysis conservatively estimates that 274 non-FSE jobs could be directly attributed to or supported by the CTFP over the next 15 years. The estimated economic impact in income of these jobs is $20.2 million annually and $212 million from the start of operations through 2040. Importantly, these employment opportunities span a wide range of occupations, from engineering and technical roles to positions in operations, and facility maintenance. The number of jobs could grow to Adelante's 2022 estimate of 378 direct jobs, if additional interested parties that Adelante was unable to interview have projects in the planning phase that are realized.

In addition to reducing transportation fuel life cycle emissions, the program is expected to deliver significant reductions in transportation-sector greenhouse gas emissions, likely mirroring successes seen in other states such as California (where a 15.34% decrease in fuel carbon intensity was achieved under the LCFS). These reductions will be complemented by improvements in local air quality, particularly benefiting communities historically burdened by transportation pollution. The economic benefit of air quality improvement is expected to be north of $1 billion.

The CTFP is also expected to support low-income and underserved communities. Participating utilities must reinvest 100% of credit revenue into transportation decarbonization efforts, with at least 50% directed toward projects serving low-income and underserved communities. This mechanism embeds equity into the core of the program, making the CTFP a critical tool for supporting rural areas, low-income, and underserved communities in transitioning to cleaner energy economies.

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APPENDIX A

Interview & Outreach Table

Entity	Method of Outreach	Dates of Outreach	Response
Interested Party A	email	03/05/2025	Interview completed
Interested Party 1	email	02/27/2025, 03/03/2025	No response
API	email	03/05/2025, 03/12/2025, 03/20/25	Indicated intent to provide input via email with another interested party
Interested Party 2	email	02/19/2025, 02/27/2025, 03/10/2025	Interview declined
Interested Party 3	email	02/18/2025, 03/04/2025	No response
Blue Pony	email	02/21/2025	Interview completed
BNSF	email	02/19/2025	Interview completed
Interested Party 4	email	03/05/2025, 03/12/2025, 03/20/2025	No response
Interested Party D	email	02/18/2025, 03/03/2025	Interview completed
Interested Party 5	email	02/19/2025, 02/27/2025, 03/10/2025	No response
Interested Party E	email	02/18/2025	Interview completed
Interested Party F	email	02/18/2025	Interview completed
Interested Party 6	email	02/18/2025, 03/04/2025	Interview declined
Dominion Energy	email	02/19/2025	Interview completed
Interested Party H	email	03/05/2025, 03/12/2025	Interview completed
Interested Party I	email	03/05/2025	Interview completed

Interested Party 7	email	03/05/2025, 03/12/2025, 03/20/2025	No response
Interested Party J	email	02/24/2025, 03/05/2025	Interview completed
Interested Party K	email	02/21/2025, 02/27/2025	Interview completed
Interested Party 8	email	02/19/2025, 02/27/2025	Interview declined
Infinium	email	02/25/2025	Interview completed
Interested Party M	email	03/05/2025, 03/12/2025	Interview completed
Kit Carson Electric Cooperative	email	02/24/2025, 03/04/2025	Interview completed
Interested Party O	email	02/18/2024	Interview completed
Interested Party 9	email	03/05/2025, 03/12/2025	Interview declined
Interested Party P	email	02/18/2025, 03/04/2025	Interview completed
Interested Party 10	email	03/05/2025	Interview declined
MAXX Energy	email	02/21/2025	Interview completed
Interested Party 11	email	03/05/2025, 03/12/2025, 03/20/2025	No response
Interested Party 12	email	03/05/2025, 03/12/2025, 03/20/2025	Initial response, no response to interview scheduling
Interested Party 13	email	02/18/2025	Interview declined
Interested Party 14	email	02/19/2025, 02/27/2025, 03/10/2025, 03/20/2025	Initial response, no response to interview scheduling
Interested Party 15	email	03/05/2025, 03/12/2025, 03/20/2025	No response
Interested Party R	email	02/18/2025,	Interview completed

		03/04/2025, 03/20/2025	
Nuvve New Mexico LLC	email	04/17/2025	Interview completed
Oberon Fuels	email	02/18/2025	Interview completed
Interested Party 16	email	03/05/2025, 03/12/2025, 03/17/2025, 03/24/2025	Initial response, no response to interview scheduling
Interested Party 17	email	02/27/2025	No response
Interested Party 18	email	02/18/2025. 03/04/2025	No response
Interested Party 19	email	03/05/2025, 03/12/2025, 03/20/2025	No response
Interested Party U	call	03/03/2025, 03/17/2025	Interview completed
Interested Party 20	email	02/18/2025, 03/04/2025, 03/20/2025	Interview scheduled on 03/11/2025 for 03/17/2025, but no one showed up and no one responded to follow up emails.
Interested Party V	email	03/05/2025, 03/12/2025	Interview completed
Interested Party W	email	03/05/2025, 03/17/2025	Interview completed
Interested Party X	email	02/18/2025, 03/04/2025, 03/20/2025, 03/24/2025	Interview completed
Interested Party Y	email	02/18/2025	Interview completed
Interested Party Z	email	02/18/2025	Interview completed
Interested Party AA	email	02/21/2025	Interview completed
Interested Party 21	email	03/05/2025, 03/12/2025, 03/20/2025	Interview declined
Union Pacific	email	02/19/2025,	Input provided via

		02/27/2025, 03/10/2025	email
Interested Party 22	email	03/05/2025, 03/12/2025, 03/20/2025, 3/25/2025	Initial response, no response to interview scheduling
Interested Party CC	email	02/20/2025, 02/27/2025, 03/10/2025	Interview completed
Interested Party DD	email	02/18/2024	Interview completed
Interested Party 23	email	02/18/2025, 03/04/2025, 03/20/2025	No response

APPENDIX B

Non-Interviewed Interested Parties: No Identified Projects

A number of potential interested parties were identified by Adelante and the Department and included in outreach efforts but were not able to participate in interviews. For these entities, no active or publicly disclosed clean fuel projects in New Mexico were identified during the research period. However, several contributed public input for the CTFP draft rulemaking process, offering perspectives on policy design and implementation. Input on the CTFP draft rulemaking process could indicate potential future involvement ranging from production projects or importation of clean fuels to support local demand. While others have not yet engaged publicly, these organizations may become more active as the program evolves and opportunities emerge. Where possible, publicly available sources were reviewed to capture the company's current level of activity and alignment with New Mexico's clean transportation goals. The summary table reflects the state of public information at the time of research and does not imply active engagement in New Mexico unless noted.

Interested Party	Input on CTFP Discussion Draft Rule?	NM Presence?
Amazon	No	Yes
American Petroleum Institute	Yes	Yes
Bunge	Yes	No
Darling Ingredients	No	Yes
ExxonMobil	No	Yes
LanzaTech	No	No
Marathon Petroleum Corporation	No	Yes
Modern Hydrogen	No	No
Neste	Yes	No
NM DOT	No	Yes

Phillips 66	No	Yes
Pilot Flying J	No	Yes
Pinal Energy	No	No
Promus Energy	No	No
Rio Valley Biofuels	Yes	No
The Fajardo Group	No	Yes
UNM	Yes	Yes
World Energy	Yes	No

APPENDIX C

Methods for Estimated Economic Impact of Full Time Jobs Connected to Promulgation of CTFP

Research was conducted to find an average job composition for each type of facility or project that was able to provide job estimates as follows:

Interested Party	Facility Type	Estimated Job Composition	Source	Mean Salaries
Blue Pony Energy	Hydrogen Production	Machinery installers, maintenance and repairers: 52% Metal workers and assemblers: 19% Executives and business operations: 12% Freight movers: 10% Production occupations: 7%	Rhodium Group. *Clean Hydrogen Workforce Development: Opportunities by Occupation – Rhodium Group*. https://rhg.com/research/clean-hydrogen-workforce-development/ (Accessed 2025-07-21).	Machinery installers, maintenance and repairers (49-9043): $58,500 Metal workers and assemblers (51-2041): $50,640 Executives and business operations (13-1199): $89,130 Freight movers (53-7062): $39,760 Production occupations (51-9199): $41,400
MAXX Energy	Hydrogen Production	Installers, maintenance and repairers: 48% Production occupations:	Rhodium Group. *Clean Hydrogen Workforce Development: Opportunities*	Machinery installers, maintenance and repairers (49-9043): $58,500

		18% Executives and business operations: 16% Engineers: 11% Plant and system operators: 7%	*by Occupation – Rhodium Group*. https://rhg.com/research/clean-hydrogen-workforce-development/ (Accessed 2025-07-21).	Production occupations (51-9199): $41,400 Executives and business operations (13-1199): $89,130 Engineers (17-2199): $118,350 Plant and system operators (51-8099): $59,890
Interested Party H	Hydrogen, RNG, and fuel cell production	Installation, maintenance and repair: 31% Business and financial operations: 17% Office and admin support: 19% Production occupations: 14% Management occupations: 9% Architecture and engineering occupations: 9%	U.S. Bureau of Labor Statistics. *Natural Gas Distribution - May 2023 OEWS Industry-Specific Occupational Employment and Wage Estimates*. Bureau of Labor Statistics. https://www.bls.gov/oes/2023/may/naics4_221200.htm (Accessed 2025-07-21).	Installation, maintenance and repair (49-0000): $58,500 Business and financial operations (13-0000): $90,580 Office and admin support (43-0000): $47,940 Production occupations (51-0000): $47,620 Management occupations (11-0000): $137,750 Architecture and engineering occupations

				(17-0000): $99,090
Oberon Fuels	Renewable methanol, DME and hydrogen production	Plant support: 67% Distribution and logistics: 33%	Oberon Fuels. [Interview]. (25 February 2025).	Plant support (51-8099): $59,890 Distribution and logistics (11-3071): $111,870
Infinium	Synthetic Fuel Production	Installers, maintenance, and repairers: 48% Production occupations: 18% Executives and business operations: 16% Engineers: 11% Plant and system operators: 7%	Rhodium Group. *Clean Hydrogen Workforce Development: Opportunities by Occupation – Rhodium Group*. https://rhg.com/research/clean-hydrogen-workforce-development/ (Accessed 2025-07-21).	Machinery installers, maintenance and repairers (49-9043): $58,500 Production occupations (51-9199): $41,400 Executives and business operations (13-1199): $89,130 Engineers (17-2199): $118,350 Plant and system operators (51-8099): $59,890
Interested Party X	RNG production	Installation, maintenance and repair: 31% Business and financial operations: 17% Office and	U.S. Bureau of Labor Statistics. *Natural Gas Distribution - May 2023 OEWS Industry-Specific*	Installation, maintenance and repair (49-0000): $58,500 Business and financial operations (13-0000):

		admin support: 19% Production occupations: 14% Management occupations: 9% Architecture and engineering occupations: 9%	*Occupational Employment and Wage Estimates*. Bureau of Labor Statistics. https://www.bls.gov/oes/2023/may/naics4_221200.htm (Accessed 2025-07-21).	$90,580 Office and admin support (43-0000): $47,940 Production occupations (51-0000): $47,620 Management occupations (11-0000): $137,750 Architecture and engineering occupations (17-0000): $99,090
Interested Party DD	Natural gas to gasoline production	Installation, maintenance and repair: 31% Business and financial operations: 17% Office and admin support: 19% Production occupations: 14% Management occupations: 9% Architecture and engineering occupations: 9%	U.S. Bureau of Labor Statistics. *Natural Gas Distribution - May 2023 OEWS Industry-Specific Occupational Employment and Wage Estimates*. Bureau of Labor Statistics. https://www.bls.gov/oes/2023/may/naics4_221200.htm (Accessed 2025-07-21).	Installation, maintenance and repair (49-0000): $58,500 Business and financial operations (13-0000): $90,580 Office and admin support (43-0000): $47,940 Production occupations (51-0000): $47,620 Management occupations (11-0000): $137,750 Architecture and

				engineering occupations (17-0000): $99,090
Kit Carson Electric Cooperative	Hydrogen Production	Installers, maintenance and repairers: 48% Production occupations: 18% Executives and business operations: 16% Engineers: 11% Plant and system operators: 7%	Rhodium Group. *Clean Hydrogen Workforce Development: Opportunities by Occupation – Rhodium Group*. https://rhg.com/research/clean-hydrogen-workforce-development/ (Accessed 2025-07-21).	Machinery installers, maintenance and repairers (49-9043): $58,500 Production occupations (51-9199): $41,400 Executives and business operations (13-1199): $89,130 Engineers (17-2199): $118,350 Plant and system operators (51-8099): $59,890
Navitas	Renewable Ethanol	N/A	New Mexico Economic Development Department. Company reviving long-shuttered ethanol plant receives support through New Mexico EDD. *EDD Press Releases*. (15 July 2025)	N/A

			https://edd.newmexico.gov/pr/company-reviving-long-shuttered-ethanol-plant-receives-support-through-new-mexico-edd/ (Accessed 2025-07-22).	

Each project or facility type was connected with the most applicable job composition available. Job compositions provided by the interested party were used where available. Oberon Fuels provided an estimated job composition during their interview, and Navitas released estimated job creation and annual payroll in an NMEDD press release. Through research, job composition percentages were available for electrolytic hydrogen projects, conventional hydrogen with carbon capture retrofit projects, and natural gas distribution projects. The electrolytic hydrogen job composition was applied to Maxx Energy's hydrogen production project, Infinium's synthetic fuel production facility, and Kit Carson Electric Cooperative's hydrogen production project. The conventional hydrogen with carbon capture job composition was applied to Blue Pony Energy's hydrogen production project as Blue Pony Energy described their hydrogen production process as such. The natural gas distribution job composition was applied to Interested Party H's hydrogen, RNG, and fuel cell production project, Interested Party X's RNG production project, and Interested Party DD's natural gas to gasoline production project.

Maxx Energy and Kit Carson Electric Cooperative described their hydrogen production process as electrolytic. Adelante was unable to uncover a publicly available job composition for a synthetic fuel production facility, therefore because some synthetic fuel production facilities use electrolytic hydrogen as a feedstock, the job composition of a synthetic fuel production facility was assumed to be most similar to that of an electrolytic hydrogen facility. Adelante was also unable to uncover a publicly available job composition for an RNG facility, therefore the natural gas job composition was determined to be the most similar to that of an RNG facility. This job composition was applied to Interested Party H's hydrogen, RNG, and fuel cell production project as RNG was discussed as the primary fuel used for vehicle applications in Adelante's interview with Interested Party H. If job composition percentages did not sum to 100, then the available job percentages were scaled to sum to 100 percent. If an interested party did not provide an estimated year for the start of operations, 2030 was assumed to be the start of operations.

All salaries were obtained from the Bureau of Labor Statistics, Occupational Employment and Wages, May 2023. Salaries were converted from 2023 USD to 2024 USD using the US Bureau of Economic Analysis Personal Consumption Expenditures Price Index.[175]

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[175] Bureau of Economic Analysis. *Table 2.3.4 Price Indexes for Personal Consumption Expenditures by Major Type of Product*. (2025). https://apps.bea.gov/iTable/?reqid=19&step=2&isuri=1&categories=survey&_gl=1*1pckb8i*_ga*MTE5Njg1NDU5MC4xNzUyNzgxNTQ0*_ga_J4698JNNFT*czE3NTQ0MTM5MjEkbzUkZzEkdDE3NTQ0MTM5OTgkajQzJGwwJGgw#eyJhcHBpZCI6MTksInN0ZXBzIjpbMSwyLDMsM10sImRhdGEiOltbImNhdGVnb3JpZXMiLCJTdXJ2ZXkiXSxbIk5JUEFfVGFibGVfTGlzdCIsIjY0Il0sWyJGaXJzdF9ZZWFyIiwiMjAxNiJdLFsiTGFzdF9ZZWFyIiwiMjAyNSJdLFsiU2NhbGUiLCIwIl0sWyJTZXJpZXMiLCJBIl1dfQ== (accessed 2025-08-05).

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ENVIRONMENT DEPARTMENT

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NMED EXHIBIT 76

STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT BOARD

IN THE MATTER OF PROPOSED
ADOPTION OF 20.2.92 NMAC –
Clean Transportation Fuel Program **No. EIB 25-23(R)**

NEW MEXICO ENVIRONMENT DEPARTMENT TESTIMONY OF MATTHEW DREWS

I. Introduction

My name is Matthew Drews, a Director in Berkeley Research Group's (BRG) Energy and Climate Practice. BRG is a global consulting firm founded in 2010 that provides economic consulting, litigation and arbitration expert witness services, and advisory services in a number of industries, including the energy and environmental industry. The New Mexico Environment Department (NMED) has retained BRG to support the economic analysis of the rules under consideration today for the state, and for me to provide today's testimony. The testimony addresses NMED's proposed rule 20.2.92 NMAC, the Clean Transportation Fuel Program (CTFP), a program authorized by the passage of House Bill 41 in 2024 which authorized the New Mexico Environmental Improvement Board (EIB) to establish a Clean Transportation Fuel Standard (CTFS).

I have worked in the energy and environmental field for over ten years and have been advising clients and employers on comparable policies to the CTFP since 2018. Before joining BRG, I worked for Chevron Corporation in a variety of roles, including in downstream headquarters, corporate mergers and acquisitions, and climate strategy where I advised internal decisionmakers on commercial, financial, and strategic considerations related to comparable policies to the CTFP, particularly the California Low Carbon Fuel Standard (LCFS). Prior to joining BRG, I also worked for Navigant Consulting, where I performed economic analyses of energy and environmental policies for public and private sector clients, advised clients on the technical and economic considerations associated with decarbonization strategies, and assisted clients in preparing and understanding outlooks for energy markets and on commercial and economic considerations of both higher and lower carbon energy assets. Since joining BRG in 2020, I have supported numerous clients in policy analysis, decarbonization strategy, and the operation and forecasting of energy markets and assets operating in these markets, among other matters. In 2022, I performed or oversaw substantial portions of the Washington Department of Ecology's Independent Cost Benefit Analysis of the Washington Clean Fuel Standard (CFS), the most recently adopted comparable policy to the CTFP. My work and oversight in this matter included the considerations of the Washington CFS's impacts on vehicle operations, fuel demand and prices, CFS credit markets, and employment impacts. I have also performed or overseen the production of fuel supply forecasts for the Washington Department of Commerce since 2022, which periodically project the availability of fuels in Washington necessary for compliance with Washington's clean fuels program requirements. In addition to these matters, I have advised utilities and energy consumers on the technical and economic feasibility of deep decarbonization of their energy systems, including in the unique context of Western power markets, and have advised on operational, financial, and regulatory matters in the production and use of low carbon hydrogen.

My qualifications to present this technical testimony are set forth in NMED's Notice of Intent to Present Direct Technical Testimony and are further provided in my curriculum vitae, attached as **NMED Exhibit 77**.

II. Regulatory Context

I would like to begin by providing regulatory context for the analysis my team and I undertook for NMED. New Mexico currently has a number of current policies which will help decarbonize the transportation sector over time, including the New Mexico New Motor Vehicle Emissions Standards (NMVES) and the New Mexico Renewable Portfolio Standard (RPS). NMVES, which I was instructed by NMED to assume is in place for the purposes of benefit-cost analysis calculations, sets targets for the percentage of new zero-emission vehicles delivered for sale in the state annually, such as battery electric vehicles (BEVs) and hydrogen fuel cell vehicles (HFCVs), which over time will result in both fewer greenhouse gas (GHG) emissions and fewer emissions from criteria air pollutants (CAPs), such as nitrogen oxides and particulate matter. The New Mexico RPS sets targets for renewable and zero carbon electricity, which will reduce GHG and CAP pollution from the New Mexico power sector. These targets will also indirectly reduce the carbon intensity (CI) of the New Mexico electric vehicle fleet expanded by NVMES, as well as the carbon intensity of other transportation fuels created in New Mexico from electric inputs such as electrolytic hydrogen. These policies will reduce the carbon intensity of New Mexico's transportation sector over time, easing the path towards compliance with the CTFP. My analysis of the costs and benefits of the CTFP is measured against this declining baseline, although I will also discuss the benefits of the CTFP and NMVES working together. As I will discuss later in my testimony, my analysis finds that NMVES and the New Mexico RPS together will eventually achieve compliance with the CTFP targets without further interventions beyond 2035.

The CTFP complements these policies by accelerating decarbonization of the New Mexico transportation sector and by economically supporting the transition to zero and low-emission vehicles. The CTFP provides immediate economic incentive for New Mexico's regulated fuel parties to reduce the carbon intensity of the fuels they provide to the state, including by supporting the use of lower carbon fuels which can be used in New Mexico's existing vehicle fleet. The CTFP also provides critical economic incentives to support the infrastructure needed to achieve NMVES compliance by providing direct fuel supply equipment credit revenue to installers of lower carbon fueling equipment, and by providing revenue to electric utilities through the sale of the CTFP credits which the CTFP and House Bill 41, **NMED Exhibit 8**, require to be invested into infrastructure projects to support transportation decarbonization and expand transportation electrification.

III. Analysis

A. Economic Reasonableness of the CTFP

My report, attached as **NMED Exhibit 78** (*New Mexico Clean-Transportation Fuel Program Benefit Cost Analysis* (Sept. 2025)) (the "BCA"),[1] outlines the benefit-cost analysis my team and I undertook for NMED, working alongside Eastern Research Group. These results are summarized in the table below.

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[1] Conclusions in the BCA are supported by the modeling described in **NMED Exhibit 78**.

Table 1. Effect of the CTFP as an individual policy and as part of a suite with the NMVES through 2040 (in $US 2024 million, discounted at 3% real discount rate)[2]

	Benefits	Costs	Net
Fuel Markets[3]	N/A	-$959	-$959
Health Effects[4]	$16	N/A	$16
GHG Emissions	$2,436	N/A	$2,436
Direct Jobs from FSE[5]	$162	N/A	$162
CTFP Total	**$2,614**	**-$959**	**$1,654**
NMVES Total[6]	*N/A*	*N/A*	*$188*
NMVES + CTFP Suite	N/A	N/A	**$1,842**

As can be seen in the table above, the CTFP's benefits, particularly the benefits of the program from reduced greenhouse gas emissions, outweigh its costs, demonstrating that the CTFP is a cost-effective way to help decarbonize the state's transportation sector. I will describe health effects, employment impacts, and monetized greenhouse gas (GHG) emissions in my testimony

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[2] Note that each category in this table includes the direct, indirect, and induced impacts of the policies.

[3] The fuel market impacts are the 50 percent pass-through scenario that averages the results from the 0 percent and 100 percent passthrough scenarios.

[4] Interpolated average of lower- and upper-bound estimates.

[5] These represent the direct, indirect, and induced impacts of fuel supply equipment (FSE) economically supported by FSE credits only, a very conservative measure. Other employment impacts, including additional benefits, are captured in the Adelante report and testimony and are discussed below.

[6] Accounts for indirect and induced consumer effects and baseline of EPA Multi-Pollutant and Phase 3 Heavy-Duty Rules; health benefits averaged.

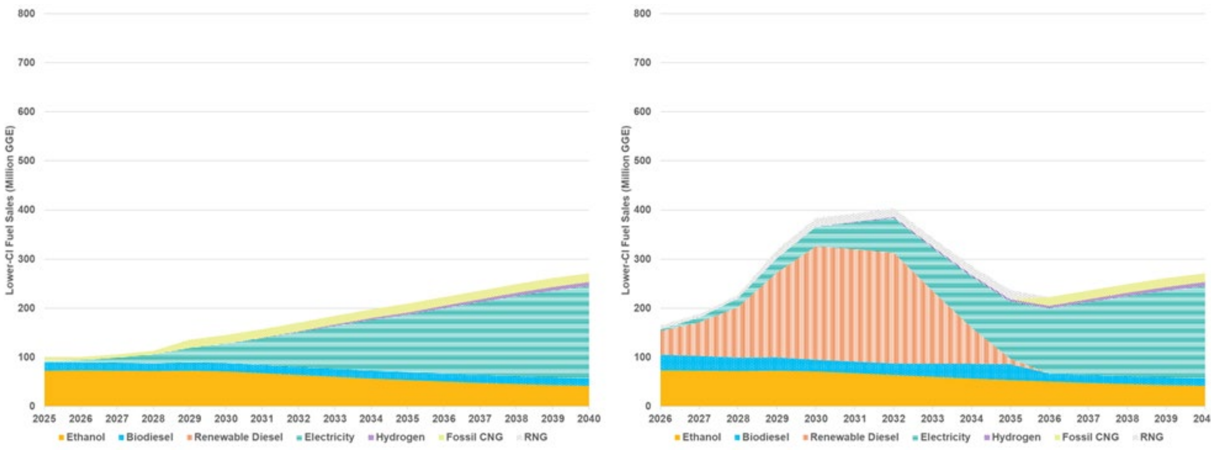
below. I will also describe the direct impacts of the program on the state's fuel markets. The health benefits resulting from lowered criteria pollutant emissions and the indirect and induced impacts of the policy are discussed in the testimony of John Koupal and the Eastern Research Group report.

B. Impacts on New Mexico Fuel Consumption

The CTFP provides economic incentives to switch from higher-CI to lower-CI fuels. These incentives can take the form of individuals and businesses switching to less carbon-intensive fuels in existing vehicles or in switching to driving new vehicles which can use less carbon-intensive fuels. My benefit-cost analysis conservatively does not assume any incremental change in the composition of New Mexico's vehicle fleet due to the CTFP, as I assume NMVES continues to be the primary policy directing vehicle-switching behaviors. Any incremental economic vehicle switching that does occur, however, would tend to reduce the costs of the policy in ways that the benefit-cost analysis does not account for.

The CTFP leads to immediate changes, however, by incentivizing the use of drop-in fuels like biodiesel and renewable diesel, the latter of which represents the largest source of fuel volumes early in the program, as shown in Figure 1 below. Renewable diesel is also the "marginal fuel" that fuel suppliers use as a substitute for fossil diesel in response to changes in CTFP credit prices, as I will discuss in a coming section. This finding is empirically consistent with what has been seen in other states, where renewable diesel has been one of the largest sources of both lower-CI fuel volumes and program credits.

Figure 1. Quantity of Lower-CI Transportation Fuels Produced, Imported, or Dispensed for use in New Mexico by Fuel Type – NMVES Baseline versus CTFP Policy Projections, 2026-2040 (Million GGE)



NMVES Baseline **CTFS**

Credit generation from renewable diesel use leads to immediate decarbonization due to the availability of credit banking as a compliance option. Credit banking allows regulated parties to over-generate credits (and associated benefits) early while banking these credits for future compliance years with more stringent CI standards. Early credit generation has resulted in a significant amount of credit banking occurring in states which have enacted comparable policies. In California and Oregon, the two-year bank balance increase in the first two years of the respective programs was 91% and 45% of the first two year deficit generation, respectively (credit generation was 191% and 145% of deficit generation, respectively).[7] In Washington, the most recent state to enact a new comparable policy, during the first two years of the policy, the state's credit bank build

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[7] California Low Carbon Fuel Standard Quarterly Summary for Q4 2024, available at https://ww2.arb.ca.gov/sites/default/files/2025-05/quarterlysummary_Q42024_0.xlsx; Oregon Clean Fuel Standard Quarterly Summary for Q4 2024, available at https://www.oregon.gov/deq/ghgp/Documents/cfpQ42024.xlsx.

was 115% and 173% of its deficit generation in 2023 and 2024, respectively.[8]

In addition to the volumetric changes visible in Figure 1, the benefit-cost analysis modeling shows meaningful levels of renewable energy credit (REC) retirement to be profitable in the early compliance years of the program. The CTFP allows electricity providers like utilities to retire RECs, which represent a quantity of electric power produced from renewable sources like wind and solar, to reduce the CI of their electricity. This compliance pathway ensures that the renewable electricity is additional to what is needed for other policies like the New Mexico RPS (REC retirement preclude double counting of RECs for multiple purposes). It also provides additional revenue to New Mexico utilities that will be used to further expand and economically support transportation access and electrification in the state.

As discussed in a prior section, New Mexico's other environmental policies, particularly NMVES and the New Mexico RPS, generate rising credit volumes over time. The benefit-cost analysis projects that such policies result in the generation of enough credits to satisfy program requirements without incremental compliance strategies by 2036. This credit generation accelerates in the 2030s for three primary reasons:

1) NMVES meaningfully increases the number of zero-emission vehicles on New Mexico roads by the 2030s;
2) The New Mexico RPS reduces the carbon intensity of electricity that battery electric vehicles and plug in hybrid vehicles consume; and
3) The statutory rate of decline for CI standards decelerates in the 2030s.

Figure 2 below shows the annual rate of the CTFP credit generation modeled in the benefit-cost

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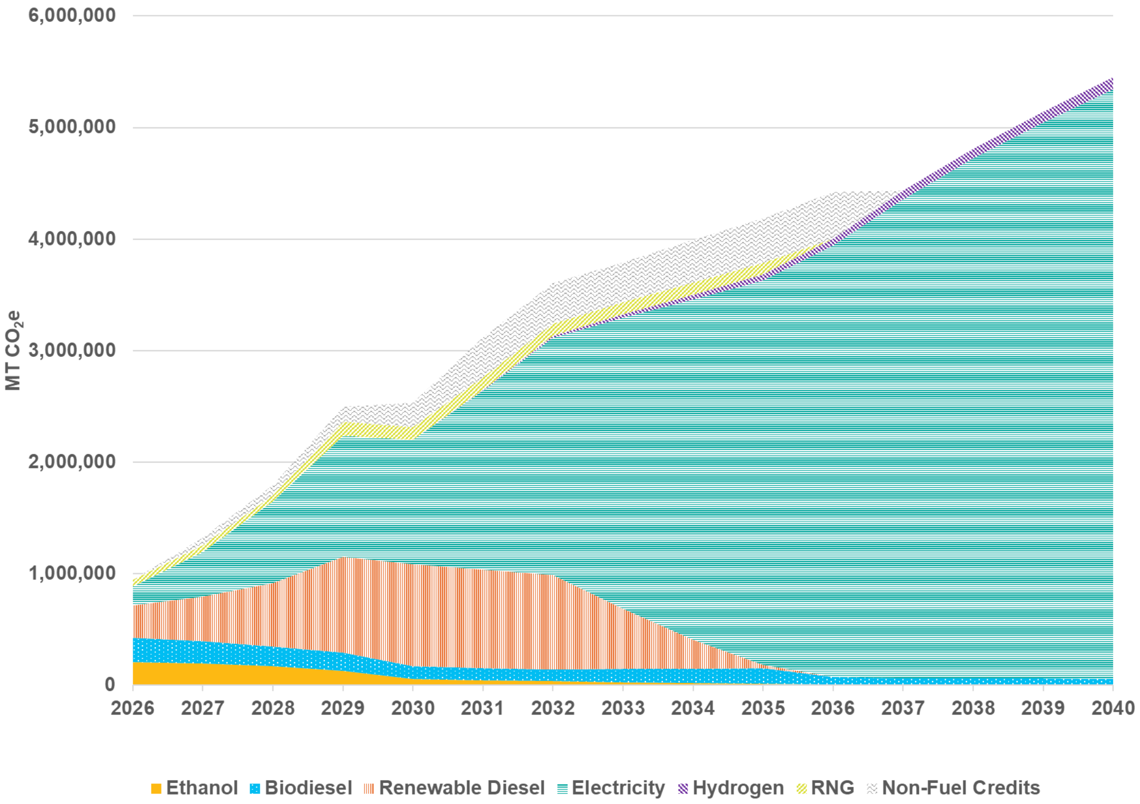
[8] Washington Clean Fuel Standard Quarterly Summary for Q4 2024, available at https://www.ezview.wa.gov/Portals/_1962/Documents/clean-fuel-data/CFSquarterlysummary_Q42024.xlsx.

analysis. I will discuss the operation of the markets associated with these credits below.

Figure 2. CTFP Credit Generation by Type



C. The CTFP Credit Markets

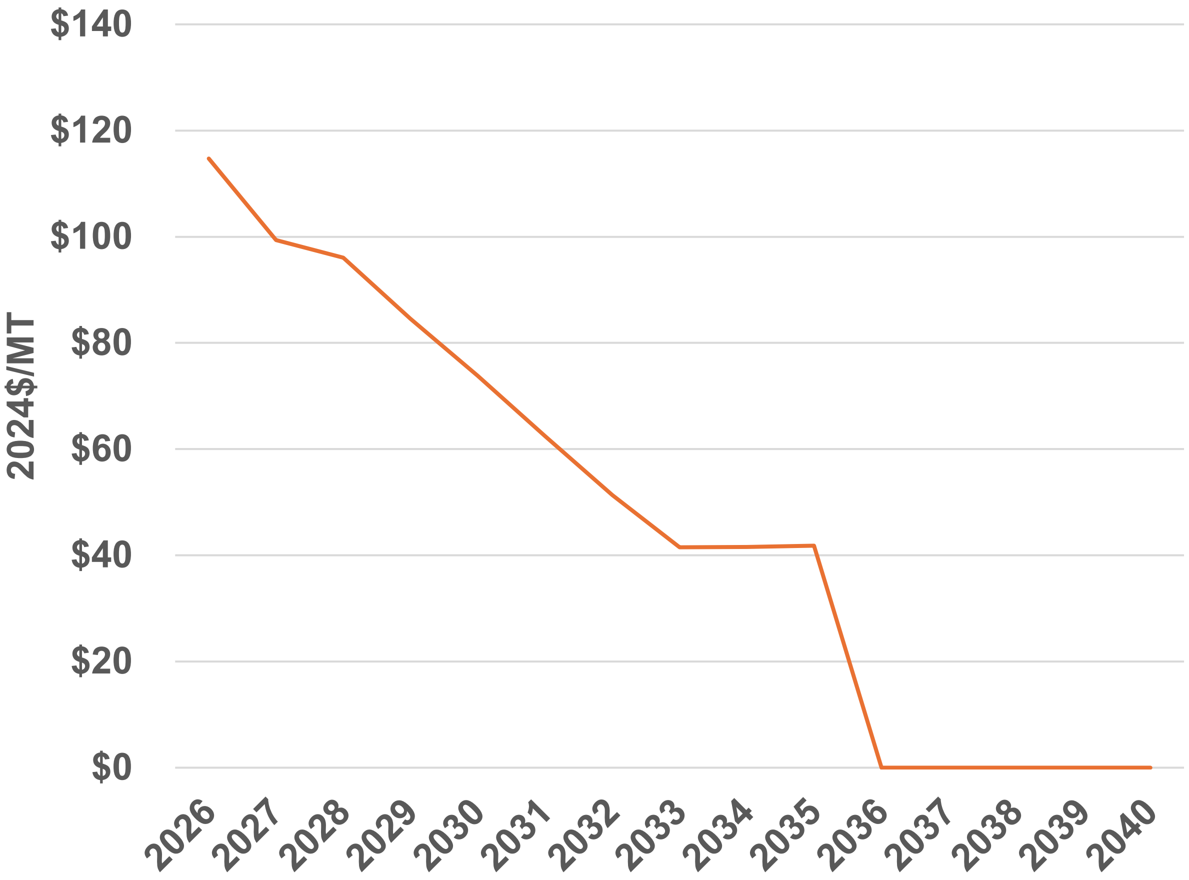
The CTFP credit markets represent the primary economic mechanism to incentivize the use of lower-CI fuels under the policy. The CTFP credits are tradeable, bankable credits awarded to regulated or opt-in parties which incentivize the availability of lower-CI fuels for New Mexicans. These fuels can be used by regulated parties to offset deficits generated by supplying higher-CI fuels like gasoline or diesel, banked by regulated parties for future compliance, or sold to third parties to offset their deficits.

Figure 3 below shows annual projected the CTFP credit prices in the benefit-cost analysis, in $/MT. These projections derive from the Fuel Credit and Markets Model, or FCMM, which was developed alongside and is described within the benefit-cost analysis. The CTFP credit prices represent both the economic benefit in dollars per metric ton of reducing the carbon intensity of transportation fuels and the compliance cost in dollars per metric ton of using higher carbon intensity fuels in the state over time.

In the FCMM, the CTFP credit prices are driven by the cost of the marginal credit-generating activity. The model has multiple activities (for example production or importation of fuel, or retirement of RECs) which can generate credits, alongside an incremental cost of doing so (for example the production or importation cost of a lower carbon fuel less the cost of its substitute). These costs are converted into dollar per metric ton costs of producing credits from the activity. The marginal activity is the highest cost activity which is still economically feasible, and is generally an activity which is undertaken in a year but which could be undertaken more if additional credits were retired in the FCMM.

The CTFP credit price is calculated in the model as the cost of the marginal fuel or credit-generating activity. As is discussed in detail in my report, from 2026 to 2035, renewable diesel is the marginal fuel in the BCA after which point the policy's targets are reached due to other New Mexico policies and the marginal cost of compliance drops to $0. The principal reason for the decline in the CTFP credit prices during the 2026-2035 timeframe is a narrowing of the cost spread between the production cost of renewable diesel and fossil-derived diesel in the federal price projections used in the benefit-cost analysis, which are principally sourced from the US Department of Agriculture and the US Energy Information Administration, respectively. The impact of the CTFP credit prices on consumer fuel prices is discussed in the testimony of Michael Ford.

Figure 3. Projected CTFP Credit Market Prices by Year



D. Greenhouse Gas Emissions Benefits and Monetization

From 2026-2040, my modeling shows that the policy will yield 10.5 million metric tons of carbon dioxide equivalent (CO_2e) in avoided New Mexico transportation sector emissions above the NMVES baseline forecast. Because the NMVES baseline forecast itself is declining over this period, absolute annual emissions declines from the 2018 statutory baseline are much higher, with the annual 2040 GHG emissions forecast from the transportation sector being about 25% below forecast 2026 levels without the CTFP.

As is detailed in our report, the federal government has provided a methodology called the social cost of carbon which converts these greenhouse gas emissions reductions to tangible financial benefit to society. The social cost of carbon is a peer-reviewed methodology to convert avoided greenhouse gas emissions to monetized benefits. While these benefits are not specific to New Mexico, they do represent the monetized value of New Mexico's avoided contributions to global climate change due to the CTFP. Using the social cost of carbon methodology, my analysis translates the benefits of these avoided greenhouse gas emissions to a discounted total monetized benefit of $2.44 billion from 2026 to 2040. These benefits are additional to the health benefits to New Mexicans of avoided criteria air pollutants, which I have included in my total benefits calculations, and which are detailed in the testimony of John Koupal.

E. Employment Impacts

The CTFP provides a number of opportunities to support employment in the state, including the building, maintenance, and operations of fuel supply equipment (FSE) and other fueling and electric infrastructure, the potential construction and operation of renewable fuel facilities to meet credit demand, and the potential construction of low carbon electricity sources to meet incremental REC demand.

The benefit-cost analysis and the summary table discussed earlier in my testimony each take a conservative approach to employment quantification, in the sense that it is more likely to undercount benefits. The benefit-cost analysis only attributes jobs to the CTFP which are directly economically supported by FSE credits under the CTFP. As a standalone policy (the "CTFP-only" scenario, as discussed in Michael Ford's testimony), the CTFP will create an estimated 581 full-time employees (FTE) from 2026 to 2040 for FSE construction, installation, and maintenance, with an FTE being the employment of one full-time employee for one year. As part of a policy suite with the NMVES (the "NMVES + CTFP" scenario, as discussed in Michael Ford's testimony), the program would create a projected 1,566 FTE for FSE construction, installation, and maintenance. Under the "CTFP-only" scenario, the policy's jobs impact is limited only to FSE that directly receives credits under the CTFP. Due to provisions under 20.2.92.302-304 NMAC, such opportunities are limited to one FSE station providing each eligible fuel type (electricity, hydrogen, natural gas) per zip code for each of light and medium/heavy duty vehicles. These jobs estimates use data from the International Council on Clean Transportation for fuel supply equipment, and assume that only those jobs that must take place in New Mexico (such as electrical installation, general construction labor, and permitting) occur as a result of the program, and exclude jobs that could be performed out of state but also may grow in New Mexico (such as equipment manufacturing and software work). Eastern Research Group's IMPLAN modeling is used to calculate indirect and induced jobs from these FSE Credit-supported jobs.

There are a number of other categories of potential jobs which may be spurred by the program which are not included as I discuss below.

A much larger quantity of jobs tied to FSE installation (particularly for residential single and multi-family chargers) are excluded from the primary BCA analysis as attributable to NMVES but are heavily economically supported by BCA revenue. Similarly, incremental transmission and distribution infrastructure for electricity, natural gas, and hydrogen, which is necessary but upstream from the FSE equipment, is not accounted for in these estimates. Additionally, while the BCA models incremental renewable energy credit retirements being used for least-cost the CTFP compliance, it does not attribute the construction of the new renewable electricity facilities needed for these RECs to New Mexico, as the policy allows out of state importation of bundled renewable electricity for this purpose. Nevertheless, given New Mexico's excellent renewable electricity potential (particularly wind and solar), there is a high probability that these activities increase construction and operation of renewable electricity facilities in the state.

Additionally, the BCA does not attribute any incremental value to lower carbon fuel production facilities which may be built due to the CTFP. The potential for these facilities is detailed in the report by Adelante Consulting filed in this docket and further discussed in Michael Ford's testimony. The BCA also does not attribute any incremental jobs to project credits available under the program, such as potential increased employment in the state's upstream oil and gas sector due to the reduction of greenhouse gas emissions intensity in New Mexico's oil and gas production facilities, which have the potential to generate project credits.

F. Feasibility of the CTFP

The CTFP is a feasible policy for New Mexico. The technology-neutral, market-based attributes of the policy allow companies and individuals to find the best solutions that work for them, and to adapt these solutions as technology and commodity prices change over time. If one compliance strategy becomes less economically tenable due to changes not foreseen in our benefit-cost analysis, the program is designed to provide both flexibility and economic incentives to achieve decarbonization targets with other strategies, as detailed further in Michael Ford's testimony.

The CTFP policies have worked in other states. As of the end of 2024, all three states that have adopted similar policies have materially positive bank balances and credit prices below what I forecast near-term. These bank balances indicate that in each case, the state has managed to over-comply with existing regulations to the end of 2024, which shows the feasibility of each policy in each of the three states that have adopted comparable policies.

The CTFP allows for compliance options both by the use of vehicle-specific low-carbon fuels like electricity, hydrogen, or compressed natural gas as well as using drop-in fuels compatible with New Mexico's existing vehicle population like ethanol, biodiesel, and renewable diesel. Each of these compliance options has a key role to play. While the modeling projects that are under the

CTFP, biomass-based diesels will play a far larger role in the New Mexico vehicle mix than they do today, even the years with higher projected biomass-based diesel blending have blending close to Oregon's 2024 blending levels and are materially lower than California's 2024 blending levels.[9] These examples show that large economies can absorb the biomass-based diesel blending levels that we forecast.

The CTFP is also self-supporting and supporting of other New Mexico policies while being independent of these policies. The availability of fuel supply equipment (FSE) credits and the economic support of electric fueling credits for transportation electrification will help finance the infrastructure needed to ensure not only CTFP's feasibility but the feasibility of New Mexico's transportation decarbonization policies more broadly.

IV. Conclusion

This concludes my testimony for today. I appreciate the time and attention you have given to consideration of adopting the CTFP. I want to end by summarizing a few key points:

- The CTFP will cause immediate reduction of greenhouse gas emissions in New Mexico while delivering health benefits and unlocking new jobs;
- These benefits when monetized exceed the net increase in fuel costs in the New Mexico;
- The CTFP will provide economic support for the buildout of transportation infrastructure to support other New Mexico policies like NMVES and make low-carbon transportation infrastructure accessible to New Mexicans;
- The CTFP is a feasible, market-based approach which provides flexible compliance pathways and spurs new opportunities for investment.

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[9] See Oregon Clean Fuel Standard Quarterly Summary for Q4 2024 and California Low Carbon Fuel Standard Quarterly Summary for Q4 2024, *supra*, n. 4.

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BRG

ENERGY & CLIMATE

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SUMMARY

Matt Drews, a director in BRG's Energy and Climate practice, is a strategy and finance professional with broad experience helping clients understand and respond to rapidly changing energy markets and regulations. He leverages deep understanding of power and fuels markets and experience in climate strategy to lead strategic advisory projects for energy companies and stakeholders and due diligence and financing support efforts for energy asset transactions.

Mr. Drews' areas of expertise include renewable and low carbon fuels monetization and policy analysis, wholesale power markets, power generation portfolio strategy, generator dispatch modeling, due diligence transaction support, net zero studies, energy transition strategy, corporate finance, mergers and acquisitions, and energy storage modeling. As an energy, finance, and modeling expert, he has worked on investment advisory, planning, finance, and strategy projects for numerous major US, Canadian, and international clients and employers on a wide range of energy assets, including renewable fuels facilities, renewable power, natural gas, coal, and nuclear power generation, power transmission and distribution systems, energy storage facilities, oil and gas production facilities, liquefied natural gas (LNG) facilities, coal mines, and oil refineries.

Mr. Drews previously worked in finance for an oil and gas major, focusing on mergers and acquisitions, financial forecasting and analysis for a business unit, financial transaction support, and energy transitions strategy. He holds undergraduate degrees in applied mathematics, economics, and history and an MBA in finance.

EDUCATION

MBA, Finance (high honors)	University of Chicago Booth School of Business
BS, Applied Mathematics (high honors)	University of Texas at Austin
BA, Economics and History (highest honors)	University of Texas at Austin

POSITIONS

Director, Berkeley Research Group, (2020-Present)
Financial Analyst, Chevron Corporation, (2018–2020)
Managing Consultant, Navigant Consulting, (2011–2017)

PROFESSIONAL EXPERIENCE

Low Carbon Fuels Policy and Investment

- **Renewable Fuel Standard Economic Analysis.** Managed economic analysis of the Washington Clean Fuel Standard for the Washington Department of Ecology. Prepared public report on the economic, environmental, health, and employment impacts of the policy and presented results in a public meeting. Report was sent to governor’s office and legislature. (BRG)
- **Renewable Fuel Availability Analysis.** Prepared and presented on clean fuel availability and demand and credit and deficit generation for Washington State Department of Commerce . (BRG)
- **Clean Transportation Fuel Standard Feasibility Analysis.** Worked with New Mexico Environment Department to model and assess technical and economic feasibility of Clean Transportation Fuel Standard.
- **Clean Hydrogen Production Tax Credit Technical and Economic Modeling.** Prepared technical operating and economic impact models of the operation of an electrolyzer under Section 45V (a clean hydrogen production tax credit) to support a large hydrogen consumer’s comments to the IRS concerning Section 45V final rule. (BRG)
- **RNG Acquisition Support.** Performed valuation and strategic due diligence for company considering investment in a California renewable natural gas producer. Evaluated scenarios for low-carbon fuel standard and RIN credit pricing and quantitative and qualitative investment risk; and presented findings to senior finance and commercial leadership. (Chevron)
- **RNG Debt Investment Analysis.** Prepared strategic, financial, and policy analysis for a debt investor raising acquisition capital in a merger of large RNG companies. Presented findings on policy, commercial, and technical risks associated with the debt investment to key decisionmakers at the investor. (BRG)
- **Biofuels Restructuring Advisory.** Advised senior lenders to a biofuels production facility on operational, financial, market, and contractual matters as they worked with management on strategic activities for the facility. (BRG)

Power and Climate Strategy and Market Assessment

- **Transmission Planning for Decarbonized Utility Study.** Analyzed numerous potential transmission pathways for a large western US utility planning for fully decarbonized power supply in the next fifteen years. Weighed and presented potential pathways to client to identify key corridors to ensure resource diversity, reliability, and consumer affordability in operating a fully decarbonized system. (BRG)
- **Metals and Mining Company Growth and Decarbonization.** Advised a large multinational metals and mining company on low-carbon, low-cost power supply options for multiple existing and new facilities in order to cost-effectively increase production and decarbonize operations. Prepared detailed site-specific operating models and strategies to advise company and operating units on effective power supply options while identifying operational challenges or risks with each approach,

and advised company on investment levels required to achieve goals and mitigate risks. Worked alongside company and their partners to help negotiate actionable and mutually beneficial solutions. (BRG)

- **Strategic Review of Merchant Power Portfolio.** Designed and led modeling efforts to analyze the profitability of a utility's merchant power subsidiary. Coordinated numerous scenarios, sensitivities, and robustness checks; and presented findings to utility executive team, subsidiary president, and government affairs leadership. Utility announced plans consistent with findings. (Navigant)
- **Nuclear Fuel Commercialization Strategy and Economic Modeling.** Assessed and advised on commercialization strategy for the developer of a new nuclear fuel technology with the potential to deliver material economic, operational, and safety benefits to existing and new nuclear reactors. Helped prepare economic models to support customers considering adopting the fuel. (BRG)
- **US Distributed Storage Market-Entry Strategy.** Performed ancillary services price forecasting and market strategy and due diligence work for multinational utility crafting entry strategy into US energy storage market. Helped client identify more attractive markets on which to focus investment. (Navigant)
- **Solar Integration Studies.** Assessed market impacts of high solar-penetration scenarios for two large US utilities. Helped utilities understand pricing, system cost, and generator dispatch implications of high solar penetration prior to significant ramp-up in solar investment. (Navigant)
- **Clean Power Plan Advisory Support.** Advised mid-sized utility leadership team on compliance options with Clean Power Plan CO2 requirements. Assessed value of state, regional, and national CO2 allowance trading markets and implications of various scenarios on customer cost and generation fleet-capacity factors. (Navigant)
- **Coal Retirement and Replacement Strategic Assessment.** Assessed relative economics of retiring coal-fired generation station and replacing with new-build NGCC facility under a variety of economic and regulatory scenarios for US utility company. (Navigant)
- **Firm Fuel Advisory for PJM Capacity Performance.** Analyzed economics of installing dual-fuel capability, securing firm fuel supply, and other strategies at a peaking power plant for a PJM generation owner seeking to assess whether and how to respond to PJM capacity performance market. Provided final recommendations consistent with ultimate approach. (Navigant)
- **Combined Cycle Technology Market Assessment.** Worked with global power systems technology manufacturer seeking to identify potential markets to introduce new combined cycle technology. Assessed variety of North American markets for potential fit between technology competitive advantages and market needs, performed dispatch simulation of plants utilizing technology in a variety of North American markets, and advised client team on best potential markets to consider introducing technology. (Navigant)
- **Wholesale Power Market Design Study.** Assisted North American utility seeking to understand potential organized market opportunities with neighboring utilities by quantifying the benefits from joint commitment and joint dispatch of generating assets and assessing the implications of joint commitment and dispatch on system cost, plant capacity factors, and emissions. (Navigant)

Energy Finance and Transaction Support

- **Generation Contract Refinancing and Rate-Reduction Analysis.** Led consulting team on behalf of Ontario Ministry of Energy seeking to refinance certain renewable and conventional power contracts to better tie timing of payments to corresponding benefits to customers, helping to enable large-scale rate relief to customers. (Navigant)
- **Long-Term Power Contract Assessment.** Assisted metals mining company seeking new power supply contract in transmission-constrained region with resource planning and evaluation and commercial negotiations. Evaluated various generation and retrofit solutions for cost and impact on reliability and wholesale power prices to support negotiations with potential providers. Company secured lower-cost, stable, and more reliable power contract by helping to finance investment in new generation solution consistent with findings. (Navigant)
- **Distributed Generation Acquisition Due Diligence.** Evaluated a portfolio of numerous distributed generation assets using a variety of technologies in order to support a bid on the portfolio. Helped client prepare due diligence questions, evaluate project materials, and prepare internal valuation of both existing and development assets in the portfolio. Client ultimately bid on portfolio in a manner consistent with advice. (BRG)
- **Upstream Oil and Gas Business Unit Financial Forecasting.** Led short-term financial and direct cash-flow forecasting for the southern Africa business unit of an oil and gas major during the market fallout of the COVID-19 pandemic. Worked with key operational, supply chain, planning, and finance leaders to help business unit managing director and leadership team make investment, procurement, and payment decisions to meet financial goals during historic commodity price collapse. (Chevron)
- **Corporate Mergers and Acquisition Target Valuation and Due Diligence.** Worked as financial analyst within the mergers and acquisitions group of an oil and gas major performing valuation, due diligence, and synergy quantification for domestic and international potential corporate acquisition targets across the energy sector. (Chevron)
- **Southern African Gas-to-Power Contracting Support.** Supported developer of a natural gas field and a downstream power asset in southern Africa, helping developer prepare power purchase agreement proposals and associated power marketing strategy within the Southern Africa Power Pool. (BRG)
- **Canadian Wind Development Support.** Helped renewable power developer understand and plan investment and bid decisions around operational and mechanical functioning of a proposed power purchase agreement. Advised on local power market dynamics, curtailment risk, and cost and risk allocation of price, weather, market, and operational risks under proposed contract. (BRG)
- **Asian Hydroelectric Portfolio Sale Support.** Provided valuation support for the marketing and sale process of a portfolio of hydroelectric assets in Asia. (BRG)
- **Japanese Gas Demand Forecasting.** Prepared scenario analysis for a major Japanese utility group to forecast both portfolio and regional demand for LNG imports for power sector applications under various market conditions, as part of a larger price and contract review process. (BRG)

- **Review of Power Portfolio Targets for New IPP.** Reviewed multiple potential power portfolios for a newly formed IPP to identify both short-term market valuation and performance and fit with long-term company strategy. Favorably reviewed IPP's first portfolio purchase. (BRG)
- **Commodity Risk and Hedging Model.** Helped designed and build commodity risk and hedging model for US subsidiary of international utility seeking to participate in forward markets to reduce cash-flow and earnings volatility. Helped utility identify power, natural gas, fuel oil, and coal-hedging and forward-purchase/sale strategies to achieve desired risk and returns outcomes. (Navigant)
- **Independent Power Producer Merger Support.** Helped assess profitability of merchant power portfolio under a variety of scenarios in support of independent power producer's successful negotiations to merge its portfolio with another merchant generator. (Navigant)
- **Acquisition of Combustion Turbine Facilities.** Performed energy market revenue, cost, and dispatch modeling for regulatory testimony and strategic assessment in support of successful acquisition of a gas combustion turbine power plant by a US utility. (Navigant)
- **Coal-Mining Company Acquisitions Due Diligence.** Helped client interested in acquiring two coal-mining companies assess coal retirement and capacity-factor risk, competing coal contracts, and other energy-market and regulatory considerations for the coal-fired power station customers of the targets being considered. (Navigant)
- **Merchant Transmission Analysis and Marketing Support.** Prepared economic and environmental analysis and provided marketing support for a proposed merchant transmission facility seeking to increase transfer capability of renewable power to a major load center. (BRG)
- **Merchant Generation Impairment-Testing Support.** Coordinated data provision and provided modeling guidance for utility company's annual impairment testing of its merchant power fleet. (Navigant)
- **North Africa Industrial Expansion Financing Support.** Supported due diligence for potential financing in international markets of an expansion for an energy-dependent manufacturing facility in North Africa. (BRG)

Disputes and Bankruptcy

- **Solar Operational and Financial Analysis of IPP during Bankruptcy Proceedings.** Provided support for a consortium of lenders providing backstop financing during the bankruptcy process of an IPP. Reviewed management operational, contract, and hedging decisions to ensure alignment with lender consortium's goals and objectives. (BRG)
- **Generator Development Analysis in Antitrust Case.** Analyzed the economic viability and opportunities to finance a combined cycle generating asset in the United States as part of a larger antitrust case. Supported economists in the case on power industry trends and industry practices. (BRG)
- **Analysis of Hedging Decisions During Extreme Weather Event.** Helped prepare multiple expert reports and depositions related to a series of disputes surrounding the hedging decisions faced by a utility which faced large losses during an extreme weather event. Analyzed hedging program,

generator performance and expectations, load forecasts, market signals, and other drivers to evaluate hedging strategy leading up to and during the event. (BRG)

- **Gas power portfolio financeability analysis.** Analyzed business plan, financial models, communications with financing counterparties, hedging and supplier contracts, and market forecasts to help evaluate financial attractiveness of project portfolio to potential financiers as part of a larger dispute between the developer and an alleged potential supplier. (BRG)
- **Solar PPA and market strategy evaluation.** Supported evaluation of PPA terms and market operations in a dispute over a solar PPA. Helped identify numerous instances of failure to mitigate damages and helped clarify purpose of contract terms under dispute. (BRG)
- **Gas power plant construction dispute damages.** Supported damages calculation arising from construction where alleged construction issues may have caused very large penalties and replacement energy requirements during an extreme weather event shortly after a plant went online. (BRG)
- **Solar Construction Dispute Mediation.** Helped quantify damages from lost solar production under a PPA in support of a client involved in a mediation arising from a construction dispute alleged to have caused material under-generation of a solar asset. (BRG)
- **Fuel Import Benchmark Contract Dispute.** Supported the analysis of appropriate benchmark fuel contracts for a Caribbean power generation facility as part of a dispute over modifications to a fuel surcharge clause. (BRG)

PUBLICATIONS

ARTICLES

(1) "Corporate Bonds for Energy Companies Show Climate Premium", TXF (April 2021)

(2) "Compliance Strategies for Satisfying Clean Power Plan Requirements", Forbes (July 2015).

(3) "Rapid Assessment of Opportunities Relating to Potential Coal Unit Retirements" (with Dale Probasco and Mark Klan), Power-Gen International Conference (December 2014).

NMED EXHIBIT 78

New Mexico Clean - Transportation Fuel Program

Benefit Cost Analysis

New Mexico Environment Department

Matthew Drews

September 2025

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List of Abbreviations

ACCII	Advanced Clean Cars II
ACT	Advanced Clean Trucks
AD	Anaerobic Digestion
AEO	Annual Energy Outlook
ATB	Annual Technology Baseline
BA	Balancing Authority
BBD	Biomass-Based Diesel
BBD	Biomass-Based Diesels
BCA	Benefit Cost Analysis
BD	Biodiesel
BEA	U.S. Bureau of Economic Analysis
BEV	Battery Electric Vehicle
BRG	Berkeley Research Group, LLC
CAFE	Corporate Average Fuel Economy
CAP	Criteria Air Pollutants
CARB	California Air Resources Board
CEA	Council of Economic Advisors
CFP	Clean Fuels Program
CFS	Clean Fuel Standard
CFS	Washington Clean Fuel Standard
CI	Carbon Intensity
CNG	Compressed Natural Gas
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide-equivalent
COBRA	CO-Benefits Risk Assessment Health Impacts Screening and Mapping Tool
CPI-U	US Bureau of Labor Statistics Consumer Price Index for all Urban Consumers
CTFP	Clean Transportation Fuels Program
CTFP-DMS	Clean Transportation Fuel Program Data Management System
CTFS	Clean Transportation Fuels Standard
DCFC	Direct Current Fast Chargers
DGE	Diesel Gallon-equivalent
DPFs	Diesel Particulate Filters
EDUs	Electric Distribution Utilities
EER	Energy Economy Ratio
eGRID	US EPA Emissions and Generation Resource Integrated Database
EIA	Energy Information Administration

EIB	Environmental Improvement Board
EPA	Environmental Protection Agency
EPE	El Paso Electric
ERG	Eastern Research Group
EValuateNM	Atlas Public Policy's Evaluate New Mexico
FCEVs	Fuel Cell Electric Vehicles
FCMM	Fuel and Credit Market Model
FRED	Federal Reserve Economic Data
FSE	Fuel Supply Equipment
FTE	Full Time Employees
g	Gram
GGE	Gasoline gallon equivalent
GHG	Greenhouse Gas
GREET	Greenhouse gases, Regulated Emissions, and Energy use in Technologies
HDO	Heavy Duty Omnibus
HFCVs	Hydrogen Fuel Cell Vehicles
ICCT	International Council on Clean Transportation
ICE	Internal Combustion Engine
ILUC	Indirect Land Use Change
IMPLAN	Impact Analysis for Planning
I-O	Input Output Model
IOU	Investor-Owned Utility
IRP	Integrated Resource Plan
IWG	Interagency Working Group
LCFS	Low Carbon Fuel Standard
LDVs	Light-Duty Vehicles
LNG	Liquified Natural Gas
LPG	Liquified Petroleum Gas
MHDVs	Medium and Heavy-Duty Vehicles
MJ	Megajoule
MMBtu	million British thermal units
MOVES	Motor Vehicle Emission Simulator
MOVES5	Fifth major release of Motor Vehicle Emission Simulator
MTCO$_2$e	Metric Tons Carbon Dioxide-equivalent
MMTCO$_2$e	Million Metric Tons Carbon Dioxide-equivalent
MWh	Megawatt-hour
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMEIB	New Mexico Environmental Improvement Board
NM-PRC	New Mexico Public Regulatory Commission

NMVES	New Mexico's New Motor Vehicle Emission Standards
NO_x	Nitrogen Oxide
NREL	National Renewable Energy Laboratory
O_3	Ozone
OMB	Office of Management and Budget
OPGEE	Oil Production Greenhouse gas Emissions Estimator
PADD	Petroleum Administration for Defense District
PCEPI	Personal Consumption Expenditures Price Index
PHEV	Plug-In Hybrid Electric Vehicle
PNM	Public Service Company of New Mexico
PPA	Power Purchase Agreement
PTR	Pass-through rate
RD	Renewable Diesel
REA	Renewable Energy Act
REC	Renewable Energy Certificate
RFS	Renewable Fuels Standard
RIN	Renewable Identification Number
RNG	Renewable Natural Gas
RPS	Renewable Portfolio Standard
RVOs	Renewable Volume Obligations
SCC	Social Cost of Carbon
SEDS	State Energy Data System
SO_2	Sulfur Dioxide
SPP	Southwest Power Pool
SPS	Southwestern Public Service (Xcel)
TEPs	Transportation Electrification Plans
TSD	Technical Support Document
UCO	Used Cooking Oil
US FHWA	Federal Highway Administration
USDA	United States Department of Agriculture
VMT	Vehicle Miles Travelled
VOCs	Volatile Organic Compounds
WECC	Western Electricity Coordinating Council
WFEC	Western Farmers Electric Cooperative
WREGIS	Western Renewable Energy Generation Information System
WWTP	Wastewater Treatment Plants
ZEV	Zero Emission Vehicle

1 Executive Summary

1.1 Purpose

This report analyzes the benefits and costs of the proposed New Mexico Clean Transportation Fuel Program (the proposed CTFP, henceforth referred to as "the CTFP"). The CTFP implements the Clean Transportation Fuel Standard (CTFS) pursuant to New Mexico Statutes Annotated (NMSA) 1978, Sections 74-1-3, 7(A)(15), 8(A)(15), and 18 (known henceforth as "the statute").[1] The statute mandates a statewide reduction in the carbon intensity (CI) of transportation fuels to 20 percent and 30 percent below the 2018 baseline by 2030 and 2040.

The CTFP is a collaborative, market-based program, with technology-neutral mechanisms, designed to reduce transportation sector greenhouse gas (GHG) emissions by establishing statewide annual CI targets for transportation fuels produced, imported, or dispensed for use in New Mexico. The CTFP sets a target CI each year for gasoline and gasoline substitutes, diesel and diesel substitutes, and alternative jet fuel. These annual targets establish the schedule of annually decreasing CI for transportation fuel produced, imported, or dispensed for use in New Mexico. This schedule comprises the CTFS and achieves its statutorily mandated CI reduction targets under Section 74-1-18(C)(1) NMSA 1978. Each year, regulated parties producing, importing, or dispensing for use in New Mexico fuel with a CI above the annual target will generate deficits that they must offset by purchasing credits from regulated parties producing, importing, or dispensing fuel with a CI below the annual target. This requirement ensures attainment of statewide annual CTFS and decadal CI targets.

Competition among regulated parties selling credits provides the incentive for them to innovate and identify process improvements to achieve CI and GHG reductions in the most efficient and effective manner possible. Although the CTFP's outcome is to reduce GHG emissions by lowering transportation fuel CI in New Mexico, it will produce additional benefits. These include enhancing energy independence, driving the diversification of statewide transportation and transportation fuel options, improving air quality and health outcomes, and accelerating new jobs and innovations that stimulate local economic development.

Further, the CTFP complements and supports other New Mexico policies that are aimed at improving clean transportation alternatives for New Mexicans. These policies include statewide Clean Car and Clean Car Charging Unit Tax Credits,[2] as well as New Mexico's New Motor Vehicle Emission Standards (NMVES) that the EIB promulgated in late 2023 under the New Mexico Administrative Code (NMAC), Title 20, Chapter 2, Part 91 (20.2.91), as permitted

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[1] https://nmonesource.com/nmos/nmsa/en/item/4415/index.do#a1.

[2] See NMSA 1978 Sections 7-2-18.36 (https://nmonesource.com/nmos/nmsa/en/item/4340/index.do#7-2-18.36), 7-2-18.37 (https://nmonesource.com/nmos/nmsa/en/item/4340/index.do#7-2-18.37), 7-2A-19.1*. (https://nmonesource.com/nmos/nmsa/en/item/4340/index.do#7-2A-19.1), and 7-2A-19.2 (https://nmonesource.com/nmos/nmsa/en/item/4340/index.do#7-2A-19.2).

under Section 177 of the U.S. Clean Air Act.[3,4] The NMVES sets new vehicle delivery targets for zero-emission vehicles (ZEVs), which include battery electric vehicles and hydrogen-powered fuel cell electric vehicles. The CTFP will support these policies by incentivizing the development of fueling infrastructure and increasing the supply of low-carbon fuel needed to make ZEV ownership more viable in New Mexico.

This Benefit-Cost Analysis (BCA) estimates the impact of the CTFP on New Mexico's transportation fuel market, job market and overall macroeconomy, air quality and the health of its residents, and statewide transportation sector GHG emissions. Doing so requires a forecast of New Mexico's fleet composition and vehicle miles traveled (VMT) and its fuel market economics as discussed in **Section 4**. The BCA also requires numerous assumptions regarding the lifecycle CI of New Mexico's transportation fuel, its state spending patterns in response to income earned from new infrastructure jobs, changes to fuel costs in response to the CTFP, the health impacts of changes to criteria air pollutants (CAPs), and GHG reduction benefits as modeled using the Social Cost of Carbon (SCC). **Section 5** and the **Appendices** provide additional details on these and discuss how they inform the results discussed below.

All modeling efforts to determine these values required NMED and its contractors to make data-supported assumptions based upon analysts' best-informed and most logical expectations. To the extent justifiable, this BCA made "conservative" (i.e., low-benefit / high-cost) assumptions to retain analytical credibility, particularly in areas that are subject to substantial uncertainty.

1.2 Summary of Results

There are two different ways to examine the results of this analysis. The first, shown in the first totals row for **Table ES-1**, is to examine only the additional impact of the CTFP as a standalone policy ("CTFP-only"). The second, shown in the final row of **Table ES-1**, is to examine the impact of both the CTFP and the NMVES as a policy suite ("NMVES + CTFP"). For both scenarios, this BCA assumes that the NMVES remains in place in New Mexico, such that the state's zero-emission vehicle (ZEV) delivery requirements are more stringent than those required under the U.S. Environmental Protection Agency (US EPA) Phase-3 multi-pollutant emissions standards.[5,6]

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[3] Office of Law Revision Counsel. New Motor Vehicle Emission Standards in Nonattainment Areas. US Code, laws in effect on May 28, 2025. Vol. 42 USC §7507. https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title42-section7507&num=0&edition=prelim.

[4] New Mexico State Records Center and Archives. "NEW MOTOR VEHICLE EMISSION STANDARDS." New Mexico Administrative Code. Title 20, Chapter 2, Part 91. December 31, 2023. https://www.srca.nm.gov/parts/title20/20.002.0091.html.

[5] US Environmental Protection Agency. "Final Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles." Other Policies and Guidance. https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-multi-pollutant-emissions-standards-model.

[6] US Environmental Protection Agency. "Final Rule: Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3." Overviews and Factsheets. https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-greenhouse-gas-emissions-standards-heavy-duty.

The difference between the two scenarios is whether they consider only the incremental effects of the CTFP (CTFP-only) or are inclusive of its supporting role and effects as part of the overall policy suite (NMVES + CTFP). The CTFP-only scenario clarifies the effects of the narrow proposal before the board, while the NMVES+CTFP scenario clarifies effects likely to be observed in the real world where both policies exist. There are mutual synergies between the CTFP and NMVES that make it difficult to identify what portion of the benefits and costs in accrue to each. However, it is clear that the CTFP will play some role in driving impacts attributed to NMVES in **Table ES-1**.

Table **ES-1** summarizes results across four key areas of CTFP impact: Fuel markets; health effects; GHG emissions; and FSE Credits (a portion of overall other jobs impacts). Each value in the table and corresponding text in this section is discounted at a real 3% discount rate. **Section 5** provides a more detailed discussion of the CTFP's effect in each of these areas.

Table ES-1. Effect of the CTFP as an individual policy and as part of a suite with the NMVES through 2040 (in $US 2024 million, discounted at a three-percent real discount rate)

	Benefits	Costs	Net
Fuel Markets[7]	N/A	-$959	-$959
Health Effects[8]	$16	N/A	$16
GHG Emissions	$2,436	N/A	$2,436
Direct Jobs from FSE	$162	N/A	$162
CTFP Total	**$2,614**	**-$959**	**$1,654**
NMVES Total[9]	*$188*	*N/A*	*$188*
NMVES + CTFP Suite	**$2,802**	**-959**	**$1,842**

The CTFP's main impact is from GHG emissions reduction benefits of $2.44 billion (in $US 2024) under the CTFP-only scenario.[10] This is expected, given the policy's principal focus on reducing transportation sector GHG emissions. As discussed in **Section 2.2**, the CTFP accomplishes GHG reductions by enacting and enforcing rules that govern a market-based credit and deficit trading system. These GHG emission benefits far outweigh the CTFP's projected net statewide costs of -$0.78 billion. The net statewide costs include the CTFP's impact on fuel markets (-$0.96 billion), jobs and economic activity from FSE credits ($0.16 billion), and health via CAP emissions reductions ($0.02 billion).

Incorporating these statewide effects leads to a slightly lower net benefit of $1.65 billion from the CTFP-only scenario, and $1.84 billion from the CTFP + NMVES scenario due to the fuel market costs of the policy. For context, the fuel market's cost of -$0.96 billion from the 15-

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[7] The fuel market impacts are the 50 percent pass-through scenario that averages the results from the 0 percent and 100 percent passthrough scenarios.

[8] Interpolated average of lower- and upper-bound estimates.

[9] Accounts for indirect and induced consumer effects and baseline of EPA Multi-Pollutant and Phase 3 Heavy-Duty Rules; health benefits averaged.

[10] $5.0 billion under NMVES + CTFP scenario.

year 2026-2040 period equals about eight weeks' worth of the $6.05 billion in total New Mexico transportation sector petroleum fuel expenditures in 2023.[11]

Table ES-2 shows the effects of the CTFP through 2030. Results are largely consistent with the results through 2040. This is largely because many of the CTFP's benefits and costs occur before 2030 due to the immediate impact it has on New Mexico fuel markets. Reaching the 2030 20-percent CI reduction target versus 2018 encourages the adoption of lower-carbon fuels in existing New Mexico vehicles, most of which are combustion engine vehicles. There is a longer timeframe needed for the state's vehicle population to turn over for ZEV penetration to allow fuels for those vehicles to play a more significant role in credit generation. Before then, CTFP plays a more prominent role in galvanizing the decarbonization of transportation fuels in New Mexico, front-loading the program's benefits and costs.

Table ES-2. Effect of the CTFP as an individual policy and as part of a suite with the NMVES through 2030 (in $US 2024 million, discounted at a three-percent real discount rate)

	Benefits	Costs	Net
Fuel Markets[12]	N/A	-$481	-$481
Health Effects	$10	N/A	$10
GHG Emissions	$1,228	N/A	$1,228
Direct Jobs from FSE	$77	N/A	$77
CTFP Total	**$1,315**	**-$481**	**$834**
NMVES Total[13]	*N/A*	*-398*	*-$398*
NMVES + CTFP Suite	**$1,315**	**-$879**	**$437**

After 2030, the relative impact of NMVES rises in significance as greater ZEV usage impels increased air quality and health improvements, jobs, income, and GHG reductions. Importantly, although the total cost of ownership (TCO) of owning a ZEV is below that of a comparable ICE vehicle, this is contingent upon owners realizing fuel and maintenance cost savings that when discounted may require four or more years to exceed the present value of the ZEV's typically greater upfront purchasing cost. The 2040 cutoff for the cumulative totals in **Table ES-1** occurs after many households that purchase ZEVs have owned them for longer than the "breakeven" period after which their discounted fuel cost and maintenance cost savings (as well as emissions and health benefits) exceed upfront sales costs, causing the NMVES row of that table show net benefits. By contrast, the 2030 cutoff for occurs before many New Mexico households have realized this "breakeven" period. This causes the NMVES row in **Table ES-2** to show negative benefits (net costs) in that table, even though the ZEV-owning households considered will generally accrue net benefits after 2030.

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[11] U.S. Energy Information Administration. State Energy Data System. "Table F17: Total petroleum price and expenditure estimates, 2023." October 2, 2024. https://www.eia.gov/state/seds/sep_fuel/html/pdf/fuel_pr_pa.pdf.

[12] The fuel market impacts are the 50 percent pass-through scenario that averages the results from the 0 percent and 100 percent passthrough scenarios.

[13] Accounts for indirect and induced consumer effects and baseline of EPA Multi-Pollutant and Phase 3 Heavy-Duty Rules; health benefits averaged.

In addition to the net benefits shown in **Table ES-1** and **Table ES-2**, there are numerous ways in which this BCA's assumptions err on the side of representing lower CTFP benefits and higher CTFP costs when there is significant uncertainty. For example, this BCA estimates that the CTFP's New Mexico job impact comes only from FSE installation directly supported by program FSE credits under the Revised Proposed New Rule 20.2.92.302-304 NMAC. This estimate does not consider jobs from the likely installation of additional FSE made possible by just the fuel credit portion of the CTFP. It also does not consider jobs from announced and planned projects to supply credit-generating fuels in New Mexico that Adelante Consulting estimates will conservatively reach 274 regular full-time jobs in the state, in addition to hundreds of construction jobs.[14] Although including such estimates would significantly increase the jobs benefits in **Table ES-1**, this BCA does not include them in its total because those estimates contain uncertainty and are outside the narrow scope of this analysis.

Similarly, conservative assumptions act as a double-edged sword because they lead to both lower estimated benefits and higher estimated costs in this BCA than may occur under the CTFP as proposed for the other two state-specific factors in **Table ES-1** (fuel markets and CAP/health benefits). This BCA highlights such assumptions throughout the main body and summarizes them in **Section 6** and **Appendix 9**.

The results from this BCA reflect a projection based upon known market trends and current regulations and practices, rather than a more explicit forecast of future fuel markets, jobs/macroeconomics, CAP/health benefits, or GHG emissions outcomes from the CTFP. Rather, this BCA reflects a conservative, illustrative modeling exercise to assist the EIB in its decision-making process. The discussions of the BCA modeling assumptions and their effects in the main body of the report are comparable in relevance to the results shown here.

1.3 Fuels Forecast for 2026

In accordance with Subsection (C) of the Revised Proposed New Rule 20.2.92.601 NMAC, beginning in 2026, NMED will announce a fuel supply forecast on October 1st each year to evaluate the availability of credit-generating transportation fuel and banked credits to satisfy forecasted deficits during the next complete compliance period. NMED will use the information from such a forecast to determine no later than December 1 each year, whether to declare a deferral for the upcoming year. This process would begin in 2026 for the 2027 compliance year.

However, NMED is currently required under Section 74-1-18(C)(9) NMSA 1978 to allow for the deferral of the program under emergency or forecasted conditions. To ensure full compliance with this provision, this BCA examined whether forecasted conditions would merit a program deferral for the first compliance year of 2026. This BCA projects that in 2026, regulated parties would generate 943,578 CTFP credits and 634,105 CTFP deficits. This is a

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[14] Adelante Consulting Inc. "Clean Transportation Fuels Program: Overview of Anticipated Projects, Jobs, and Benefits." August 6, 2025. DRAFT REPORT prepared for NMED. Publication pending.

result that BRG staff calculated using the projections in this BCA. The annual fuel supply forecast beginning in 2026 will not necessarily follow the same methodology. This BCA's projection for 2026 is not intended to reflect a precise prediction but does point to overall credit availability that exceeds next year's projected deficits. This would enable regulated parties to produce a surplus of credits in 2026 to both meet current-year compliance obligations and bank surplus credits for use in future compliance periods. This BCA anticipates credit generation from numerous sources, including "drop-in" biofuels and vehicle-specific fuel pathways to adequately cover the 2026 CI reduction of 1.8 percent below the 2018 baseline.[15] It is worth noting that in the first year of Washington's Clean Fuel Standard, the most recent policy similar to CTFP adopted in another state, more than twice as many credits as deficits were generated in the state.[16]

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[15] Importantly, the 1.8-percent reduction below the 2018 baseline includes CI reductions that have already begun largely due to ZEV growth in New Mexico from 2019-2025, as represented by the vertical axis intercept in **Figure 1**.

[16] https://www.ezview.wa.gov/Portals/_1962./Documents/clean-fuel-data/CFSquarterlysummary_Q12025.xlsx

2 Introduction

2.1 Need for the CTFP

Climate change from human-caused emissions of greenhouse gases (GHGs) pose numerous threats and costs to human health, welfare, families, communities, Tribes, property, infrastructure, businesses, and the environment throughout New Mexico, as well as animal and plant life, and many of the state's cultural resources. Other adverse effects to the state from emissions, like more frequent and severe heat waves and wildfires, reduced snowpack, disrupted and/or endangered tribal resources and cultural practices, and more extreme weather, pose significant risks with dire consequences and costs that burden New Mexicans.[17]

In a 2019 Executive Order, the Governor of New Mexico identified the 1.5 °C limit as the level necessary to forestall dramatic climatic changes that will further imperil the state's water supplies.[18] New Mexico has taken a proactive approach to reducing GHG emissions. As a member of the US Climate Alliance, the state targets GHG reductions below 2005 levels of 50-52 percent by 2030, 61-66 percent by 2035, and net-zero GHG emissions by 2050.[19]

New Mexico's transportation sector has proven to be a relatively more difficult area in which to achieve GHG emissions reductions. The state's GHG inventory and forecast project that the two largest GHG emitting sectors in 2005 – oil and gas, and electric power generation – will reduce GHG emissions by one-third and over three-fifths below 2005 levels, respectively, by the end of this year. By contrast, it projects that New Mexico's transportation sector only realizes a four percent GHG reduction over this period.[20] New Mexico has proactively responded to this challenge by enacting transportation sector policies including adopting NMVES in late 2023 and the CTFP statute on March 5, 2024.[21] The statute mandates adoption of the CTFP by July 1, 2026.

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[17] US Environmental Protection Agency. "What Climate Change Means for New Mexico." EPA 430-F-16-033. August 2016. https://www.epa.gov/sites/default/files/2016-09/documents/climate-change-nm.pdf.

[18] New Mexico Governor's Office. "Executive Order 2019-003: Executive Order on Addressing Climate Change and Energy Waste Prevention." January 29th, 2019. https://www.governor.state.nm.us/wp-content/uploads/2019/01/EO_2019-003.pdf.

[19] US Climate Alliance. "US Climate Alliance Applauds New Federal Goal to Slash Harmful Climate Pollution, Sets Complementary Collective 2035 Target." December 19, 2024. https://usclimatealliance.org/press-releases/alliance-2035-target-dec-2024/.

[20] Energy & Environmental Economics, Inc. "New Mexico Greenhouse Gas Emissions Inventory and Forecast: 2021 Emissions Inventory and 2030-2050 Forecast." December 2024. https://cloud.env.nm.gov/resources/_translator.php/OGMyZmMwODI4ODEzZDJmNzU1Njk4NmQyNl8xNzcyMTM~.pdf.

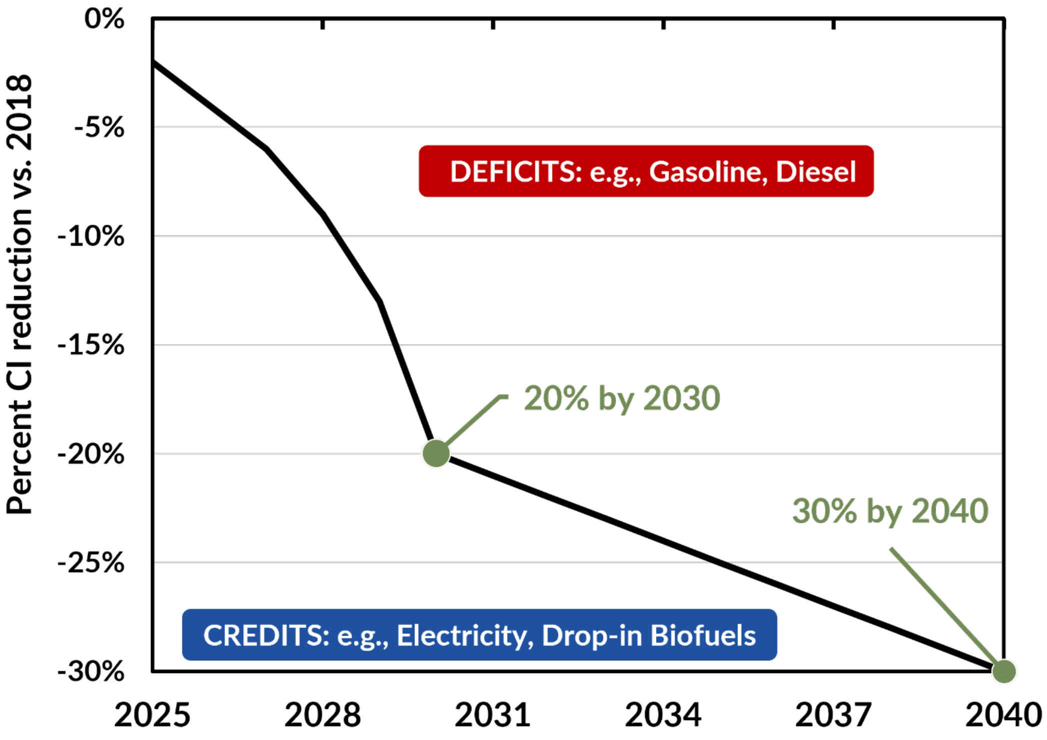
[21] New Mexico Statute Annotated 1978, Sections 74-1-3, 74-1-7(A)(15), 74-1-8(A)(15), and 74-1-18. https://nmonesource.com/nmos/nmsa/en/item/4415/index.do#a1.

2.2 How the CTFP Works

The CTFP is a collaborative, market-based program designed to reduce transportation sector GHG emissions by establishing statewide annual CI targets for transportation fuels produced, imported, or dispensed for use in New Mexico. It achieves this in a manner that is technology-neutral, evaluating each transportation fuel pathway according to its CI value. The CI value for a transportation fuel pathway is determined using data-driven lifecycle analysis (LCA) methods. Methods to customize LCA models to fuels in New Mexico are detailed in the report of Eastern Research Group ("ERG"). The CTFP establishes credit trading as a market mechanism to reduce statewide transportation fuel CI. This analysis uses explicit CI assumptions that are detailed in **Appendix** B.

The CTFP is agnostic to the technologies used for each transportation fuel and focuses only on each transportation fuel pathway's GHG impact as measured by its "well-to-wheel" CI. This is an objective LCA accounting method to quantify GHG emissions for each transportation fuel pathway from the feedstock production to the final fuel's consumption in a motor vehicle. Using this method, the CTFP establishes whether each transportation fuel produced, imported, or dispensed for use in New Mexico generates credits or deficits under the program, by comparing its CI to a declining annual target CI ("the CTFS") shown in **Figure 1**.

Figure 1. Annual decreases in the statewide carbon intensity (CI) of transportation fuel produced, imported, or dispensed for use in New Mexico under the CTFP, with examples of credit- and deficit-generating fuels through 2040



The annual credits or deficits that a regulated party incurs depend upon its fuel pathway's CI compared to the CTFS and the energy economy ratio- (EER-) adjusted quantity of transportation fuel that they produced, imported, or dispensed for use in New Mexico. Credit markets provide deficit-holding regulated parties with a way to satisfy their "compliance obligation" under the CTFP with credits that they purchase from other regulated parties.

The CTFP's requirement that regulated parties fully offset deficits with credits ensures that the weighted average CI of transportation fuels consumed in New Mexico aligns with the annual CI standard, satisfying requirements under the CTFS.

2.3 Projected CTFP Impacts

As discussed in **Appendix** , BRG staff developed the Fuel and Credit Market Model ("the FCMM") to project New Mexico's transportation fuel consumption quantities based upon the latest analyst understanding of each transportation fuel pathway's CIs, their cost of production and transportation, demand for each fuel, and other relevant policy factors.

Although BRG staff used the FCMM to project how the CTFP will shape transportation fuel quantities consumed in New Mexico, this is impossible to fully predict. The technology-neutral nature of the CTFP, combined with the incentives that it provides for innovation at every stage of the fuel making process, mean that market forces will ultimately determine what mix of transportation fuels will most economically and effectively achieve the program's goals.

The FCMM results show that under the CTFP, New Mexico's transportation sector realizes GHG emissions reductions via annual reductions to the statewide transportation fuel CI. This occurs even as travel increases in New Mexico throughout the projection period, with projected VMT in 2040 exceeding 2024 VMT by over 20 percent. This results from a combination of a greater overall energy economy of fuels that vehicles use under New Mexico's suite of transportation policies, and their lower CIs. In addition to reducing GHG emissions, this BCA finds that the CTFP will reduce CAP emissions that harm air quality and public health in New Mexico. These include ozone (O_3) precursor pollutants like oxides of nitrogen (NO_x) and volatile organic compounds (VOCs), as well as other harmful pollutants like particulate matter measuring 2.5 micrometers or less in diameter ($PM_{2.5}$) and sulfur dioxide (SO_2). This analysis quantifies the health benefits from reducing these CAP emissions.

This analysis further finds that New Mexican workers and consumers will benefit from the accelerated diversification of transportation and transportation fueling options that the CTFP will support. Whereas the infrastructure to supply New Mexicans with fossil gasoline and diesel is largely in place, new infrastructure is needed to allow for the provision of clean fuels. These include new fuel supply equipment to dispense low-CI fuels like electricity, hydrogen, and compressed natural gas, and potentially blended fuels that include higher biofuel volumes than could be accommodated with traditional infrastructure. This reduces New Mexico commuters and the state's overall economic exposure to gasoline and diesel price changes, which depend mainly on global supply and demand for crude oil, as well as on refining and distribution costs and taxes.[22]

This reduction in exposure occurs in two ways on the demand side. First, it stems from increasing drivers' access to ZEV fuels that are relatively less responsive to the global factors affecting gasoline and diesel prices. Second, drivers of ICE vehicles are shielded from fuel price impacts as the higher percentage of biofuels and CTFP credit market dynamics reduce the degree of influence that oil prices have on statewide gasoline and diesel prices. On the supply side, the fueling infrastructure and fuel supply buildout under the CTFP can also provide jobs in New Mexico's labor markets that can serve to make local economies and the state economy more resilient to the economic and employment impacts of a relatively low oil price environment. The role that the CTFP plays in reducing climate change-enhancing GHG emissions, improving New Mexico's air quality and health outcomes, diversifying statewide transportation and transportation fuel options, and stimulating new economic development and resiliency all depend not only on the policy itself but how it interacts as a complimentary policy to other state and federal initiatives.

3 Description of the Policy

3.1 Policy Dynamics

The CTFP reduces GHG emissions by establishing statewide annual CI targets for transportation fuels produced, imported, or dispensed for use in New Mexico. The CTFP sets a target CI each year for gasoline and gasoline substitutes, and diesel and diesel substitutes. These annual targets represent the proposed CI reduction trajectory, starting from the 2018 baseline CI for these fuels and progressively decreasing to meet the CTFS reduction targets for 2030 and 2040. There are separate targets under the CTFP for gasoline and its substitutes, diesel and its substitutes, and conventional jet fuel and its substitutes (the last of which are opt-in fuels under the policy). These targets are shown for the gasoline standard and diesel standard in **Figure 2** below. These targets are measured in grams of carbon dioxide equivalent (gCO_2e) emitted per megajoule (MJ) of energy content, or gCO_2e/MJ.

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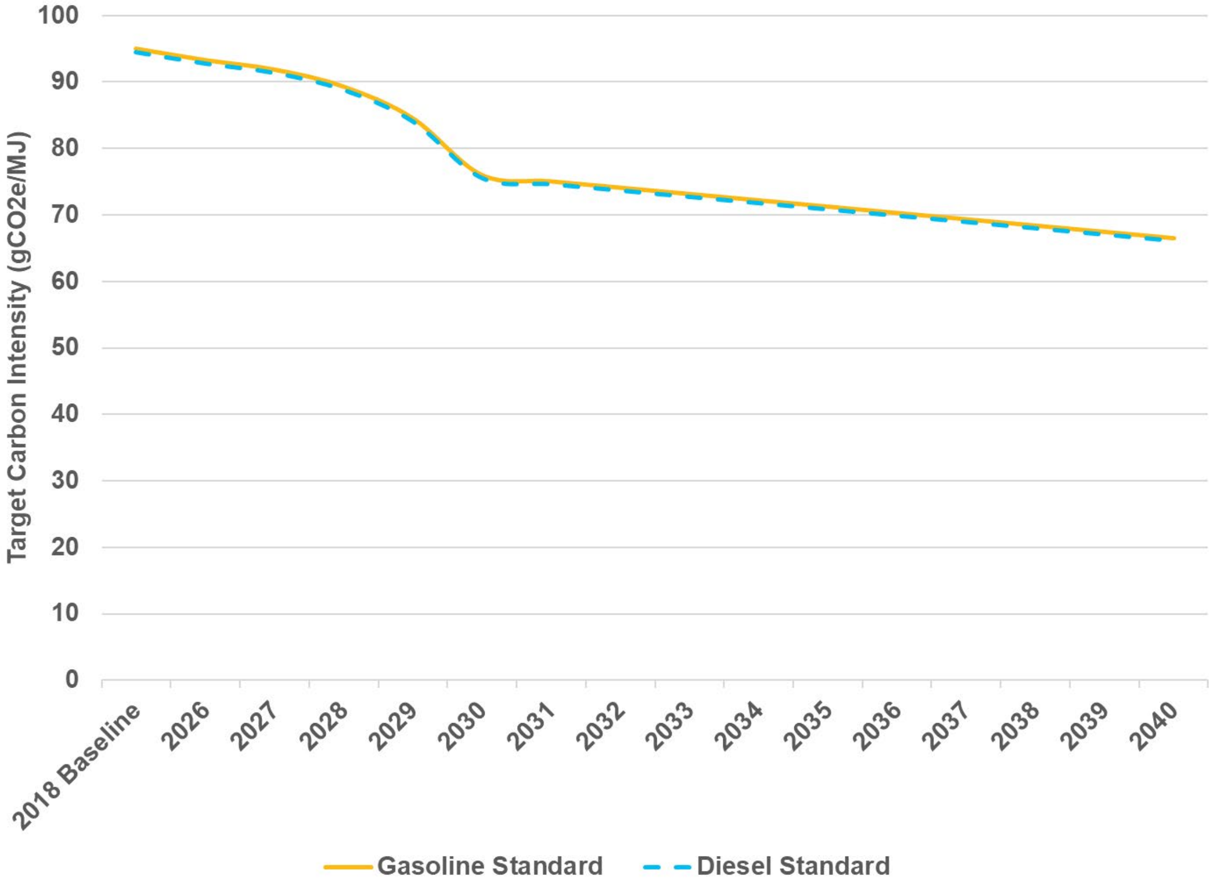
[22] US Energy Information Administration. "Gasoline and Diesel Fuel Update." May 28, 2025. https://www.eia.gov/petroleum/gasdiesel/.

Figure 2. Standard Carbon Intensity (gCO_2e/MJ)



Each transportation fuel pathway's annual credit or deficit generation by year will depend upon the following factors, further detailed in **Appendix B**.

1. The quantity of transportation fuel for a given fuel pathway that a regulated party produces, imports, or dispenses for use in New Mexico;
2. That fuel's energy density, or the energy content it contains per unit of quantity;
3. The fuel's Energy Economy Ratio (EER). The CTFP calculates this by considering how effectively that each primary energy unit of a transportation fuel translates into final energy and distance when applied to a motor vehicle drivetrain relative to a comparable vehicle using the transportation fuel that it displaces for the purpose of determining credit or deficit generation.
4. The transportation fuel's CI relative to each year's EER-adjusted CTFS for the fuel that it displaces.

Because the target CIs established by the CTFS for gasoline and gasoline substitutes, diesel and diesel substitutes, and alternative jet fuel must decline annually, the CTFP becomes "stricter" over time. A decreasing standard increases the deficits generated by transportation fuels with a CI above the CTFS and reduces the credits generated by fuels with a CI below the

CTFS. This causes the mix of fuels produced, imported, or dispensed in New Mexico to shift from earlier to later years of the CTFP towards lower-CI transportation fuels.

The CI value for a transportation fuel pathway is an outcome-based metric that leverages data-driven LCA methods as detailed in **Appendix B**. For transportation fuels other than electricity supplied by electric distribution utilities (EDUs), the CTFP assigns statewide CI values from Table 4 of Subsection (D) of the Revised Proposed New Rule 20.2.92.701 NMAC and temporary CI values from the Table 5 of Subsection (E) of Revised Proposed New Rule 20.2.92.701 NMAC, respectively.[23] The CIs in these tables come from customized LCA calculations using the Argonne National Laboratory's peer-reviewed Greenhouse Gas, Regulated Emissions, and Energy Use in Transportation, specifically the 2023 Research and Development version (R&D GREET 2023). R&D GREET systematically examines the energy and environmental effects of a wide variety of transportation fuels and technologies across major sectors and energy systems.[24] The lookup and temporary CI values are intentionally conservative in that they err on the side of risking insufficient crediting for alternative transportation fuels rather than over-crediting. Regulated parties that believe their transportation fuel has a lower CI than their assigned temporary CI value may apply for a certified CI under an alternative fuel pathway that they must verify and maintain pursuant to the Revised Proposed New Rule 20.2.92.202-205 NMAC.

The CTFP assigns an annual CI for each EDU's or other electric service provider's grid electricity using the best available information for their respective generation mixes. Utilities or other electricity providers may elect to retire EER-adjusted "incremental" Renewable Energy Certificates ("RECs") to receive credit under the CTFP for providing electricity that is zero-carbon rather than their grid-specific CI. [25,26]

Each year, regulated parties producing, importing, or dispensing for use in New Mexico fuels with a CI above the annual target will generate deficits that they must offset by purchasing credits from regulated parties producing, importing, or dispensing for use in New Mexico fuels with a CI below the annual target. Because the credits that regulated parties may purchase to offset deficits may only be for New Mexico transportation fuels, and because every regulated party must offset any balance of transportation fuel deficits, the CTFP must result in a statewide average CI that is at or below the CTFS. This ensures attainment of statewide

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[23] If Table 5 does not have a temporary CI for a fuel production process or feedstock, a regulated party may apply to NMED for a unique temporary CI.

[24] Wang, Michael, Amgad Elgowainy, Uisung Lee, Kwang Hoon Baek, Sweta Balchandani, Pahola Thathiana Benavides, Andrew Burnham, et al. 2023. "Summary of Expansions and Updates in R&D GREET 2023." ANL/ESIA-23/10. Argonne National Laboratory (ANL), Argonne, IL (United States). https://doi.org/10.2172/2278803.

[25] A REC is a certificate or record that represents all the environmental attributes from one megawatt-hour of electricity generated from renewable sources and is also used for compliance with the New Mexico Renewable Portfolio Standard (RPS).

[26] The RECs associated with electing this option would not be able to be double counted for compliance with the New Mexico RPS or any other state's RPS policy. RECs generated from electricity may be retired to reduce the CI of electricity (potentially to zero), with retirement precluding the retirement of these RECs in other programs or for purposes in or outside of New Mexico.

annual CI reduction targets below the 2018 baseline as set forth in the statute. Regulated parties that produce, import, or dispense transportation fuel for use in New Mexico may participate in CTFP credit markets. This distinguishes the program from carbon offset or exchange markets in which companies purchase credits from third parties that reduce emissions from projects that are outside of the CTFP's purview.

To ensure that regulated parties satisfy these criteria, the CTFP requires that they register, report, and trade credits (satisfy deficits) and manage alternative fuel pathways within the Clean Transportation Fuel Program Data Management System (CTFP-DMS). Regulated parties with fuel pathways must submit fuel pathway reports in the CTFP-DMS that contain all information needed to verify quantities delivered by compliance period and their operational CI. The CTFP establishes actions that NMED may take in cases where a transportation fuel's operational CI is greater than either its temporary CI or its certified CI within an acceptable margin of error, and requires third-party verification, data checks, and corrective action in cases of material miscalculation of credits or deficits in a regulated party's CTFP-DMS account.

As required by Section 74-1-18(C)(4) NMSA 1978, the CTFP establishes "mechanisms, including cost-containment mechanisms and credit holding limits." Cost containment mechanisms include provisions that allow regulated parties to bank credits for future periods. The purpose of such banking provisions is "to stabilize and incentivize investment in the transportation fuel credit market, verify the validity of compliance obligations, maximize savings and limit consumer costs, ensure CTFP compliance, trade credits and allow for market participation by persons who register in the market to facilitate credit generation."

The CTFP allows regulated parties to use banked credits for compliance without limitations on their age. Regulated parties may generate credits that they bank to sell to other regulated parties that retire them in later periods or may bank credits that they have generated or purchased to retire as an offset to their own deficits in later periods. Market participants in other states have empirically banked credits in early years when adopting comparable policies, with bank balances being drawn down in periods of relative market tightness. This framework provides regulated parties with flexibility in how to meet the CTFS CI reduction standard over time, which stabilizes CTFP credit markets, smooths out CTFP credit price fluctuations, and protects regulated parties and other entities from any effects of credit market volatility.

The CTFP includes other policies that increase credit generation options for regulated parties. These include FSE credits, "project credits" for projects that reduce the CI of specific regulated fuels produced, imported, or dispensed for use in New Mexico, and "opt-in" provisions that allow fuel suppliers for locomotives, aircraft, and even some agricultural or industrial equipment (e.g., dyed fuel suppliers) that are all fully or partially exempt from the CTFP to have their transportation fuels become regulated under the program.

As required by Section 74-1-18(C)(6) NMSA 1978, the CTFP considers similar programs in other jurisdictions, allowing for coordination to promote regional GHG emission reductions or removals while ensuring that the CTFP contains mechanisms that avoid the double-counting of any emissions reductions across federal and state programs.

As discussed in **Section 1**, New Mexico is the fourth state to adopt a similar program, after California, Oregon, and Washington. Each of these programs remains in place today and has successfully reduced transportation-sector emissions in their respective states as follows:

- Credits representing GHG reductions equal to 192.5 million metric tons of CO_2e (million MT CO_2e, or MMT CO_2e) from the first quarter of 2011 through the fourth quarter of 2024 under California's Low Carbon Fuel Standard (LCFS);[27]
- Approximately 13.9 $MMTCO_2e$ reduced since 2016 under the Oregon Clean Fuels Program (CFP);[28]
- 1.9 $MMTCO_2e$ in 2023 and 2.9 $MMTCO_2e$ in 2024, the first two full years of the State of Washington's Clean Fuels Standard (CFS).[29]

All three states have generated most credits with BBDs, ethanol, biomethane or "renewable natural gas (RNG)", and electricity, with other fuels also contributing. BBDs, ethanol, and RNG are drop-in fuels that regulated parties have blended directly with their fossil-based counterparts to lower the CI of delivered finished fuels. Electricity is a "vehicle-specific fuel" that has also become an increasing source of credits in each state as ZEVs' portion of their respective vehicle populations has risen and the CI of electricity has decreased. This has resulted from each West Coast state with CTFP-like policies also having comparable policies to NMVES and the New Mexico RPS.

Credit markets have generally proven sufficient in West Coast states, alongside other policies, to incentivize transportation-sector decarbonization through the fuel changes described above. In addition, each West Coast state saw its cumulative credit bank balance reach an all-time high in 2024 as an annual average.[30]

3.2 Interaction with Other Policies

A "three-legged stool" dynamic exists for decarbonizing transportation sector emissions in New Mexico and elsewhere. These legs are the transportation fleet, VMT, and fuel mix. Changes to any of these three factors will have a greater or lesser effect depending upon the degree to which they are supported by the two other legs. For example, CTFP can augment the effect of NMVES because CTFP will incentivize the fueling infrastructure that can help make it easier for consumers to buy ZEV ("transportation fleet leg") and use them for longer

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[27] California Air Resources Board. "quarterlysummary_Q42024." Spreadsheet. May 2025. 'Graph Data' Tab, Rows 51-58 ("Figure 3 – GRAPH DATA"). https://ww2.arb.ca.gov/sites/default/files/2025-05/quarterlysummary_Q42024_0.xlsx.

[28] Oregon DEQ. 2025. "2024 Annual Cost of the Clean Fuels Program." State of Oregon. https://www.oregon.gov/deq/ghgp/Documents/cfp2024costBene.pdf.

[29] State of Washington Department of Ecology. "2024 Annual Cost of the Clean Fuel Standard." April 2025. Publication 25-14-025. https://apps.ecology.wa.gov/publications/documents/2514025.pdf.

[30] Some rulemaking and legislation is ongoing in other states to tighten policies.

and more frequent trips (“VMT leg”). Similarly, NMVES can augment the effects of the CTFP. For example, a reduction in the CI of transportation fuels used in ZEVs that is incentivized under the CTFP (“fuel mix leg”) will reduce overall GHG emissions in New Mexico to a greater degree as a result of greater ZEV penetration into New Mexico’s vehicle fleet under NMVES (“transportation fleet leg”) and their greater resultant use for on-road travel (“VMT leg”).

The CTFP operates in conjunction with several other key New Mexico climate and energy policies to decarbonize New Mexico’s transportation sector and the broader state economy.

Prior to the CTFP, the EIB ratified in late 2023 the state’s adoption through 2032 of New Mexico’s New Motor Vehicle Emission Standards (NMVES) under 20.2.91 NMAC, as permitted under Section 177 of the U.S. Clean Air Act.,

NMVES will require manufacturers to increase the proportion of ZEVs delivered for sale in the state over time. In an economic analysis of NMVES, Eastern Research Group (ERG) estimated that by 2040, the rule would save New Mexicans $289 million per year (in US$2023) via reduced expenditures, in addition to generating $1.1 to $3.5 billion in avoided climate damages from GHG emissions reductions and $12.6 to $28.5 million in health benefits from reduced criteria pollutants like NOx, VOCs, and PM10 and PM2.5.[31]

However, these benefits depend upon the existence of fueling infrastructure available for ZEVs. The CTFP is a supporting policy for the NMVES and these associated benefits, by ensuring the availability and affordability of necessary FSE and the fuel that it dispenses. In doing so, the CTFP, along with NMVES, work collectively to ensure that sufficient economic incentives exist to support the decarbonization of the New Mexico transportation fleet.

In addition to the economic incentives CTFP provides to the buildout of FSE infrastructure needed to support NMVES, CTFP also supports the transition to ZEVs under NMVES by providing fueling credits, which will reduce the net cost of electricity as a transportation fuel. The precise degree to which these savings will be passed on to consumers will depend on the price elasticities of supply and demand for electricity as a transportation fuel, which are discussed in greater detail in **Section 5.1.4**.

The NMVES is also supported by the clean car tax and charging units tax credits, which provide personal and business income tax credits for both ZEVs and electric vehicle chargers or hydrogen refueling stations under Subsections 7-2-18.36, 7-2-18.37, 7-2A-19.1 and 7-2A-

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[31] Eastern Research Group, LLC. “New Mexico Advanced Clean Cars II, Advanced Clean Trucks and Heavy-Duty Omnibus Rules: Assessment of Economic, Health and Environmental Impacts.” Testimony. Environmental Improvement Board: New Mexico Environmental Department (NMED) and City of Albuquerque Environmental Health Department. Exhibit 47. https://www.env.nm.gov/opf/wp-content/uploads/sites/13/2023/10/EIB-23-56-NMED-Exhibits-45-pg-14-48.pdf.

19.2 NMSA 1978.[32] These tax credits will further reduce the cost of NMVES compliance for businesses and consumers and help expand ZEVs that will generate CTFS credits.

Alongside CTFP's interactions with the above state policies targeting transportation-sector decarbonization, the policy interacts with New Mexico's renewable electricity standard (RPS), a policy enabled by the state's Energy Transition Act (ETA) under Section 62-15-34 NMSA 1978 and Section 17.9.572 NMAC ("Rule 572"). This policy requires investor-owned electric utilities in the state to serve all retail load with carbon-free electricity by 2045, and all electric cooperatives in the state to serve all retail load with carbon-free electricity by 2050. During the same period that NMVES is increasing the number of ZEVs in the state, including electric vehicles, and by extension the consumption of electricity in the state transportation sector, New Mexico's RPS will reduce the CI of electricity produced, imported, or dispensed for use as a transportation fuel in New Mexico. Over time, the NMVES and RPS in tandem will increase the number of electricity credits available under CTFP. In turn, the CTFP's provisions for the retirement of incremental RECs for additional CTFP credits from EV charging provide a further incentive to rapidly bring zero-carbon power sources online in New Mexico.[33]

New Mexico is the fourth state in the United States to adopt a clean transportation fuel policy, following the adoption of the California LCFS, which was implemented on January 1, 2011, the Oregon CFP, which was implemented in 2016, and the Washington CFS, which was implemented on January 1, 2023. This analysis relies heavily on the historical data and experiences with the implementation and operation of these three programs, though it is worth noting that New Mexico is the first state not on the West Coast to implement an analogous program and is more integrated with the larger US fuel supply network than those three West Coast states.

New Mexico fuel importers will compete with importers in each of these states for low-CI "drop-in" fuels that regulated parties can blend directly into their pool of fossil-based counterparts to earn CTFP credits. These include biomass-based diesel (BBD) fuels like biodiesel (BD) and renewable diesel (RD), which the regulated parties typically blend with fossil diesel, and ethanol, which the regulated parties typically blend with gasoline. RNG is another drop-in fuel that regulated parties can blend with fossil-derived compressed natural gas (CNG) for use in natural gas vehicles (NGVs).[34] Just as New Mexico-regulated parties can import drop-in fuels from other states, they can export such fuels that they produce in New Mexico

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[32] See https://nmonesource.com/nmos/nmsa/en/item/4340/index.do#7-2-18.36;
https://nmonesource.com/nmos/nmsa/en/item/4340/index.do#7-2-18.37;
https://nmonesource.com/nmos/nmsa/en/item/4340/index.do#7-2A-19.1; and
https://nmonesource.com/nmos/nmsa/en/item/4340/index.do#7-2A-19.2. ,
https://nmonesource.com/nmos/nmsa/en/item/4340/index.do#7-2-18.37,
https://nmonesource.com/nmos/nmsa/en/item/4340/index.do#7-2A-19.1,
https://nmonesource.com/nmos/nmsa/en/item/4340/index.do#7-2A-19.2.

[33] For more information on incremental RECs, see **Footnotes 25** and **26**.

[34] For modeling purposes, the FCMM considers all fuel for NGVs to be CNG, as noted in **Appendix B.2.6**. Thus, all RNG replaces CNG, which subsumes any quantities of other NGV fuels produced, imported, or dispensed for use in New Mexico like liquified natural gas (LNG), and liquified compressed natural gas (L-CNG).

to other states. This ability to trade drop-in fuels will tend to cause some CTFP credit price convergence between New Mexico and other states with CTFP-like policies. However, as detailed in **Appendix B**, state-specific factors that are unique will also shape its CTFP credit markets in ways that diverge from other states with CTFP-like policies. These include New Mexico's ZEV penetration rate, the CTFP CI standard, unique state policy differences, fuel transportation costs, infrastructure constraints, as well as other factors affecting the supply and demand for CTFP credits.

The CTFP also works in conjunction with numerous federal policies, including the federal Renewable Fuel Standard (RFS), and the Section 45Z Clean Fuel Production Tax Credit. The federal RFS sets national mandates on the minimum volumes of biofuels consumed in the United States, with specific carveouts for specific fuel categories and a tradeable market for credits which represent compliance with the policy. The credits are tracked using Renewable Identification Numbers (RINs) to represent compliance. The RFS has specific carveouts for cellulosic fuels, BBDs, advanced biofuels, renewable fuels, and cellulosic diesel. The credits associated with these biofuel mandates are referred to as D3, D4, D5, D6, and D7 RINs, respectively.[35,36] Each of these mandates under the federal RFS will provide additional economic support for biofuels consumed in New Mexico. This reduces the cost of supplying these fuels to consumers and ultimately reduces the CTFP credit price needed to incentivize the production of low carbon fuels and, by extension, reduces the economic impact of the policy in New Mexico.

The Section 45Z Clean Fuel Production Tax Credit provides up to $1 per gallon for alternative non-aviation fuels and up to $1.75 per gallon for alternative aviation fuels for projects meeting wage and apprenticeship requirements, adjusted for inflation. 45Z scales inversely to each transportation fuel's CI as determined with Argonne National Laboratory's Greenhouse gases, Regulated Emissions, and Energy use in Technologies (ANL-GREET) model. ANL-GREET derives from the same base model as the R&D GREET that determines CIs under the CTFP.[37][38] Transportation fuels with a higher CI in ANL-GREET receive a proportionally lower per-gallon 45Z tax credit than those noted above. 45Z tax credit availability lowers the CTFP credit price needed to incentivize the production of alternative transportation fuels, particularly those with lower CIs. This reduces the credit market costs used to evaluate the CTFP's economic impact.

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[35] See US Code of Federal Regulations (CFR) Title 40, §80.1425: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-80/subpart-M/section-80.1425.

[36] RNG is eligible to generate D3 RINs (for cellulosic fuels) under pathway Q of the RFS. For more information, see US EPA. "Approved Pathways for Renewable Fuel." https://www.epa.gov/renewable-fuel-standard/approved-pathways-renewable-fuel.

[37] Note that House Resolution 1 (2025), which passed after assumptions finalization for the BCA modeling, excludes Indirect Land Use Changes (ILUC), which should increase the money available under 45Z.

[38] Arrington, Jodey C. "H.R.1 - One Big Beautiful Bill Act." 119th U.S. Congress. July 4, 2025. https://www.congress.gov/bill/119th-congress/house-bill/1/text.

4 Modeling Scenarios

The mutual co-dependency between the CTFP and NMVES, outlined under the "three-legged stool" analogy, exists in relation to the use of ZEV vehicles and fuels. In addition, the CTFP can compel decarbonization of New Mexico's vehicle fleet with associated benefits as a standalone policy in areas that do not overlap with NMVES. Gauging the CTFP's full effect can be difficult because of its overlap with NMVES.

To account for causal uncertainty associated with attributing impact to the CTFP and NMVES, BRG staff used the FCMM to analyze the CTFP's effect under two scenarios that the model derives from analyzing projections under three different policy assumptions:

1. A "Federal baseline" in which neither the NMVES nor the CTFP is enacted and the assumed effective policy is the latest US Environmental Protection Agency (EPA) national standard: the 2024 Multipollutant Rule for light-duty vehicles (LDVs) and the 2024 Phase 3 Rule for medium and heavy-duty vehicles (MHDVs).[39,40] These federal standards remain in effect at the time of publication of this BCA.
2. An "NMVES baseline" in which the NMVES is effective in New Mexico and its more stringent requirements for new vehicles in New Mexico are binding. This state standard remains in effect at the time of publication of this BCA.
3. A scenario in which New Mexico enacts the CTFP alongside the NMVES.

BRG staff used these three policy projections in the FCMM to determine the CTFP's policy effect under two scenarios described below and illustrated for GHG reductions in **Figure 3**:

1. An "NMVES + CTFP policy suite." This scenario looks at the program's impact as the difference between policy projections (3) and (1) from the list above. This provides an upper-bound estimate of the CTFP's impact across all model results, because it attributes to the CTFP emissions reductions from its effect as a standalone policy and as a policy that fully supports NMVES as part of the "three-legged stool" as discussed above; and
2. A "CTFP-only" scenario that looks at the program's impact as the difference between policy projections (3) and (2) from the list above. This provides a lower-bound estimate of the CTFP's effect. This scenario considers that the NMVES

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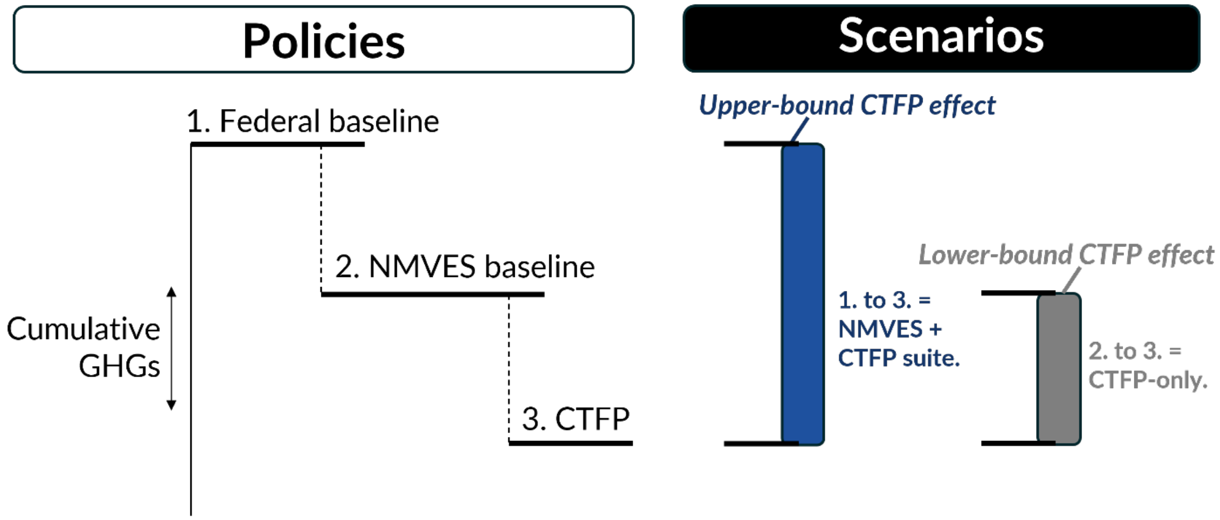
[39] US Environmental Protection Agency (EPA), Office of Transportation and Air Quality (EPA-OTAQ), "Final Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," Other Policies and Guidance, April 18, 2024, https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-multi-pollutant-emissions-standards-model.

[40] US EPA OTAQ, "Final Rule: Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3," Overviews and Factsheets, March 29, 2024, https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-greenhouse-gas-emissions-standards-heavy-duty.

Baseline would remain in place and attributes all emissions reductions from fleet and VMT changes to NMVES with no consideration of CTFP's supporting role. Notably, the CTFP's role in reducing emissions would change if the NMVES baseline were not in place, with greater GHG reductions under CTFP-only but at a potentially greater total program cost.

Figure 3. Illustrative diagram of the policies and scenarios analyzed for cumulative GHG emissions over a projection period



1. MOVES5 runs with federal Phase-3 Multi-Pollutant Rule
2. MOVES5 runs with NMVES ZEV requirements
3. Fuel markets model applied to NMVES fleet + VMT

Note: Illustrative depiction, does not represent actual quantities.

The CTFP's actual effect on New Mexico transportation sector emissions is likely somewhere between the upper-bound ("NMVES + CTFP") and lower-bound ("CTFP-only") scenarios. It is clear that the CTFP will play an important role in supporting NMVES with credits for the buildout of fuel supply equipment (FSE) needed to support using ZEVs for longer trips, paired with credits for the continued supply of fuel from FSE to ensure the longevity and reliability of this infrastructure, and requiring the reinvestment of credit from residential EV charging into distribution, grid modernization, infrastructure and other transportation decarbonization projects. The lower-bound "CTFP-only" estimate thus likely understates the policy's true effect. At the same time, the NMVES would certainly impact New Mexico's transportation sector without the CTFP. Thus, the upper-bound "NMVES + CTFP" estimate overstates the CTFP's true effect.

It is difficult to ascertain exactly where the CTFP's effect would lie between these scenarios, so the **Model results** section provides both to cover the full range of outcomes. In doing so, the Model results section considers all benefits and costs of the CTFP depicted in and across New Mexico transportation fuel markets outcomes, GHG and CAP emissions reductions, statewide employment and its overall macroeconomy. For all areas other than emissions reductions, the results include input-output (I-O) modeling from ERG to determine indirect and induced effects for fuel savings and costs, employment impacts, and health effects. **Appendix D** describes this I-O modeling in greater detail.

5 Study Results

This section provides a more detailed analysis of the BCA's findings on the CTFP's impact on New Mexico's transportation fuel markets, job market, and overall macroeconomy, as well as air quality, resident health, and statewide transportation sector GHG emissions.

Modeling adjustments and limitations

To the extent justifiable, this BCA made conservative (low-benefit/high-cost) assumptions to retain analytical credibility. As discussed in the Direct Testimony of Kolt Vaughn (**NMED Exhibit 34**), on January 31, 2025, NMED publicly published graphs that provided initial fuel market modeling results.[41] On March 18, 2025, NMED published documentation of the assumptions that it used to do this modeling.[42] Many of the assumptions and broader modeling trends hold true in the modeling for this BCA. However, to remain consistent with conservative CTFP program assumptions, BRG staff re-modeled the underlying vehicle fleet population and VMT projections based upon public input that interested parties following the release of these fuel and credit market projections and related assumptions. Doing so reduced the projected quantity of electricity consumed in this BCA as compared to the initial modeling results. The impact of these changes affected results across all areas that this section covers, reducing some projected benefits from electricity consumption and increasing overall program costs. **Appendix A** and **Appendix B** discuss these updates in greater detail.

This experience illustrates that this BCA modeling cannot aim to precisely predict future transportation market, macroeconomic, air quality/health, or GHG emissions outcomes from the CTFP. However, it also illustrates that NMED, to the best of its ability, has integrated all data and feedback whenever and wherever possible, serving to improve its understanding of the factors that will determine the CTFP's ultimate impact, as detailed in this section. Throughout this process BRG staff have made a concerted effort to describe the CTFP's impact in a rigorous and data-driven manner that most thoroughly serves to aid the EIB's

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[41] New Mexico Environment Department. "Fuel volume and credit market projections for the Clean Transportation Fuel Program (CTFP)." January 31, 2025. https://cloud.env.nm.gov/resources/_translator.php/NzgyMDU0NTgwNTA5MWY3ZGMyM2Y5ZDdmNV8xODY3OTI~.pdf.

[42] New Mexico Environment Department. "Modeling Assumptions for the Fuel Volume and Credit Market Projections Regarding the Clean Transportation Fuel Program." March 18, 2025. https://cloud.env.nm.gov/resources/_translator.php/NzgyMDU0NTgwNTA5MWY3ZGMyM2Y5ZDdmNV8xODY3OTI~.pdf#page=7.

decision in accordance with the factors listed under NMSA 1978, Section 74-1-9.[43] Further, NMED notes that any future disagreements that may arise from the assumptions of this BCA are disagreements with the BCA itself and not with the overall CTFP rule that the NMED has proposed to the EIB.

The remainder of this section discusses results of the BCA across the four major categories considered: Fuel markets, employment, GHG reductions, and health effects. BRG staff provided direct fuel market and employment impacts to ERG. ERG used this information, along with health outcomes from changes to air quality, to prepare estimates for induced and indirect economic activity that result from the CTFP. ERG estimated the program's effects across these areas by inputting estimated direct effects into an input-output (I-O) model built with the IMPLAN software.[44] The I-O modeling effort also accounted for any induced effects from changes to household income and spending from fuel cost changes assuming 0, 50, and 100 percent pass-through of wholesale benefits and costs to retail fuel markets, as well as the effects of direct jobs supported by FSE credits under the CTFP and reduced health cost expenditures attributable to CAP emissions reductions under the program.

5.1 Fuel Markets

5.1.1 Impact on New Mexico Fuel Quantities

The CTFP benefits the public interest due to GHG reduction, air quality improvements, greater job growth and economic diversity, and greater energy security. The CTFP establishes annual target CI values for the CTFS. Each year, regulated parties producing, importing, or dispensing for use in New Mexico fuels with CIs that are above the CTFS generate deficits, whereas regulated parties producing, importing, or dispensing for use in New Mexico fuels with CIs below the CTFS generate credits. Regulated parties that generate deficits must purchase credits to offset them on an annual basis. This ensures that each regulated party complies with the CTFS on an annual basis. As the CTFS becomes stricter (lower target CI) in later years, the CTFP shifts the statewide transportation fuel mix towards fuels with lower lifecycle GHG emissions per unit. The fuel market effects of this shifting fuel mix under the CTFP determine its economic reasonableness and technical practicability.

This analysis projects a significant increase in the quantity of lower-CI transportation fuels produced, imported, or dispensed for use in New Mexico through 2040 under the CTFP (**Figure 4**), with a corresponding decline in demand for fossil-derived fuels. This is especially pronounced for clear (fossil) diesel, which regulated parties blend at a lower rate as BBDs displace them to generate CTFP credits. Clear diesel displacement peaks in the late 2020s and early 2030s, just before and after New Mexico's statutory 2030 reduction target.

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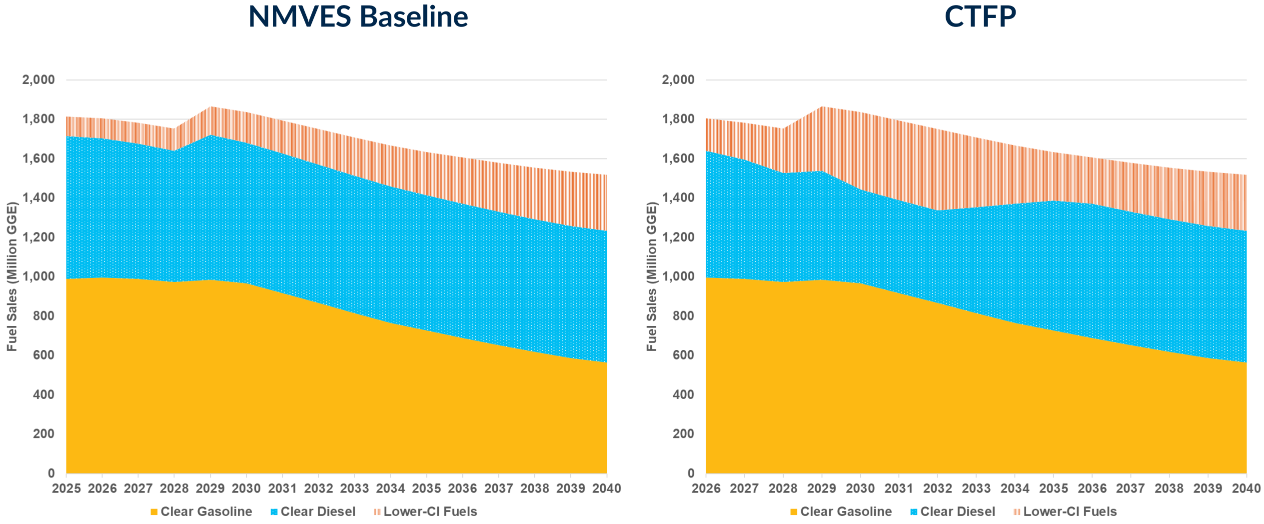
[43] https://nmonesource.com/nmos/nmsa/en/item/4415/index.do#74-1-9.

[44] https://implan.com/.

Figure 4. Quantity of Regulated or Opt-In Clear and Lower-CI Fuels Produced, Imported, or Dispensed for Use in New Mexico – NMVES Baseline versus CTFP Policy Projections, 2025-2040 (Million GGE)[45]


NMVES Baseline

CTFP

Figure 5 focuses on the transportation fuel types contributing to the lower-CI fuels portion of the yellow area in **Figure 4**. Over the 2020s, the largest drivers of sectoral decarbonization are the growth of drop-in biofuels, specifically BBDs and RNG.[46] Consumption of these fuels rises rapidly in the BCA as CI targets accelerate through the statutory 20-percent reduction in 2030 below the 2018 baseline CI. Over the 2030s, the demand for drop-in biofuels falls as the CTFS decelerates and the quantity of credits sourced from vehicle-specific fuels like electricity and hydrogen increases. This increase in fleet-specific fuels is specifically attributable to a growth in ZEVs due to NMVES combined with a decline in the grid CI of electricity due to New Mexico's RPS and other similar policies. **Appendix B** discusses the modeling inputs that BRG staff use to support FCMM projections.

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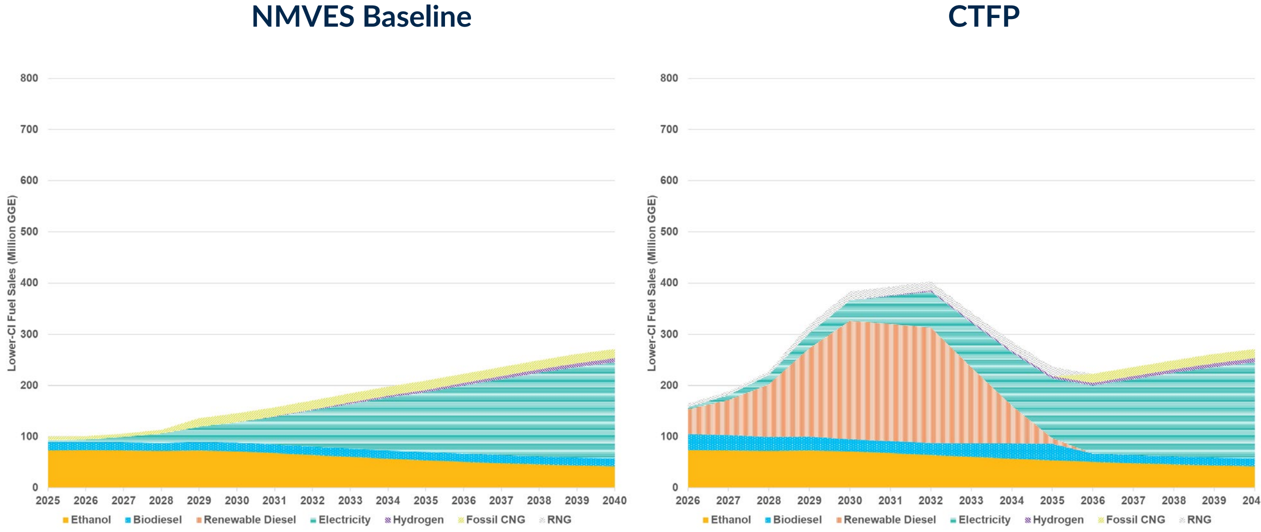
[45] Note that this figure, and other volumetric figures in this report, shows the volume of fuels regulated under the policy in each policy assumption. Non-road "dyed" fuels begin to be regulated under the policy in 2029, leading to the apparent increase in demand in this year.

[46] See **Footnote 34**.

Figure 5. Quantity of Lower-CI Transportation Fuels Produced, Imported, or Dispensed for use in New Mexico by Fuel Type – NMVES Baseline versus CTFP Policy Projections, 2026-2040 (Million GGE)[47]



5.1.2 Credit Market Dynamics

Regulated parties who produce, import, or dispense the fuel shown in **Figure 5** for use in New Mexico generate CTFP credits. This allows them to make money from the "CI attribute" of such fuels, in addition to revenue from direct fuel sales.[48] The difference under the CTFP is that these fuel suppliers will additionally earn or pay an amount per unit of fuel supplied based upon the lifecycle GHG emissions that result from its feedstock, production, transportation and distribution, and consumption. These determine each fuel's "CI attribute." These emissions are measured as a ratio of the lifecycle units of CO_2e emitted per unit of energy.

Any fuel with a CI below the annual CI target generates credits. The sale of credits can provide revenue to fuel suppliers.[49] Revenue from credit sales can help defray the higher costs of producing a low-carbon fuel relative to a fossil fuel like gasoline or diesel. Low-carbon fuel suppliers can capture revenue from various streams, which can largely be characterized as the wholesale price of the fuel, federal tax incentives or tax credits, other environmental attributes from federal programs (e.g., the federal Renewable Fuel Standard or RFS),[50] and CI attributes from state-level programs like the CTFP.

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[47] Note that this figure, and other volumetric figures in this report, shows the volume of fuels regulated under the policy in each policy assumption. Non-road "dyed" fuels begin to be regulated under the policy in 2029, leading to the apparent increase in demand in this year.

[48] A regulated party can earn direct fuel sales revenue from retail sales or via sales to the establishments along the supply chain connecting the regulated party to entities that dispense this fuel to users at retail locations.

[49] A fuel supplier may earn both deficits and credits each year if they supply both credit-generating and deficit-generating fuels to New Mexico. In such cases, the credits that they must purchase or may sell will depend upon the net balance of credits and deficits generated across all fuels supplied.

[50] Electronic Code of Federal Regulations. Title 40, Part 80, Subpart M. "Renewable Fuel Standard." https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-80/subpart-M.

If a regulated party's cost of producing, importing, or dispensing low-carbon fuel for use in New Mexico exceeds the revenue associated with value streams outside of the CTFP, then this program can help to reduce or eliminate that gap entirely. If a regulated party receives an amount of revenue in CTFP credits per unit of low-carbon fuel sold in New Mexico that exceeds this gap, then the CTFP makes the supply of this fuel into New Mexico economically viable. For fuel types that a regulated party can sell in New Mexico in addition to other states (or even other countries), economic viability under CTFP further requires that credit revenue under the program makes it at least as profitable for the regulated party to supply to New Mexico compared to elsewhere.

This comparison is particularly important for fuels that are "drop-in" substitutes for gasoline and diesel, primarily biofuels. For BBDs, supply economics depend upon multiple factors like state and federal tax credits (as well as how tax credits apply for feedstock imported from other countries, if applicable), the RFS, the CI of different BBD feedstock types, transportation cost and distance from BBD refineries to wholesale markets, and CI attributes and credit prices in other states and countries with CTFP-like policies. These factors all shape the relative economics of BD and RD versus fossil diesel that determine the rate at which regulated parties will blend BBDs into New Mexico's diesel pool.

By contrast, other alternative transportation fuels are vehicle-specific, like electricity, hydrogen, and compressed natural gas (CNG). These fuels are relatively less dependent upon their economics versus traditional fuel types, because they have no substitute for use in the vehicles that consume them like BEVs, fuel cell electric vehicles (FCEVs), and NGVs.[51] The FCMM models the quantity of these vehicle-specific fuels and the credits that they generate as a result of the prevalence and use of their dedicated vehicle types in a manner that does not vary in response to the CTFP.[52] Each year, a given quantity of these vehicle-specific fuels generates credits based on their CIs and the fuel efficiencies of their dedicated vehicles compared to traditional ICE counterparts.[53,54]

In addition, BRG staff incorporated in the FCMM the CTFP's provision under the Revised Proposed New Rule 20.2.92.302-304 NMAC, allowing regulated parties to generate credits from installing FSE equipment up to their maximum allowable limit equal to five percent of

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[51] For CNG this is somewhat nuanced because CNG can come from fossil gas as well as renewable natural gas (RNG) from various sources. Each CNG source will have unique CI values under the CTFP that affect their relative economics and respective shares of the CNG quantity supplied to CNG vehicles in New Mexico.

[52] Note that there is a higher cost associated with these options, but the higher cost sits on the purchase of the vehicle and with the fueling infrastructure itself, rather than the fuel.

[53] For each credit-generating fuels, there is an Energy Economy Ratio (EER) adjustment that accounts for the ability of such vehicles to translate their energy units into distance traveled when compared to energy units of gasoline or diesel for internal combustion engine (ICE) vehicles. The EER is only relevant for fuels like electricity, hydrogen, and CNG that require their own vehicle types for use.

[54] Where credit-generating fuels have no difference in EER from the deficit-generating counterparts, their credits per unit sold are a product of quantity, energy density, and lifecycle GHG emissions.

prior-period deficits. **Section 5.2** outlines the calculation of jobs and treatment of FSE credits for economic impact purposes.

BRG staff used the FCMM to forecast the least-cost solution for regulated parties to meet their annual CTFP compliance obligations. For this forecast, BRG staff considered each potential credit source that can bid into the CTFP credit market. Some sources bid into the CTFP credit market at a price as low as \$0/MTCO$_2$e because these fuels would be used irrespective of the program. By contrast, “incremental” credit-generating sources like incremental RECs and many “drop-in” substitutes for fossil-derived transportation fuels require CTFP revenue to be economically viable. BRG staff programmed the FCMM to assume that regulated parties generating incremental credits bid into the CTFP credit market in greater quantities at higher CTFP credit prices. This leads to the formation of a CTFP credit market supply curve as discussed in **Appendix B**.

5.1.3 Credit Market Outcomes

In developing the FCMM, BRG staff considered RD produced, imported, or dispensed for use in New Mexico to be the “marginal” credit source through 2035. This means that credits from RD use generated the final credit quantities needed to satisfy regulated parties’ compliance obligations. The minimum bid price for these marginal RD credits sets the “market clearing” price that balances CTFP credit supply and demand. This becomes the price that all credit sources receive each year in the FCMM.[55] **Figure 6** maps this price through 2040.

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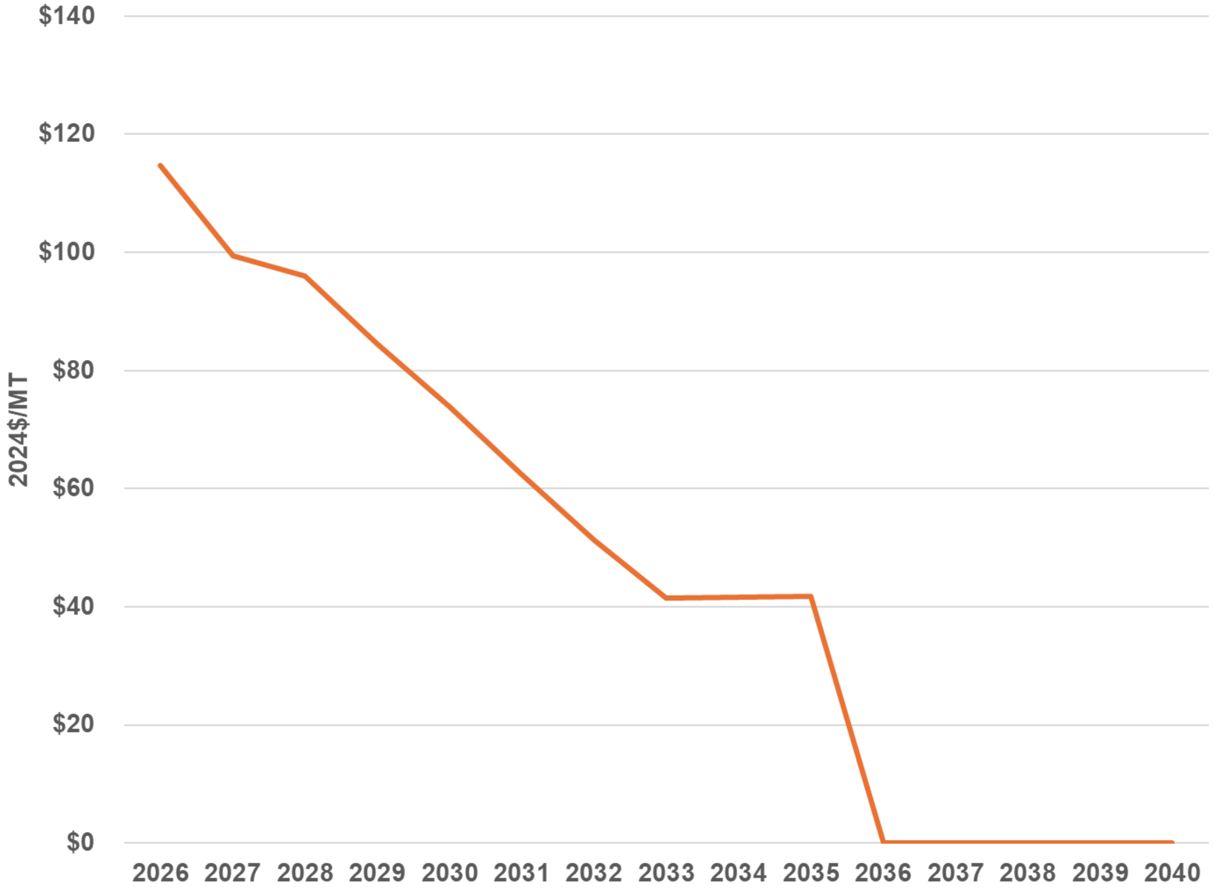
[55] BRG staff included the assumption in the FCMM that even if a regulated party can bid CTFP credits at a minimum price that is below the CTFP market-clearing price, they can recognize what the market clearing price is and increase their bid accordingly. This BCA counts any CTFP credit market revenue that a regulated party earns above their minimum bid price as a program benefit under the fuel markets category in **Table ES-1** that is netted out of the overall cost in that row.

Figure 6. Projected Credit Market Price by Year



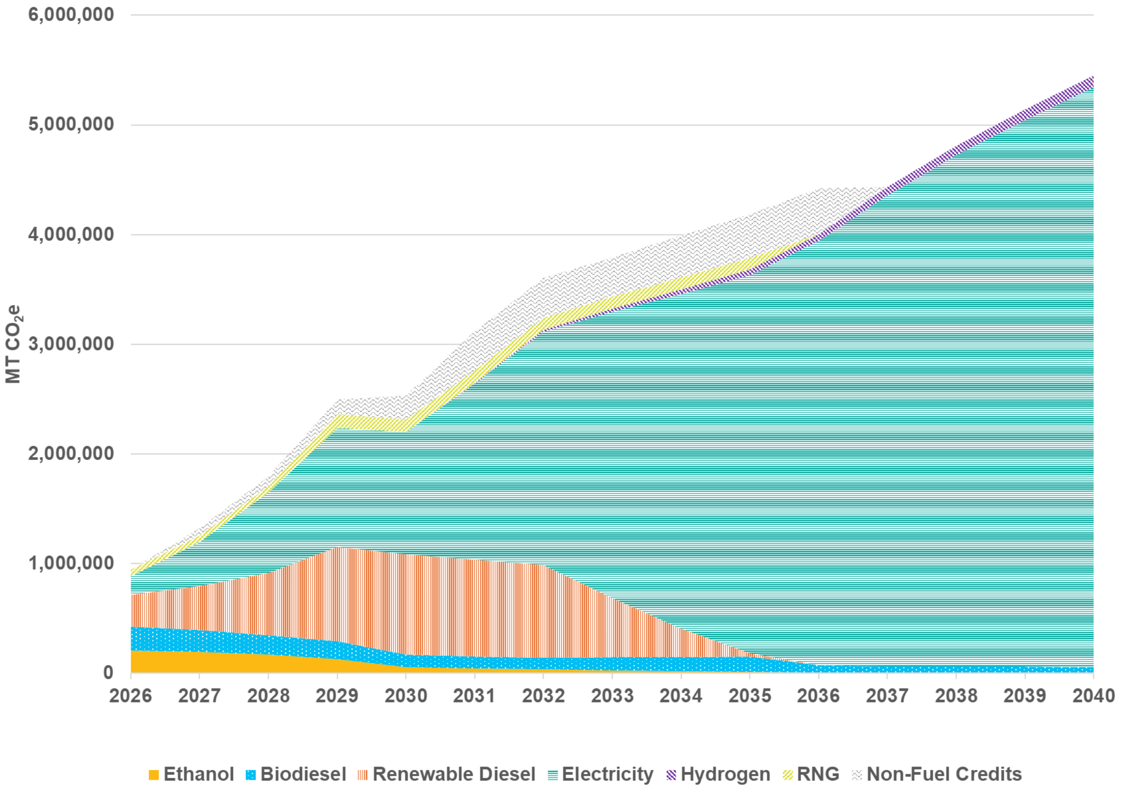
As shown in **Figure 6** and described in **Appendix B**, the CTFP credit market price declines over the compliance period. Partially, this is because of the increased contribution of non-marginal (non-RD) fuels like electricity to satisfying annual regulated party compliance obligations under the CTFP. This rises in later years of the forecast because of greater use of ZEVs under the NMVES Baseline and the CTFP policy projections as ZEV penetration rises as a portion of New Mexico's vehicle fleet. In addition, BRG staff use the FCMM to project greater credit generation from plug-in vehicles, like BEVs and PHEVs, that use electricity. As detailed in **Appendix B.3.4**, each unit of electricity generates increasing CTFP credits due to increasingly stringent RPS under the ETA reducing the statewide grid CI. This, along with fewer deficits that regulated parties must satisfy due to the reduced clear gasoline and diesel quantities consumed per Figure 4, reduces the need for RD blending into New Mexico's diesel pool for CTFP compliance. In addition, regulated parties can produce, import, or dispense each unit of BBD for use in New Mexico at relatively lower CTFP credit prices. This occurs because BRG staff incorporate federal policy assumptions into the FCMM that project that the degree to which BBD production costs exceed those of clear diesel narrows over time, such that they need less support from CTFP credit revenue to blend BBD into the New Mexico diesel pool.

This is true for RD, which is the marginal credit-generating fuel that sets the CTFP credit price, as discussed in **Appendix B**, leading to a further lowering of CTFP credit prices over time.

As expanded upon in **Appendix** B.**7**, credit market prices "collapse" to \$0/MTCO$_2$e beginning in 2036, as grid electricity and other non-incremental credit sources satisfy CTFP compliance obligations and make the policy non-binding.

Figure 7 below shows forecasted CTFP credit generation by fuel type. As discussed above, BBDs – particularly RD – generate a large portion of CTFP credits in early program years. In later years, electricity becomes an increasingly prevalent source of CTFP credit generation because of both the greater quantity consumed and its decreasing CI as discussed above, as well as increased REC retirements. Fuel credits from ethanol and RNG, as well as FSE credits that are represented as Non-Fuel Credits in **Figure 7** also represent material credit sources during early compliance years. By 2036, regulated parties achieve CTFP compliance without incremental drop-in fuel consumption, incremental REC retirements, or other strategies with incremental costs as the credit market is served largely by vehicle-specific fuels.[56]

Figure 7. Annual Credit Generation by Alternative Fuel under the CTFP, 2026-2040 (MTCO$_2$e)



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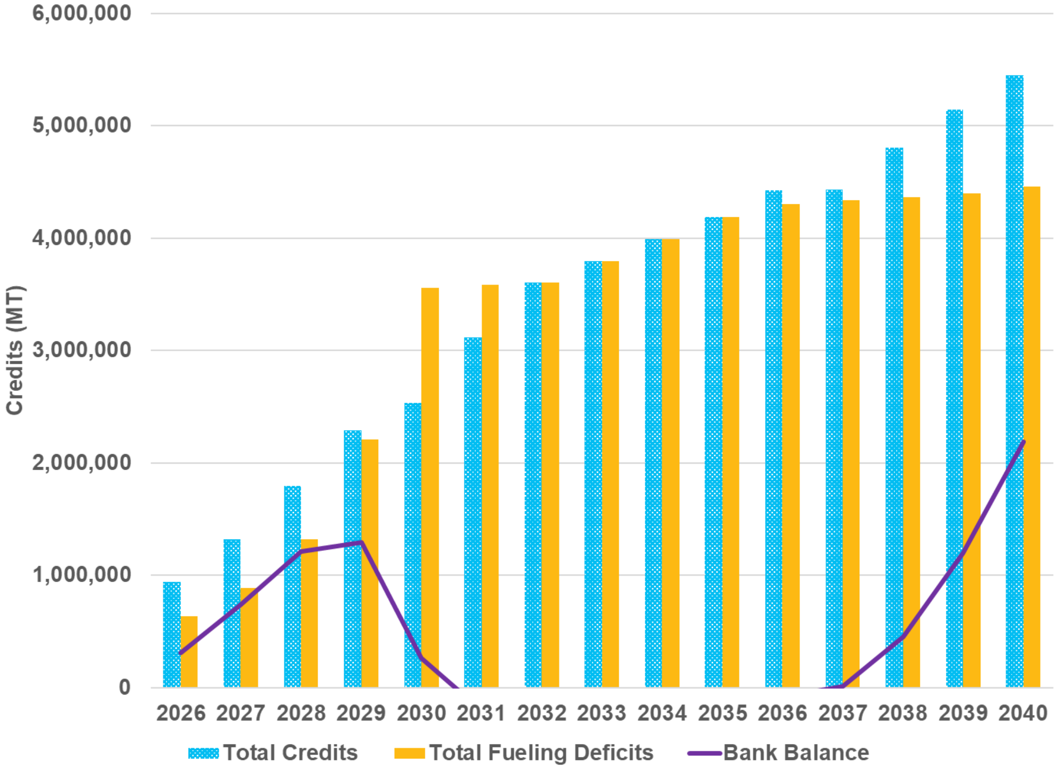
[56] Some remaining drop-in fuels continue to produce credits as they remain in the baseline at rates comparable to those seen prior to the policy.

Figure 8 shows the projected credit and deficit generation and associated compliance bank balance in the BCA analysis. As has been seen in other states, the BCA assumes that there is some buildup of the compliance credit bank during the early years of the policy, in anticipation of future CI targets approaching the statutory 20 percent reduction by 2030. Net withdrawals of banked CTFP credits begin in the early 2030s, the most challenging years for compliance. Regulated parties fully exhaust available banked credits in 2032, after which they must generate or retire sufficient credits each year to fully offset deficits. However, this proves less challenging with time as vehicle-specific credits like electricity loosen credit markets. After 2035, credit generation from non-incremental fuels overtakes deficit generation and there is no need for incremental credit-generating fuels that require CTFP credit revenue for economic viability in New Mexico. This makes the CTFP non-binding and causes the credit price to “collapse” to \$0/MTCO$_2$e. **Appendix B.6** discusses these banking assumptions in greater detail.

Figure 8. Projected Credit and Deficit Generation and Bank Balance



5.1.4 Transportation Fuel Cost Effects

The result of the credit market outcomes discussed above determines the fuel market benefit and cost that the CTFP generates for transportation fuels that regulated parties produce, import, or dispense for use in New Mexico. Fuel market benefits come from revenue that credit-generating transportation fuels earn from credit sales while fuel market costs come from expenditures that deficit-generating fuels require for credit purchases.[57] In both cases, the benefit or cost per unit of transportation fuel equals the product of the credits or deficits that it generates per energy unit and the CTFP credit price.

In developing the FCMM for this BCA, BRG staff do not consider the degree to which regulated parties and their supply chain partners either internalize this revenue or cost or pass it down the supply chain to the final retail customer. This section briefly outlines different possible "pass-through rate" ("PTR") assumptions with an explanatory discussion, and NMED further discusses PTRs as part of a PTR literature review submitted with its EIB Testimony. The direct (first-order) fuel market effects shown in do not vary based upon the assumed PTR. This BCA uses a general welfare approach for direct effects that includes all CTFP benefits and costs regardless of who bears them. However, second-order indirect and induced effects may differ by PTR because affected parties have different in-state spending patterns. ERG's input-output (macroeconomic) analysis thus models these second-order effects differently under different assumed PTRs. **Appendix D.1** discusses the approach that ERG takes to account for these differences and how they impact the final fuel market effects shown in .

Figure 9 shows an estimated price change for five credit-generating fuels in dollars per gallon of gasoline equivalent, or $/GGE,[58] under a 0, 50, and 100-percent assumed PTR. Under the 100-percent assumed PTR, credit-generating fuel producers pass all revenue that they receive from selling CTFP credits on to consumers in the form of retail price discounts. Under this assumption, regulated parties see no change in the profit margins because of the CTFP. Instead, all program benefits go to customers, who pay retail prices that incorporate the full program benefit. The opposite is true under a 0-percent PTR, in which regulated parties fully internalize the impact of revenue earned from CTFP credit sales in the form of higher profit margins. In this case, retail fuel consumers pay the same price for credit-generating transportation fuels that they would pay in the absence of a CTFP. The 50-percent PTR assumption is an average between these two, with the benefits of CTFP revenue evenly split between regulated parties that earn greater profit margins and retail customers that see a price discount.

Note that across all cases PTR assumptions and across all credit-generating fuel types, the policy's impact goes to zero in 2036. As discussed above, this is because in that year, the CTFP becomes non-binding and the credit price drops to $0/MTCO$_2$e. Because CTFP credit revenue is the sole source of CTFP benefits in **Figure 9**, there is no CTFP benefit once this occurs.

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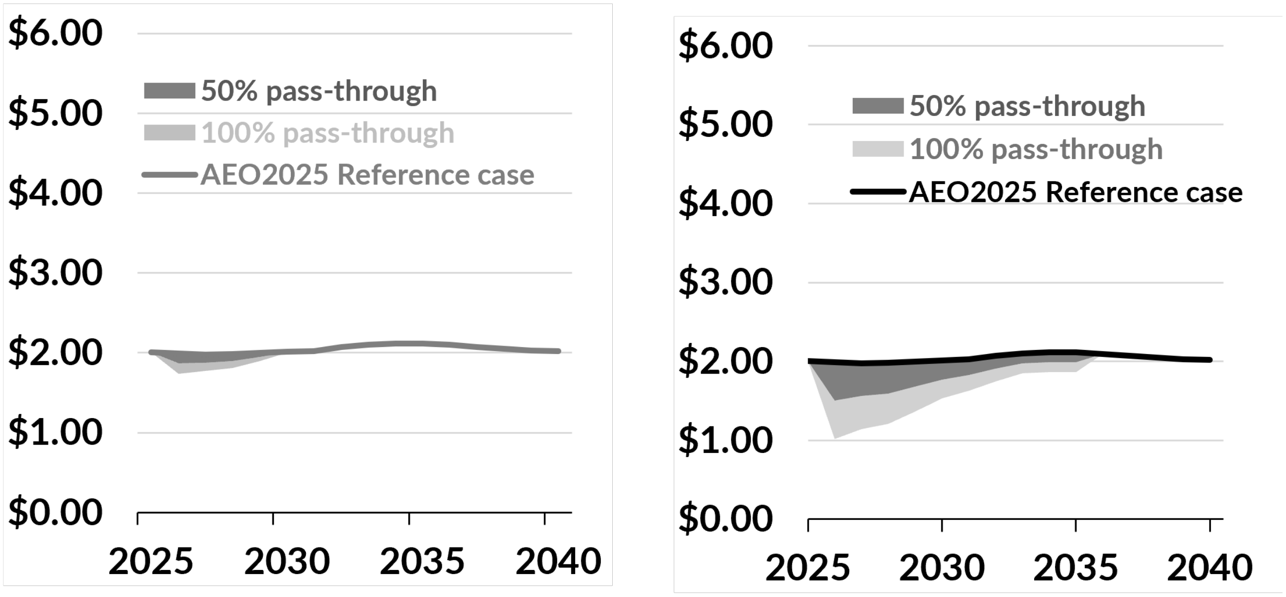
[57] For regulated parties that generate both credits and deficits, this BCA assumes that CTFP credits and deficits still both have a cost or benefit equal to the CTFP credit price. If a regulated party generates net credits, deficits reduce the credit balance that they can sell to generate revenue, creating an opportunity cost. If a regulated party generates net deficits, the credits that they generate reduce the deficit balance that they must offset from credits purchased, creating an opportunity benefit (or a reduced opportunity cost). In both cases, this BCA incorporates such effects by looking at the total balance of all credits and deficits generated under the program irrespective of individual regulated parties to determine the CTFP's effects on a fuel-by-fuel rather than entity-by-entity basis.

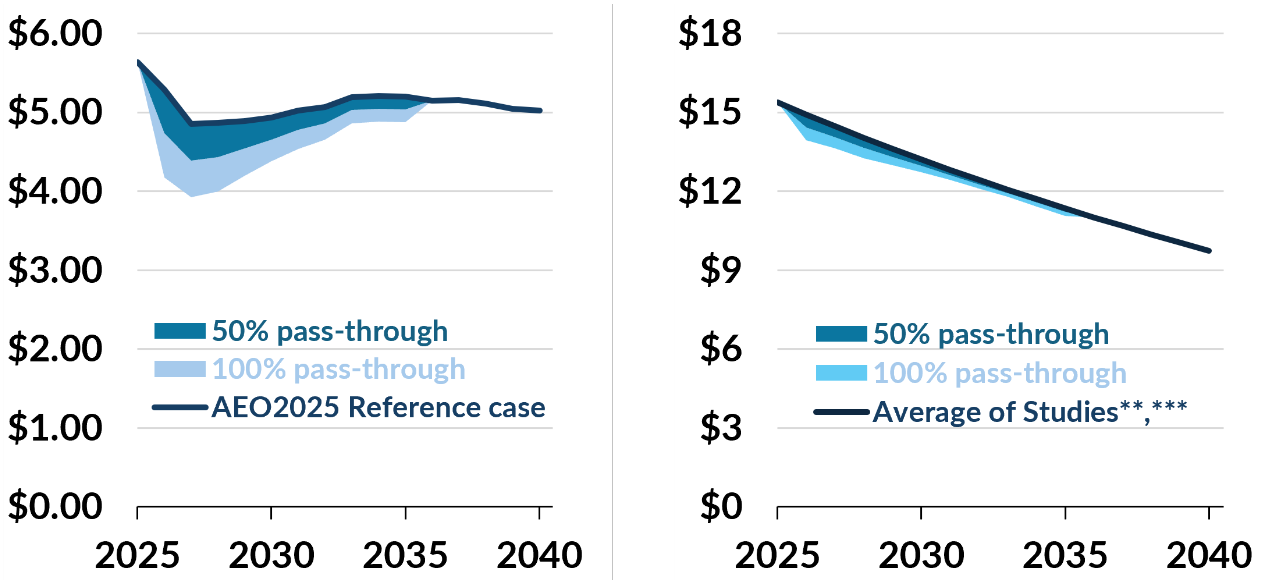
[58] Megajoules (MJ) are the energy unit measuring CI under the CTFP. This analysis must thus convert each fuel's credit- or deficit-generating potential under the CTFP into gallons of gasoline equivalent (GGE) for **Figure 8** and **Figure 9**. 1 GGE = 126.833 MJ. https://www.eia.gov/energyexplained/units-and-calculators/energy-conversion-calculators.php.

Figure 9. Changes to credit-generating fuel prices by year from the CTFP compared to the US Energy Information Administration 2025 Annual Energy Outlook Reference case scenario and an average of hydrogen cost from the US National Renewable Energy Laboratory,*** assuming 0-, 50-, and 100-percent PTR of credit revenues, 2025-2040 (US $2024 / GGE)**



Compressed natural gas – fossil

Compressed natural gas - renewable



Electricity*

Hydrogen,*****

Sources: Projection cases from the US Energy Information Administration's (EIA) 2025 Annual Energy Outlook (AEO2025) report for transportation sector electricity and natural gas in real $2024, converted from million British thermal units (MMBtu)

into gallons of gasoline equivalent (GGE) with AEO2025 conversion factor of 0.125 MMBtu / GGE.[59,60] Pass-through rate series assume a percentage of credit purchase values added to projected prices. Pass-through rates converted from $2023 to $2024 using the US Bureau of Economic Analysis Personal Consumption Expenditures Price Index (PCEPI).[61]
Note: Drop-in substitute biofuels for gasoline and diesel fuels consumed in internal combustion engine (ICE) vehicles such as ethanol and biomass-based diesels (BBDs) like biodiesel (BD) and renewable diesel (RD) will also generate credit revenue under the CTFP. However, commuters purchase these fuels at retail locations as part of their final blended pool of motor gasoline and diesel fuel, respectively.[62] This analysis subsumes the effect of any such revenues in the finished gasoline and diesel prices shown in **Figure 10**.
Note: RNG graph assumes that baseline prices for RNG as a transportation fuel equal baseline fossil CNG due to large amount of available credits under the federal RFS.
*In New Mexico, electric distribution utilities (EDUs) only change electricity rates with approval from the New Mexico Public Regulatory Commission (NM-PRC) pursuant to NMSA 1978 Section 62-8-7.[63] In addition, the statute retains under Paragraph 5 of Subsection C of 74-1-18 that those EDUs that are investor-owned utilities (IOUs) may adjust rates as needed to cover costs of their Transportation Electrification Plans (TEPs) pursuant to NMSA 1978 Section 62-8-12.[64] However, the statute requires in that paragraph that EDUs reinvest all CTFP credit revenues minus administrative costs into distribution, grid modernization, infrastructure and other projects that support transportation decarbonization, with at least 50 percent of this investment in low-income and underserved communities.[65] This analysis considers all such investments, including those made by IOUs, to be additional to those planned under TEPs. Absent the CTFP, this analysis assumes that IOUs or other EDUs may either not have made such investments or made them as standalone projects that could be subject to rate recovery. In either case, the CTFP results in IOUs or other EDUs passing value through to BEV and PHEV drivers with CTFP credit revenue.
**Annual hydrogen costs come from a linear interpolation between current (2025) and future (2050) expected costs from the US National Renewable Energy Laboratory (NREL) 2024 Annual Technology Baseline (NREL-ATB 2024) data browser for hydrogen used in transportation.[66]
***Current (2025) hydrogen costs are an average of four data points: The upper- and low-bounds of cost ranges from the NREL-ATB 2024's high- and low- hydrogen production cost scenarios, respectively.[67] This same general method also produces

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[59] https://www.eia.gov/outlooks/aeo/data/browser/#/?id=3-AEO2025&region=1-0&cases=ref2025~highprice~lowprice&start=2023&end=2050&f=A&linechart=~~~~~~~~~~~~~~~~~~~~~ref2025-d032025a.32-3-AEO2025.1-0~highprice-d032525b.32-3-AEO2025.1-0~lowprice-d032125a.32-3-AEO2025.1-0~~~~ref2025-d032025a.34-3-AEO2025.1-0~highprice-d032525b.34-3-AEO2025.1-0~lowprice-d032125a.34-3-AEO2025.1-0&map=ref2025-d032025a.3-3-AEO2025.1-0&sourcekey=0.

[60] 5.253 MMBtu / barrel of finished conventional gasoline: https://www.eia.gov/outlooks/aeo/data/browser/#/?id=20-AEO2025&region=0-0&cases=ref2025~highprice~lowprice&start=2023&end=2050&f=A&linechart=~~~~~ref2025-d032025a.77-20-AEO2025&map=&ctype=linechart&sourcekey=0. Multiplied by 1 barrel / 42 gallons (https://www.eia.gov/energyexplained/units-and-calculators/) = 0.125 MMBtu / GGE.

[61] U.S. Bureau of Economic Analysis. "Table 2.3.4. Price Indexes for Personal Consumption Expenditures by Major Type of Product." National Income and Product Accounts. Last Revised on July 30, 2024. https://apps.bea.gov/iTable/?reqid=19&step=2&isuri=1&categories=survey&_gl=1*1pckb8i*_ga*MTE5Njg1NDU5MC4xNzUyNzgxNTQ0*_ga_J4698JNNFT*czE3NTQ0MTM5MjEkbzUkZzEkdDE3NTQ0MTM5OTgkajQzJGwwJGgw#eyJhcHBpZCI6MTksInN0ZXBzIjpbMSwyLDMsM10sImRhdGEiOltbImNhdGVnb3JpZXMiLCJTdXJ2ZXkiXSxbIk5JUEFfVGFibGVfTGlzdCIsIjY0Il0sWyJGaXJzdF9ZZWFyIiwiMjAxNiJdLFsiTGFzdF9ZZWFyIiwiMjAyNSJdLFsiU2NhbGUiLCIwIl0sWyJTZXJpZXMiLCJBIl1dfQ==.

[62] Particularly for BBDs, credit revenue will partially cover the incremental costs associated with producing, importing, or dispensing fuel quantities for use in New Mexico. To the degree that this occurs, such revenues would not be available for pass-through to the consumer or buffering profits for regulated parties.

[63] https://nmonesource.com/nmos/nmsa/en/item/4407/index.do#62-8-7.

[64] https://nmonesource.com/nmos/nmsa/en/item/4407/index.do#62-8-12.

[65] https://nmonesource.com/nmos/nmsa/en/item/4415/index.do#74-1-18.

[66] https://atb.nrel.gov/transportation/2024/Hydrogen.

[67] In both the high- and low-cost scenarios for current costs, the lower-bound is for hydrogen produced using steam methane reforming with no carbon capture and storage (SMR, no CCS) from the US Department of Energy's May 2024 Hydrogen Fuel Cell and Technologies Office Multi-Year Program Plan. (https://www.energy.gov/sites/default/files/2024-05/hfto-mypp-2024.pdf), and the upper-bound is for hydrogen

an average projected future (2050) cost of producing hydrogen using the upper- and lower-bounds of future rather than current high- and low- hydrogen production cost ranges from NREL-ATB 2024.[68]

In addition to generating credit revenue, the CTFP imposes a compliance cost to deficit-generating fuels to pay for these credits, as shown in **Figure 10**. Such fuels include fossil gasoline and diesel. Regulated parties producing, importing, or dispensing such fuels for use in New Mexico must purchase CTFP credits to offset any balance of deficits annually. Under the assumption that sellers of high-CI transportation fuels raise finished gasoline and diesel retail prices to cover CTFP credit expenditures (100-percent PTR), they see no change in profit margins as a result of the policy because they pass its full cost on to consumers in the form of retail price increases. The opposite occurs under 0-percent PTR, in which regulated parties fully absorb program costs in the form of lower profit margins while retail prices are unaffected. Once again, a 50-percent PTR assumption interpolates between these scenarios, with CTFP expenditures borne in equal measure by regulated parties and consumers.

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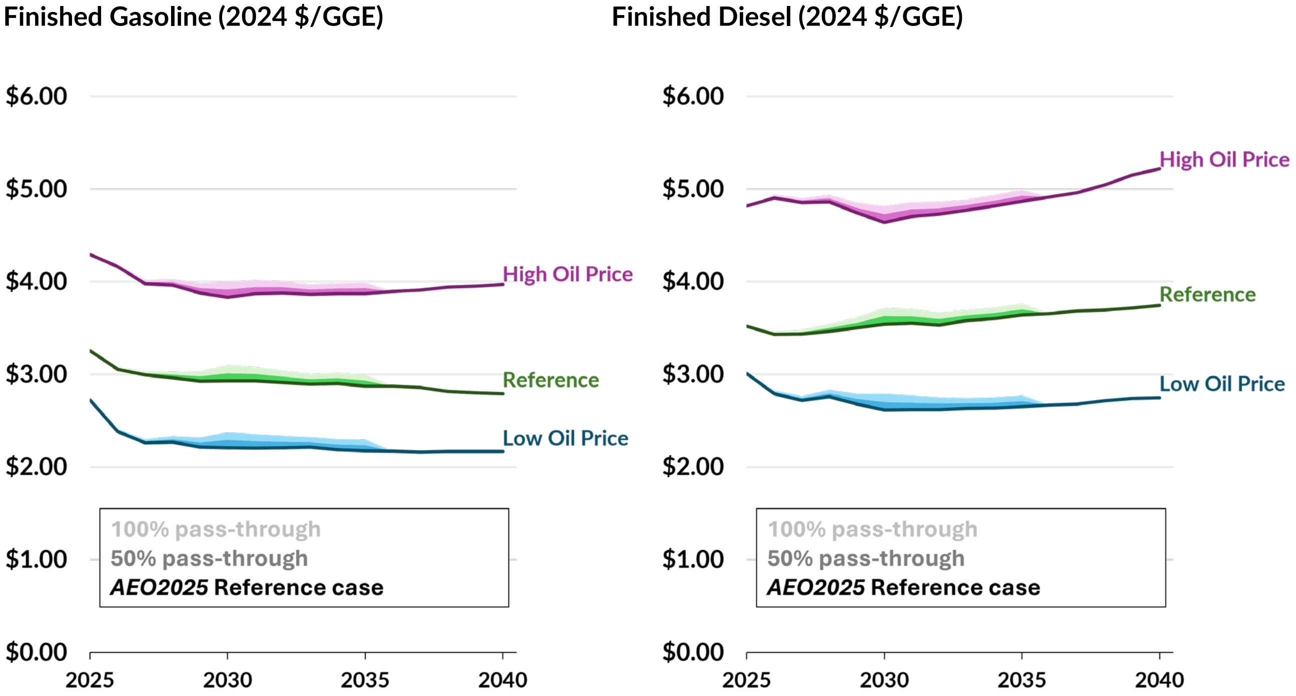
produced from low-temperature proton-exchange membrane (PEM) electrolysis from NREL's October 2024 Hydrogen Analysis Lite Production Model (https://www.nrel.gov/hydrogen/h2a-lite-download). Across all current cases, assumed delivery costs come from US Department of Energy's May 2024 Hydrogen Program Record for Clean Hydrogen Production Cost Scenarios with PEM Electrolyzer Technology (https://www.hydrogen.energy.gov/docs/hydrogenprogramlibraries/pdfs/24005-clean-hydrogen-production-cost-pem-electrolyzer.pdf?sfvrsn=8cb10889_1).

[68] In the low-cost scenario for future costs, the lower-bound comes from both hydrogen from steam methane reforming with carbon capture and storage (SMR, CCS) and PEM electrolysis and the higher bound comes from SMR, no CCS, all from the US Department of Energy's May 2024 Hydrogen Fuel Cell and Technologies Office Multi-Year Program Plan (https://www.energy.gov/sites/default/files/2024-05/hfto-mypp-2024.pdf), which also provides estimated delivery costs. In the high-cost scenario for future costs, the lower-bound comes from the cost of hydrogen produced from SMR, no CCS and the upper-bound comes from SMR, CCS projected from NREL's October 2024 Hydrogen Analysis Lite Production Model (https://www.nrel.gov/hydrogen/h2a-lite-download), with delivery costs from Bracci, Justin, Mariya Koleva, and Mark Chung. "Levelized Cost of Dispensed Hydrogen for Heavy-Duty Vehicles." National Renewable Energy Laboratory (NREL), Golden, CO (United States), March 5, 2024. https://doi.org/10.2172/2322556.

Figure 10. Retail gasoline and diesel prices relative to US EIA AEO2025 oil price scenarios under 0-, 50-, and 100-percent assumed PTR of CTFP credit expenditures to the price of product supplied, 2025-2040 (US $2024 / GGE)


Finished Gasoline (2024 $/GGE)

Finished Diesel (2024 $/GGE)

Sources: Projection cases from the AEO2025 report.[69] Pass-through rate series assumes a percentage of credit purchase values added to projected prices. Pass-through rates converted from $2023 to $2024 using the US Bureau of Economic Analysis Personal Consumption Expenditures Price Index (PCEPI).[70]

As shown in **Figure 10**, the cost of the CTFP when assuming 100-percent pass-through will rise to 16.8 cents per gallon of gasoline equivalent ($0.168/GGE) of gasoline by 2030 in 2024$ ($0.084/GGE assuming 50 percent pass-through) and then decline to $0.119/GGE by 2035 in 2024$ ($0.06/GGE assuming 50 percent pass-through) before converging to the baseline values, with diesel prices following a nearly identical trend over this period. This is well within bands of oil price scenario uncertainty used in the US Energy Information Administration (US EIA) 2025 Annual Energy Outlook (AEO2025) shown in **Figure 10**, and a small fraction of gasoline and diesel price fluctuations from logistical, financial, and geopolitical dynamics unrelated to the CTFP. From 2026-2040, the additional cost for gasoline prices under the CTFP amounts to 11.7 percent of the difference in retail gasoline prices between the AEO2025 Low Oil Price and Reference cases and 8.2 percent of the difference between the AEO2025 Reference and High Oil Price cases, respectively, showing that it is well within the bounds of projection uncertainty. Further, the $0.168/GGE peak program gasoline cost

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[69] https://apps.bea.gov/national/pdf/SNTables.pdf#page=4.

[70] See **Footnote 61**.

assuming 100-percent pass through is less than one-sixth of the $1.075/gallon average annual range of weekly US retail gasoline prices from 1995-2024 (in $2024).[71,72,73]

As noted above, this BCA uses conservative assumptions in cases of uncertainty. This includes assumptions about how much CTFP credits will cost and as a result, how much gasoline and diesel producers must pay to comply with the program. The FCMM that BRG staff developed for this BCA does not consider many strategies that deficit-generating petroleum fuel suppliers have used to adapt to CTFP-like policies in West Coast states. These include innovations to reduce the CI of their supply chains and generate credits from lower-CI fuels. In addition, this analysis does not account for any less traditional avenues for credit generation that could become available at a lower cost per unit of CO_2e reduced to deficit-generating fuel suppliers under the CTFP, like:

- Suppliers of alternative fuels for exempt uses like locomotion, aviation, and dyed fuels used for agricultural and industrial equipment prior to 2029 opting into the program and becoming credit generators;
- Credits from innovative low-CI fuels and processes like using RNG power generation and process energy to lower grid electricity and process CI values; fuels produced from novel feedstocks; biofuel CI reductions from capturing and sequestering biogenic CO_2 at ethanol refineries or other alternative methods; and
- Credits for improved energy economy from increasing public transit ridership above baseline year levels.

This BCA does not account for such options to lower the program compliance costs shown in **Figure 10**. **Appendix B.8** provides a detailed discussion on these conservative assumptions.

5.2 Jobs and Economic Impacts

5.2.1 Conservative Estimation Approach

The CTFP will further impact the public interest stemming from New Mexico's transportation fuels markets. The job creation, infrastructure development, and resultant economic activity spurred in the state by the CTFP are key factors to consider in assessing how the CTFP will

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[71] Calculated with data from the US Energy Information Administration. "Weekly U.S. Regular All Formulations Retail Gasoline Prices (Dollars per Gallon)." Source key EMM_EPMR_PTE_NUS_DPG. https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMM_EPMR_PTE_NUS_DPG&f=W.

[72] Adjusted from nominal to real 2024$ using the US Bureau of Labor Statistics Consumer Price Index for all Urban Consumers (BLS, CPI-U) for the U.S. Census Bureau's Mountain Region (Series ID CUUR0480SA0) for 2018-2024. Adjustments prior to 2018 made using annual changes in the BLS, CPI-U for all Urban Consumers, US city average (Series ID CUUR0000SA0).

[73] The difference in weekly averages over the course of a year will be less than the difference in daily prices, understating the true degree to which routine price changes exceed projected CTFP program costs, even when assuming a 100-percent PTR.

shape New Mexico's social, economic and cultural landscape. These economic impacts also provide necessary perspective in analyzing the CTFP's economic reasonableness.

Whereas the infrastructure to supply New Mexicans with fossil fuels like gasoline and diesel is largely in-place, new infrastructure is needed to allow for the provision of alternative fuels. This includes new fuel supply equipment (FSE) used for dispensing electricity, hydrogen, and CNG. It also includes greater sales of biofuels like BD, RD, and higher ethanol blends that could be accommodated at traditional gasoline and diesel pumps, and storage tanks.

New jobs may also be created through the development of infrastructure such as biofuel refineries, pipelines and storage facilities built in-state, as well as anaerobic digesters (ADs) for producing RNG. However, to remain consistent with conservative benefit-cost assumptions, this analysis does not include any direct jobs from these facilities. A separate report from Adelante Consulting examines likely projects and jobs spurred by the CTFP.

Instead, this analysis only estimates direct full-time employees (FTE) associated with building FSE, where one FTE equals one full-time job held by a worker for one year. These estimates are based on forecasts of FSE fuel consumption for publicly accessible FSE and number of plug-in vehicles for residential electric charging, and the FSE needed to provide such quantities.[74] FSE construction requires project managers and administrators, installation electricians, construction workers, and maintenance workers. This report uses estimates from the International Council on Clean Transportation (ICCT) on FTE needed to build, maintain, and operate FSE, and the wages for each profession.[75] This allows for estimates of both direct jobs and revenue for FSE, as well as induced jobs and revenue from salaries spent in local New Mexico economies. This analysis also estimates the indirect FTE and revenue from equipment, parts, and materials needed to build FSE.

5.2.2 Jobs Results

Under the CTFP-only scenario, construction is limited to 2,550 electricity DCFC stations and an equivalent number of hydrogen and CNG fueling stations. This estimate assumes that each fuel type will be available within every ZIP code for both light-duty and medium- and heavy-duty vehicles.

The "CTFP-Only Scenario" forecasts 248 cumulative FTE through 2030 and 581 cumulative FTE through 2040 attributed to installation of FSEs. The policy leads to an average of over 62 new jobs created each year from 2027-2030 and over 33 new jobs created each year for FSE building from 2030-2040, as shown in **Figure 11**. These jobs have a $77.2 million cumulative economic impact through 2030 ($53.8 million direct, $12.1 million indirect, and $11.3 million

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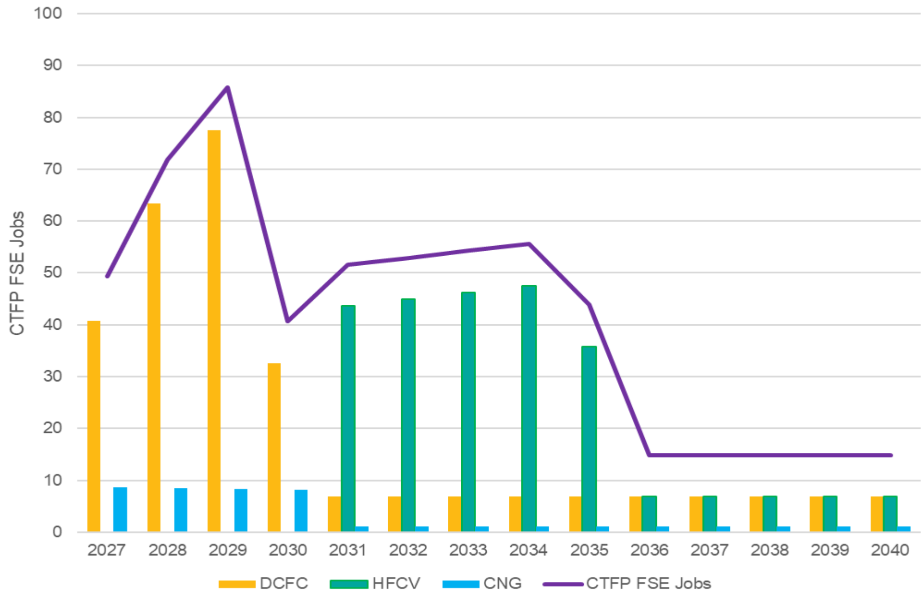
[74] Residential electric charging FSE employment is only considered in the NMVES + CTFP policy suite analysis.

[75] Bauer, Gordon, Chih-Wei Hsu, Mike Nicholas, and Nic Lutsey. "Charging Up America: Assessing the Growing Need for US Charging infrastructure through 2030." The International Council on Clean Transportation. July 2021. https://theicct.org/sites/default/files/publications/charging-up-america-jul2021.pdf.

induced) and a $161.9 million cumulative economic impact through 2040 ($111.4 million direct, $26.5 million indirect, and $24.0 million induced). These totals are greater than those shown in the "Direct Jobs from FSE" rows of **Table ES-2** through 2030 and **Table ES-1** through 2040 due to the use in these summary tables of a three-percent annual discounting factor.

Construction of FSE stations supported by CTFP FSE credits occurs through 2035, culminating in 2,550 installations each of DCFC, hydrogen and natural gas stations. Since CTFP provides incentives mainly for DCFC and equivalent charging stations, BRG staff limit job creation estimates to their construction and ongoing maintenance. After construction stops in 2035, employment continues but exclusively in electricity maintenance and repair through 2040.

Figure 11. FSE Direct FTE in CTFP-Only scenario, 2027-2040



The "NMVES + CTFP policy suite" scenario projects the creation of 225 cumulative FSE FTE through 2030 and 1,566 cumulative FSE FTE through 2040, as shown in **Figure 12**.[76] These jobs have a $81.4 million cumulative economic impact through 2030 ($58.1 million direct, $13.0 million indirect, and $10.3 million induced) and a $635.4 million cumulative economic impact through 2040 ($467.9 million direct, $96.1 million indirect, and $71.4 million induced).

Most of these FTE arise from electrical installation, followed by electrical maintenance and repair, and general construction labor. Non-residential Level 2 and DCFC stations—including hydrogen and natural gas—drive consistent demand for electrical maintenance and repair, providing a steady source of job creation. In addition, FSE installations generate employment in planning, administration, legal services, and design. Residential FSE installations primarily

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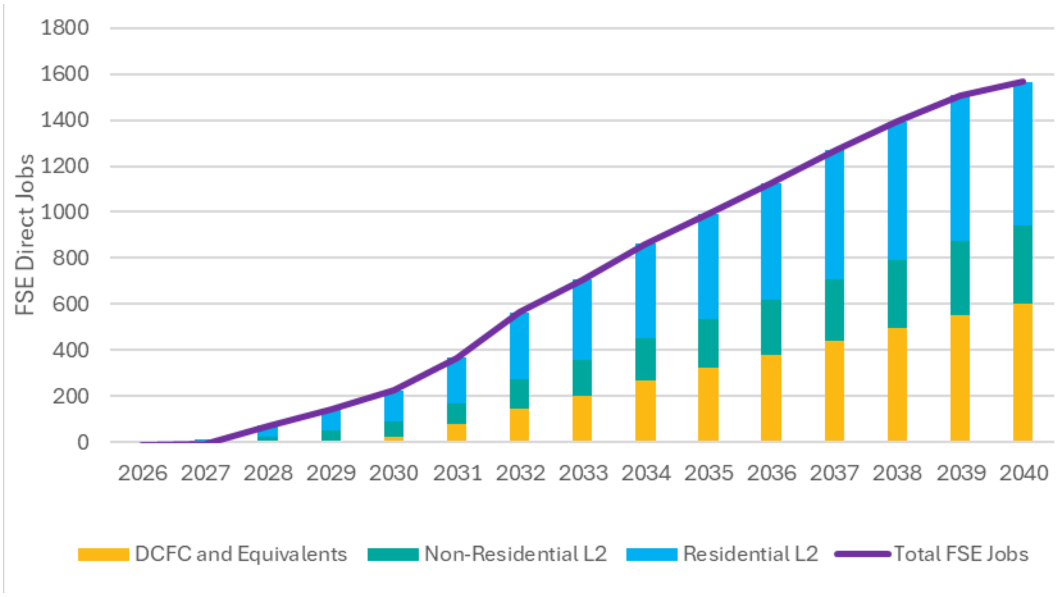
[76] FSE jobs are measured in FTE, which represent one full-time equivalent job held for one year.

create electrical installation jobs. Given limited maintenance needs and minimal planning or design, only multi-family housing generally requires such support.

Figure 12. FSE Direct Jobs FTE in NMVES + CTFP Policy Suite scenario



5.2.3 Jobs not Considered

To better understand what additional jobs might result from the CTFP beyond those counted in this report, Adelante Consulting conducted extensive research to identify 54 interested parties that currently produce, import, or dispense transportation fuels in New Mexico, or could potentially do so under the CTFP. Adelante interviewed 30 of the interested parties. In total, Adelante found that 16 interested parties have plans for 19 new projects that are directly related to or supported by the CTFP. These projects include facilities to produce credit-generating fuels like hydrogen, RNG, renewable methanol, ethanol, synthetic fuel including dimethyl ether (DME), and others. Adelante conservatively estimated that these projects could create 274 jobs over the next 15 years. Income from these jobs would reach \$20.2 million annually and \$212 million from the start of operations through 2040 (in \$US 2024). All of these jobs and resultant income would be additional to those created under the CTFP that are related to FSE infrastructure.[77]

Many interviewed, interested parties with projects noted plans to participate in the CTFP and underscored the importance to their projects that the program be enacted and remain in place. Some companies noted that they chose New Mexico as an investment location specifically in response to CTFP implementation.

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[77] Adelante Consulting Inc. “Clean Transportation Fuels Program: Overview of Anticipated Projects, Jobs, and Benefits.” August 6, 2025. DRAFT REPORT prepared for NMED. Publication pending.

The jobs figures and direct benefits considered in this BCA do not account for any of these estimated jobs from Adelante's interviews. Because such jobs are not directly linked with a CTFP provision like those associated with building out FSE supported with FSE credits, they are subject to some degree of uncertainty. As a result, this analysis does not consider them, even though it is almost certainly the case that at least some of them would come to fruition due to the CTFP, and some – like the Navitas advanced ethanol plant in Portales – have already taken concrete steps towards doing so.[78,79] This is to maintain consistency with this BCA's conservative approach.

5.3 Greenhouse Gas Emissions Reductions

The goal of the statute is to reduce New Mexico's overall transportation fuel CI by 20 percent below 2018 levels by 2030 and 30 percent below 2018 levels by 2040. The GHG emissions reductions from this program are its desired outcome. In addition, GHG emissions are a significant cause of injury to and interference with health, welfare, animal and plant life, property and the environment.

The BCA considers these effects using the social cost of carbon (SCC). The SCC measures the net near- and long-term modeled effects on global human well-being from each unit of GHG emissions (in CO_2e) and the commensurate impact of reducing such emissions. In developing the FCMM, BRG staff estimate an SCC value for this BCA using the \$190/$MTCO_2e$ 2020 value (in \$US 2020) that the US EPA uses for the social cost of carbon dioxide (SC-CO_2) with a two-percent discount rate.[80,81] **Appendix 9.1** provides additional detail on this method. This BCA finds that the CTFP-only scenario results in cumulative GHG emissions reductions of 10.5 $MMTCO_2e$ through 2035. Under the NMVES + CTFP scenario, this BCA finds cumulative GHG reductions of 22.4 $MMTCO_2e$ through 2040. **Appendix 9.2** further details these findings. Combining these GHG reductions with the SCC leads to cumulative GHG reduction benefits of \$2.44 billion (in \$US 2024) under the CTFP-only scenario.

GHG reductions under the CTFP-only and NMVES + CTFP scenarios occur even as projected statewide travel rises throughout the projection period, increasing by 20 percent from 28.3 billion VMT in 2024 to 35.2 billion VMT in 2040. This is due in part to the greater energy economy of vehicle-specific transportation fuels consumed under both the NMVES Baseline and CTFP policy projections. A shift towards fuels with a greater EER under the NMVES

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[78] This project, leveraging New Mexico Local Economic Development Act funding, will support the creation of 31 new jobs in New Mexico with an estimated annual payroll of \$1.9 million and a capital investment up to \$42 million.

[79] For more information, see New Mexico Economic Development Department. "Company reviving long-shuttered ethanol plant receives support through New Mexico EDD." Press Release. July 15, 2025. https://edd.newmexico.gov/wp-content/uploads/2025/07/Navitas-LEDA-pr.pdf.

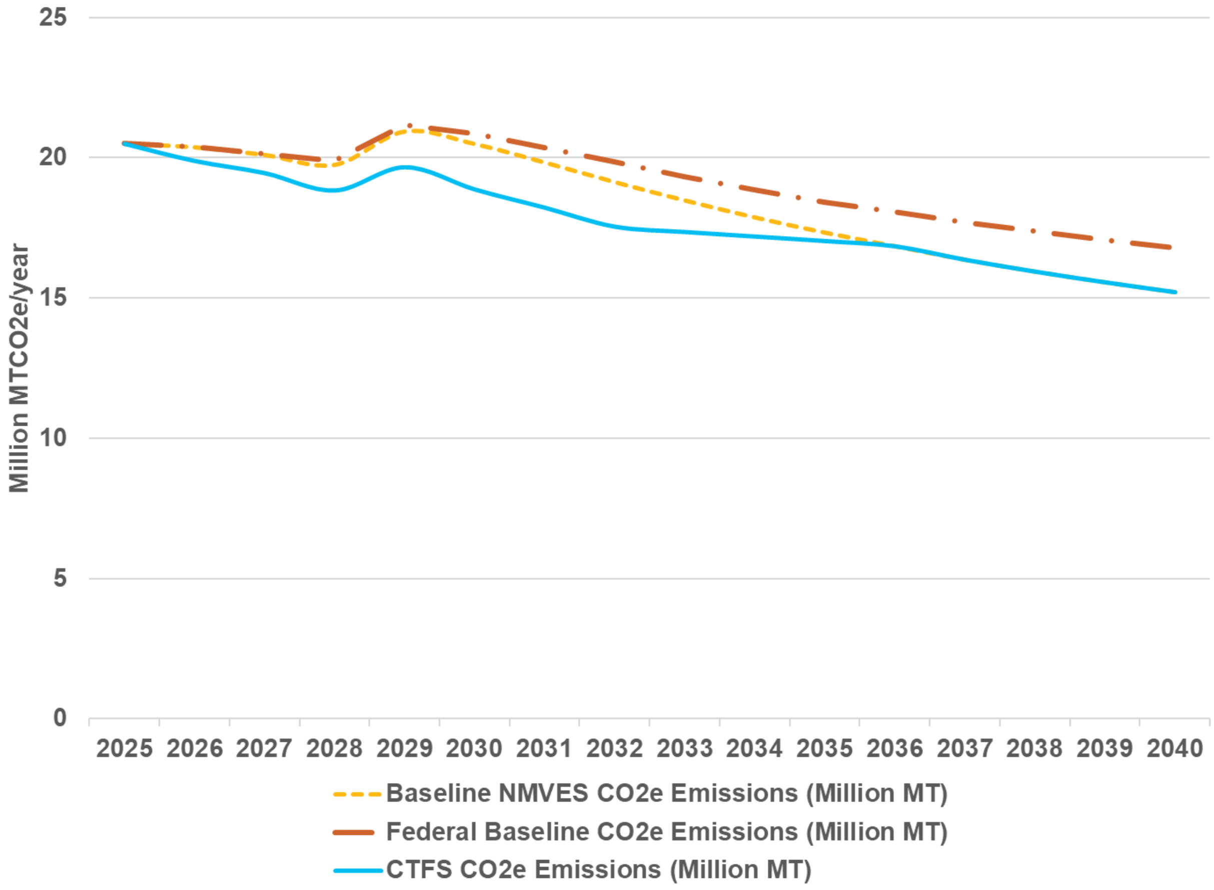
[80] US Environmental Protection Agency. "Supplementary Material for the Regulatory Impact Analysis for the Final Rulemaking, 'Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review.'" November 2023. Docket ID No. EPA-HQ-OAR-2021-0317. https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf. Table 4.1.1: Estimates of the Social Cost of Greenhouse Gases (SC-GHG), 2020-2080 (in 2020 dollars per metric ton). Page 101.

[81] Equals \$224.24/$MTCO_2e$ in \$US 2024 after adjusting for inflation using the U.S. Bureau of Economic Analysis Personal Consumption Expenditures Price Index (PCEPI). See **Footnote 61** for source.

Baseline fleet and VMT assumptions that apply to both policy projections leads to a lower amount of energy consumed per VMT. In addition, such vehicle-specific fuels generally have a lower CI per energy unit than the transportation fuels that they displace under the NMVES. This combination of less energy needed per VMT and fewer emissions per energy unit allow for lower total transportation sector GHG emissions in New Mexico through 2040 even as VMT rises. This is equally true for both the NMVES Baseline and CTFP policy projections.

This effect is then augmented under the CTFP policy projection from the greater uptake of lower-CI drop-in fuels like BBDs under the CTFP that further lower transportation sector GHG emissions in New Mexico under existing fleet and VMT projections. **Figure 13** below shows the annual emissions under the NMVES Baseline and CTFP policy projections, as well as the Federal Baseline across the projection period.[82]

Figure 13. Projected Emissions by Policy Projection



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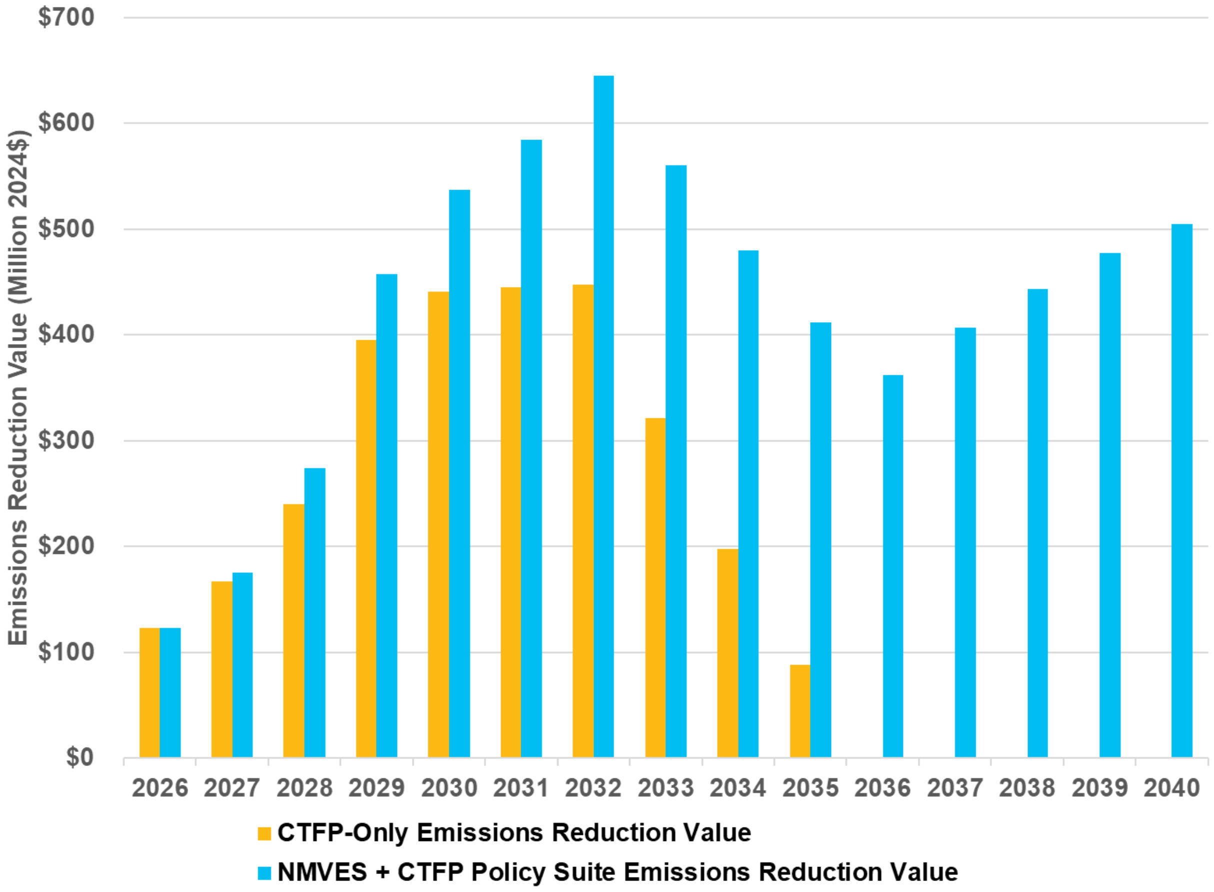
[82] Note that as with the volumetric figures above, this chart shows emissions associated with regulated fuels. The increase in 2029 is due to the inclusion of non-road (dyed) fuels under the regulation in this year.

This BCA finds that these GHG reductions result in a cumulative $1.23 billion benefit under the CTFP-only scenario and $1.41 billion under the NMVES + CTFP suite through 2030, and $2.44 billion and $5.02 billion benefit, respectively, through 2040. This further illustrates the degree to which the CTFP is in the public interest and its necessity for eliminating or otherwise taking action with respect to environmental degradation. **Figure 14** shows these monetized GHG benefits though the projection period. In both scenarios the emissions reductions occur in early years due to increased blending of low-carbon biofuels before the reduction values decline as the policy scenario with CTFP converges towards the NMVES-only policy scenario. The NMVES + CTFP scenario continues to have material emissions reduction value above the federal baseline due to a larger penetration of ZEVs even after 2035 under the NMVES Baseline policy projection for fleet and VMT that is considered under NMVES + CTFP scenario but not the CTFP-only scenario.

Figure 14. Projected Emissions Reduction Value by Policy Assumption



5.4 Health Impacts

Although the CTFP's specific goal is to reduce the CI of transportation in New Mexico, the changing of transportation fuel mix shown in Figure 4 also has implications for criteria air pollutants (CAP) like oxides of nitrogen (NOx), volatile organic compounds (VOCs), PM2.5, and PM10 emitted by the on-road combustion of transportation fuels in New Mexico. CAP emission volumes are an important determinant of the CTFP's health effects, since they are linked to the incidence of asthma and other respiratory illnesses. Current New Mexico Department of Health data indicate that one in 10 New Mexicans currently has asthma, and that one seventh will likely be diagnosed in their lifetime.[83] Understanding these health impacts is vital to understanding the character of any degree of injury or benefits to health from the CTFP and whether it is in the public interest.

ERG used fuel quantity results from the FCMM model for the CTFP-only and NMVES + CTFP scenarios, respectively, to project CAP reductions, resultant health cost savings, and the dollarized impacts by scenario, as discussed below. ERG provides additional detail for each in **NMED Exhibit ___**.

5.4.1 CAP Reductions

To calculate CAP emissions, ERG coupled New Mexico-specific emission factors (EFs) for both on-road vehicles and non-road equipment with changes to fuel quantity from the FCMM. The product of the EFs and transportation fuel quantities yields separate estimates for on-road and non-road reductions to criteria air pollutant (CAP) emissions. Criteria pollutants include ozone (O_3) precursors like nitrogen oxides (NO_x) and volatile organic compounds (VOCs), as well as particulate matter 2.5 micrometers or less in diameter ($PM_{2.5}$) and sulfur dioxide (SO_2). This provided ERG with projected future changes across each of these CAP categories.

ERG benchmarked its projected changes to CAP emissions to data from the most recent 2020 National Emissions Inventory (NEI), which EPA publishes every three years.[84] The NEI provided ERG with New Mexico county inputs (often called MOVES5 county databases or CDBs) drawing vehicle population from state registration data and VMT from US Department of Transportation (US DOT) Federal Highway Administration (FHWA) data compiled from state transportation departments. ERG coupled this CDB data with custom fuel penetrations by vehicle type over time from MOVES5.[85]

ERG developed all EFs for the "CTFP-only" and "NMVES + CTFP" scenarios using county-scale runs of EPA's latest Motor Vehicle Emission Simulator release (MOVES5) that ERG then aggregated over the entire state. The MOVES5 model incorporates recent emission research and test results as well as any current federal regulations, including EPA's Multipollutant and

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[83] New Mexico Department of Health. "Diagnosed Adult Asthma Prevalence: Current Prevalence by Year, Adults Aged 18+, New Mexico and U.S., 2005 to 2021." New Mexico Indicator Based Information System. https://ibis.doh.nm.gov/indicator/view/AsthmaPrevAdult.Current.Year.NM_US.html.

[84] US EPA, "2020 National Emissions Inventory (NEI) Data," Other Policies and Guidance, July 2023, https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data.

[85] US EPA OTAQ, "Population and Activity of Vehicles in MOVES5," November 2024. https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P101CUN7.pdf.

Phase 3 Rules mentioned above for LDVs and MHDVs, respectively. Although MOVES5 includes emissions data for the most prevalent fuels, the model does not have data for all the eligible fuels in New Mexico's program.

This fuel data gap pertains particularly to BBDs. These include both on-road and non-road use of RD and non-road use of BD. For BBDs, ERG applied published RD and BD fuel effects to base MOVES5 EFs. These fuel effects are important because under the "CTFP-only" scenario, the incremental impact of the CTFP on CAP emissions results entirely from increased blending of BBDs into the pool of diesel fuel produced, imported, or dispensed for use in New Mexico.

The CTFP has mixed effects on air quality for drop-in BBDs that generate credits under the CTFP and have a lower CI than fossil fuels like gasoline and diesel. For example, while research shows that RD has typically lower NO_x emissions per energy unit than fossil diesel, it also shows that BD leads to an increase.[86] These findings, however, depend upon the age of vehicles in New Mexico's vehicle fleet, as different fuel types burn differently in different engine types. In addition, the relative effect of drop-in BBDs that substitute for diesel will depend upon whether engines are equipped with diesel particulate filters (DPFs) that capture PM types emitted from the fossil diesel that BBDs replace.

Because RD, unlike BD, is chemically almost identical to fossil diesel, it is not constrained by a "blendwall" or maximum blending ratio when used in pipelines, storage tanks, or vehicle engines. As a result, RD volumes exceed BD volumes in all projection years for the CTFP-only scenario, resulting in net emission reductions and net health benefits. Emissions reductions under the CTFP-only scenario equal to 169 tons for NO_x, 200 tons for VOCs, and 144 tons for $PM_{2.5}$ through 2030, and 264 tons for NO_x, 286 tons for VOCs, and 214 tons for $PM_{2.5}$ through 2040. These are translated into health benefits using the US EPA's CO-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA).

The NMVES + CTFP scenario accounts for the inclusion of ZEVs that come onto the road through 2040 to account for the CTFP's role as a supporting policy for NMVES via the FSE and other infrastructure and incentives enabled with CTFP credit revenue streams. ZEV adoption fully eliminates all CAP emissions from the ICE vehicles that they replace. Accounting for the whole policy suite that CTFP helps support leads to emissions reductions equal to 501 tons for NO_x, 351 tons for VOCs, and 150 tons for $PM_{2.5}$ through 2030, and 3,252 tons for NO_x, 2,399 tons for VOCs, and 248 tons for $PM_{2.5}$ through 2040.

5.4.2 Health Cost Savings

By reducing CAP emissions, the CTFP removes precursors that exacerbate respiratory symptoms, thereby improving health outcomes. These outcomes include mitigating asthma onset and aggravation, cardiovascular disease, reduced lung function, and premature death.

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[86] Eastern Research Group, Inc. "Impact Assessment of Renewable and Biodiesel Blends on Emissions of Respirable Pollutants from Diesels in Portland." Report prepared for City of Portland. September 26, 2022. https://efiles.portlandoregon.gov/record/15463474.

Adverse health impacts are especially harmful to vulnerable populations including older adults, children, and pregnant individuals.[87]

Asthma is one of the most common chronic diseases in New Mexico, with an estimated 9.7 percent of adults afflicted by the disease. Asthma can require hospitalization, routine checkups, medications, and missed work days, which can be costly to the individual and New Mexico's economy. Criteria and precursor pollutant reductions can yield health benefits that are economically quantifiable in monetary (dollar) units. A study in California between 1993 and 2014 found that fine PM and NO_x emissions reductions could reduce the risk of asthma incidence in children by up to 20 percent.[88]

To quantify these health impacts, ERG input the CAP emissions changes discussed in **Subsection 5.4.1** into EPA's Co-Benefits Risk Assessment (COBRA) Health Impacts Screening and Mapping Tool to assess the CTFP's statewide health impacts.[89] COBRA uses peer-reviewed epidemiological literature to estimate how changes in outdoor air quality affect the incidence of various health outcomes.[90] ERG used COBRA outputs with inputted CAP emissions changes under the CTFP-only and NMVES + CTFP scenarios to determine health outcome changes from each for mortality, asthma, emergency room visits, hospital admittance, the onset of hay fever/rhinitis, nonfatal heart attacks, and lung cancer, and other impacts like restricted activity and work loss or school loss days.

Emission reductions under the CTFP-only and NMVES + CTFP scenarios reduce the incidence of respiratory and other conditions compared to the baseline, as shown in **Table 1**. Reductions for the CTFP-only scenario are from 2026-2035, after which the policy no longer "binds" as discussed in **Appendix B.7** and **Subsection 5.1.3**. Reductions for the NMVES + CTFP scenario are for 2026-2040 under the assumption that CTFP-supported infrastructure and other measures continue to support NMVES fleet and VMT impacts after 2035.

Table 1. Avoided Incidence for CTFP-only and NMVES + CTFP Scenarios (cumulative through 2040)

Health Outcome Category	Cumulative Avoided Incidence for CTFP-only Scenario	Cumulative Avoided Incidence for NMVES + CTFP Scenario
Total mortality (low estimate)	0.6	2.0
Total mortality (high estimate)	1.2	2.8
Total asthma symptoms	336.7	1,462.8
Total asthma onset	1.9	8.9

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[87] New Mexico Environmental Public Health Tracking, "NM-Tracking - Asthma," Asthma, May 2025, https://nmtracking.doh.nm.gov/health/breathing/Asthma.html.

[88] Erika Garcia et al., "Association of Changes in Air Quality With Incident Asthma in Children in California, 1993-2014," JAMA 321, no. 19 (May 21, 2019): 1906–15, https://doi.org/10.1001/jama.2019.5357.

[89] OAR US EPA, "CO-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA)," Collections and Lists, April 22, 2020, https://www.epa.gov/cobra.

[90] OAR US EPA, "User's Manual for the CO - Benefits Risk Assessment (COBRA) Screening Model," Data and Tools, June 26, 2017, https://www.epa.gov/cobra/users-manual-co-benefits-risk-assessment-cobra-screening-model.

Total emergency room visits	0.7	3.0
Total hospital admittance	0.4	0.6
Total onset*	12.6	59.4
Minor restricted activity days	353.0	466.4
Work loss days	59.9	79.0
School loss days	58.6	712.9

* Includes onset of hay fever/rhinitis, nonfatal heart attacks, and lung cancer.

5.4.3 Impacts by Scenario

presents the total cumulative monetized health benefits in New Mexico from reduced CAP pollution from the CTFP under the CTFP-only and NMVES + CTFP scenarios. The total monetized health benefits are presented as a lower- and upper-bound estimate because COBRA has a low and high estimate for mortality. The low estimate is based on an evaluation of $PM_{2.5}$ impacts on mortality by the Harvard T.H. Chan School of Public Health.[91] The high estimate represents $PM_{2.5}$ results based on a study from the Environmental Health Perspectives journal.[92] Presenting low-to-high monetary benefits range is EPA's standard practice.[93] All health outcomes other than those for $PM_{2.5}$ are as point estimates, but the total is a range because it includes the range of $PM_{2.5}$ values.

ERG ran COBRA separately for the on-road and off-road CTFP cases to identify health benefits separately but present them together in **Table 2**. Off-road fuel health benefits begin in 2029 due to the inclusion that year of dyed fuels under the CTFP pursuant to Paragraph (2) of Subsection (A) of the Revised Proposed New Rule 20.2.92.102 NMAC.

Table 2. Cumulative statewide health benefits from reduced pollutants by scenario (million 2024 $US)

Scenario	Timeframe	Cumulative Net Benefits (lower-upper bound)
CTFP-only	2026-2035	$10.9-$20.7
CTFP + NMVES	2026-2040	$35.9-$49.0

Note: Includes health benefits from both on-road and off-road fuel use beginning in 2029.

For the CTFP-only scenario (2026-2035), cumulative benefits range from an estimated $10.9 to $20.7 million (an average of $15.8 million), whereas cumulative benefits of the combined NMVES + CTFP scenario (2026-2040) range from $35.9 to $49.0 million (average of $42.4 million). For both scenarios, these emissions reductions benefits result from the emissions reductions discussed in **Subsection 5.4.1** multiplied by the monetary value of the health effects for each discussed in **Subsection 5.4.2**. Health benefits are significantly higher under

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[91] X. Wu et al., "Evaluating the Impact of Long-Term Exposure to Fine Particulate Matter on Mortality among the Elderly," Science Advances 6, no. 29 (July 2020): eaba5692, https://doi.org/10.1126/sciadv.aba5692.

[92] C. Arden Pope et al., "Mortality Risk and Fine Particulate Air Pollution in a Large, Representative Cohort of U.S. Adults," Environmental Health Perspectives 127, no. 7 (July 2019): 77007, https://doi.org/10.1289/EHP4438.

[93] US EPA, "COBRA Questions and Answers." https://www.epa.gov/cobra/cobra-questions-and-answers.

the NMVES + CTFP scenario than under the CTFP-only scenario. This results from the significantly greater emissions reductions under NMVES + CTFP discussed in **Subsection 5.4.1**, as it counts the use of ZEVs that have no tailpipe emissions.

The induced effects from household spending due to these avoided health costs are included in the I-O analysis discussed under **Jobs and Economic Impacts** and are added to the direct health effects to calculate the Health Effects row total in Table ES-1.

6 Conclusions

The CTFP establishes, regulates, and enforces annual CI reductions under the CTFS for transportation fuel produced, imported, or dispensed for use in New Mexico, as required in statute. It does so under a collaborative, outcomes-based policy that requires regulated parties to generate, purchase, and retire CTFP credits to offset deficits each year. Similar policies in other states have demonstrated that such market mechanisms can form part of a policy suite that leverages competition, innovation, and investment in the clean fuel technologies needed to tackle the challenge of reducing transportation sector GHG emissions in an efficient and effective manner. Even under conservative (low-benefit / high-cost) assumptions, this BCA projects that the CTFP will be no exception, generating GHG reductions, improving air quality, and creating jobs in New Mexico to generate value that far exceeds program costs.

The compliance obligation that the CTFP creates for regulated parties focuses on the full lifecycle of "well-to-wheel" transportation sector GHG emissions. The CTFP's regulatory requirements ensure that program credits come from real and verifiable reductions to the CI of New Mexico's transportation fuel mix, and that regulated parties must retire enough credits to satisfy their annual compliance obligation. This ensures that the average CI of transportation fuel produced, imported, or dispensed for use in New Mexico matches annual CTFS targets for each regulated party and the entire state. This BCA finds that these CI reductions lead to commensurate GHG reductions totaling 10.5 $MMTCO_2e$ through 2035 when considering the CTFP as a standalone policy ("CTFP-only") and 22.4 $MMTCO_2e$ through 2040 when considering CTFP as a complimentary, supporting policy with NMVES ("NMVES + CTFP").[94]

GHG reductions under both the CTFP-only and NMVES + CTFP scenarios occur even as projected statewide travel rises throughout the projection period, increasing by over 20 percent from 28.3 billion VMT in 2024 to 35.2 billion VMT in 2040. In large part this is because the CTFP serves as one-third of the three-legged stool of fleet, VMT, and fuels. When a greater share of all three shifts towards travel in vehicles that more efficiently consume transportation fuels with lower CIs, this allows for transportation sector emissions reductions even as travel rises. This BCA finds that these GHG reductions result in a cumulative $2.44 billion benefit considering the CTFP as an individual policy and $5.02 billion when considering

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[94] The CTFP remains an effective state policy through 2040 but become "non-binding" beginning in 2036 due to credit market outcomes, as discussed in Section 5.1.3.

the CTFP both on its own and as a supporting policy for NMVES. The CTFP makes a particularly strong contribution to reducing GHG emissions in early years, providing tangible near-term benefits as the state's ZEV adoption rates are in the earlier stages of their ramp-up. As the **Executive Summary** notes, these GHG emission benefits far outweigh the CTFP's projected net costs of $0.78 billion from their impact on statewide fuel markets (-$0.96 billion), jobs and macroeconomic activity ($0.16 billion), and health benefits from CAP emissions reductions ($0.02 billion). Incorporating these statewide effects leads to a slightly lower net benefit of $1.65 billion under CTFP-only and $1.84 billion under CTFP + NMVES.

However, there are numerous ways in which this BCA's conservative assumptions err on the side of representing lower CTFP benefits and higher CTFP costs when there is substantial uncertainty. These cause the results from this analysis to understate program benefits and to overstate program costs compared to those that will likely occur when the CTFP is put into practice in New Mexico. This is the case across all three state-specific factors (fuel markets, jobs/macroeconomics, and CAP/health benefits). It impacts both their direct estimated costs and benefits, as well as their indirect and induced second-order macroeconomic effects as modeled by ERG in an input-output (I-O) macroeconomic as discussed in **Appendix D**.

For fuel markets, the FCMM that BRG staff used for this BCA intentionally does not consider numerous credit-generating options that could loosen the supply-demand balance for CTFP credits and reduce the fuel market costs. As discussed in **Appendix B** and summarized in **Appendix 9**, the CTFP will enable regulated parties to leverage opportunities to provide new and lower-CI transportation fuels, processes, and feedstocks, and capitalize on opportunities to reduce the CI of existing transportation fuels, processes, and feedstocks. Although the uptake of each of these options is subject to uncertainty, excluding all of them likely means that the FCMM underestimates opportunities that regulated parties can realize to reduce the CTFP's cost in practice.

Through this mechanism, the CTFP impacts fuel markets by requiring regulated parties holding a balance of deficits to purchase credits to offset them and satisfy their CTFP compliance obligation. In turn, this affects the relative economics of credit- and deficit-generating transportation fuels that regulated parties produce, import, or dispense for use in New Mexico. Because there is an "incremental cost" to bringing some credit-generating fuels into the state under the CTFP, the program's fuel market effects have a cost on-balance of $0.96 billion. **Section 5.1** discusses ways in which BRG staff incorporated intentionally conservative credit price assumptions in the FCMM that increase this BCA's projected fuel market costs.

There is uncertainty about the degree to which such costs are reflected in retail fuel prices. To address this, **Section 5.1** discusses these costs under various assumed pass-through rates (PTRs), with a PTR analysis providing additional insight into this matter in **NMED Exhibit ___**. These costs do not vary by assumed PTR because this BCA uses a general welfare approach that does not distinguish whether regulated parties bear the full fuel market cost of the program or pass some portion of it through their supply chain. Any discussion of the retail effects of such costs should come with an awareness that these are not only the product of conservative assumptions but that their effect on retail markets is subject to uncertainty. In analyzing the CTFP's statewide effects, it is important to note that the policy directly creates jobs in New Mexico. This BCA conservatively estimates that the CTFP's job creation in New Mexico only comes from FSE installation directly supported by program FSE credits. Restricting benefits to only such jobs that are directly created by the letter of the program has a conservative benefit of only $0.16 billion. However, additional work by Adelante Consulting shown in **NMED Exhibit __** shows the potential for additional employment benefits associated with producing, importing, or dispensing clean transportation fuels for use in New Mexico. Because such additional jobs are subject to uncertainty, this BCA excludes them altogether from its estimates. In not including any benefits that are not directly attributable to the Revised Proposed New Rule 20.2.92 NMAC, this BCA almost certainly understates the CTFP's job market benefits, which may prove far more significant than those in .

The health benefits from CAP emissions reductions that result from the CTFP may also be understated under the "CTFP-only" scenario. This is not only because these health benefits do not account for the CTFP's supporting rule for the NMVES. It is also because BRG staff did not assume in developing the FCMM any change in underlying VMT from ZEV vehicles that result from the CTFP. The CTFP provides the incentives needed to build out the charging and fueling infrastructure that makes ZEV ownership and use viable. These incentives come in the form of credits for the buildout of fuel supply equipment (FSE) needed to support using ZEVs for longer trips and generally increasing accessibility to ZEV charging, paired with credits for the continued supply of fuel from FSE to ensure the longevity and reliability of this infrastructure. In addition, the CTFP requires the reinvestment of credit from residential EV charging into distribution, grid modernization, infrastructure and other projects that support transportation decarbonization, with at least fifty percent of such revenues supporting low-income and underserved communities. This means that as a policy, the CTFP is likely to impact CAP emissions and resultant health outcomes by supporting NMVES as captured in the NMVES + CTFP scenario. It also means that the CTFP is likely to lead to at least some increase in ZEV use above those in the underlying NMVES baseline scenario that this BCA does not consider, in addition to helping to economically support NMVES compliance in the state.

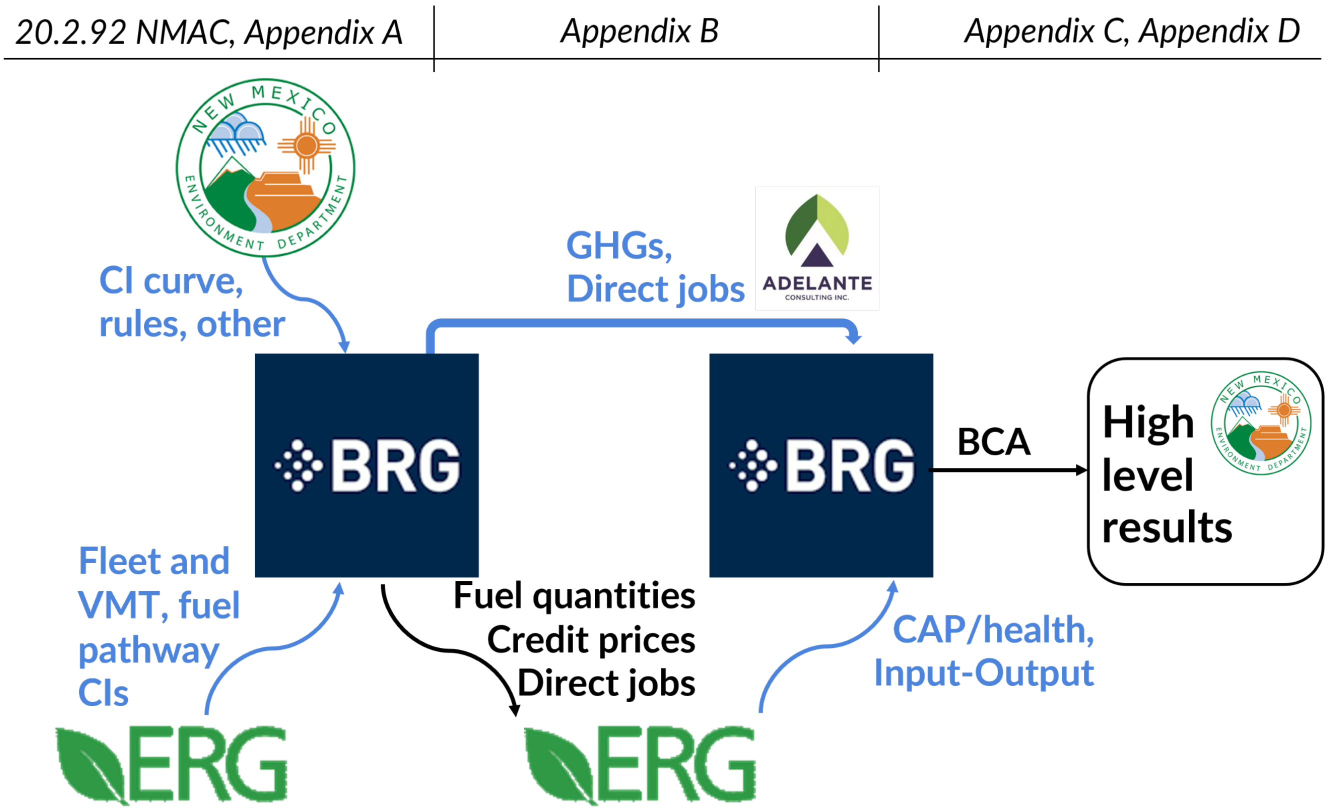
A similar logic applies to the results for GHG emissions, jobs, and fuel market impacts. Were the CTFP in practice to shift New Mexico's vehicle fleet beyond what is projected in the NMVES, its impact in each of these areas would be greater than this BCA's findings stated here.

Although this analysis must make conservative assumptions regarding benefits and costs when there is substantial uncertainty, it nonetheless finds that the CTFP leads to significant overall net benefits compared to net costs statewide. On a statewide level, there is a high chance that benefits can exceed costs and costs can fall below those assumed in this analysis. This is an important consideration in interpreting BCA's results, which provide a rigorous quantitative analysis of the program with the aim of most thoroughly outlining the factors that the EIB must consider under NMSA 1978, Section 74-1-9.

Appendices

Each of the appendices in this section details an aspect of the CTFP that is important to this BCA's projected results. The assumptions and methods that this section describes each play an important role in shaping this analysis and its projected outcomes. **Appendix A** discusses ERG's methods for projecting New Mexico's statewide vehicle fleet and VMT by vehicle class and powertrain type. BRG staff post-processed the fleet and VMT output from ERG under the Federal and NMVES Baseline policy projections. These projections, along with the CTFP carbon intensity (CI) standard and proposed CTFP rule provisions that included alternative fuel CIs served as critical inputs to the Fuel and Credit Market Model ("the FCMM") that BRG staff developed to estimate transportation fuel quantities, credit market outcomes, and GHG impacts, as detailed in **Appendix B**. BRG staff also used the FCMM to estimate direct jobs from installing FSE, as detailed in **Appendix D.2**. ERG used the fuel quantities that BRG staff produced with the FCMM to project criteria air pollutant (CAP) changes and resultant health effects, as detailed in **Appendix C** and shown in **Figure App-1**.

Figure App-1. Process and entity flow diagram for the Benefits-Cost Analysis



The effects discussed above are all "direct" or first-order effects. To fully gauge the CTFP's effect as a standalone policy and as part of a policy suite with the NMVES, it was also important to incorporate second-order “indirect” and “induced” effects. These could include, for example, a rise in economic activity in New Mexico as a result of a worker spending in the local economy money that they have earned from a job created under the CTFP. ERG used macroeconomic (Input-Output or “I-O”) modeling to determine the second-order indirect and induced effects from indirect jobs, health, and fuel market impacts under the CTFP.[95] Lastly, BRG staff combined the calculated direct, indirect, and induced effects into final values for . As discussed in **Section 4**, this BCA used differences between the CTFP policy projection and the NMVES Baseline policy projection to estimate impacts under the “CTFP-only” scenario and between the CTFP policy projection and the Federal Baseline policy projection to estimate impacts under the “NMVES + CTFP” scenario.

As **Figure App-1** shows, Adelante Consulting also provided additional likely employment effects from opportunities that are not directly attributed to FSE credit revenues under the Revised Proposed New Rule 20.2.92.302-304 NMAC. **Section 5.2.3** discusses these estimates in greater detail. Because these estimates were not explicitly linked to CTFP provisions, they were subject to uncertainty that prevented them from being included in Section 5.2.2. It is likely that many of the job-creating projects that Adelante’s research has identified will create direct jobs under the CTFP that this BCA does not incorporate. In fact, it is possible that actual jobs created under the CTFP will significantly exceed this BCA’s estimates.

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[95] This BCA does not attribute any additional second-order effects to GHG emissions reductions. As discussed in **Section 5.3** and **Appendix B.9.1**, this BCA uses the Social Cost of Carbon (SCC) to monetize the effect of GHG emissions and the net benefits of reducing them. The SCC is inclusive of indirect and induced effects.

A Fleet and Vehicle Miles Traveled (VMT) Modeling

This appendix discusses the development of Vehicle Miles Travelled (VMT) and vehicle fleet modeling projections that BRG staff developed for the FCMM, including the methodology for projecting this data for both the NMVES and Federal Baseline scenarios.

BRG staff incorporated in the FCMM underlying projections from ERG for both VMT and vehicle population with output from Version 5 of the US Environmental Protection Agency (EPA) Motor Vehicle Emission Simulator (MOVES5) model. MOVES5 is a publicly available, peer-reviewed deterministic model that estimates air pollution from vehicles and non-road equipment.[96] To tailor this rule to New Mexico, ERG utilized MOVES5 county databases for each of the state's 33 counties from the latest US EPA National Emissions Inventory (NEI) data. This rulemaking analysis adopted VMT and population growth factors developed by the US Department of Transportation - Federal Highway Administration (US FHWA).[97] With these county inputs, MOVES5 produces detailed projections that incorporate information on New Mexico's vehicle turnover rate and new sales by vehicle fuel type. This information feeds into estimates of vehicle populations and miles traveled for vehicles by age, class, and fuel type.[98] When appropriate, BRG staff post-processed ERG's MOVES5 output to benchmark results in the FCMM to more recent historical observations in New Mexico.

ERG's MOVES5 output provided BRG staff with results to post-process into aggregate vehicle populations and VMT statewide across nine vehicle regulatory classes for the FCMM:

- Motorcycles;
- Light-duty (Class 1-2a) passenger vehicles (LDV);
- Light-duty (Class 1-2a) passenger trucks (LDT);
- Light heavy-duty (Class 2b-3) trucks;
- Light heavy-duty (Class 4-5) trucks;
- Medium heavy-duty (Class 6-7) trucks (MHD);
- Heavy heavy-duty (Class 8) trucks (HHD);
- Urban buses; and
- Gliders.

For the FCMM, BRG staff examined MOVES5 runs that ERG produced under two scenarios:

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[96] US EPA. "MOVES5 Introduction & Overview." Webinar, December 18, 2024. https://www.epa.gov/system/files/documents/2024-12/moves5-webinar-2024-12-18.pdf.
[97] US FHWA. "2024 FHWA Forecasts of Vehicle Miles Traveled (VMT)." https://www.fhwa.dot.gov/policyinformation/tables/vmt/vmt_forecast_sum.cfm.
[98] US EPA. "MOVES5 Introduction & Overview." Webinar, December 18, 2024. https://www.epa.gov/system/files/documents/2024-12/moves5-webinar-2024-12-18.pdf.

1. The latest model defaults under MOVES5, referred to as the federal baseline, in which new sales must only meet criteria established under the US EPA Light- and Medium-Duty Multi-Pollutant Rule and Heavy-Duty Greenhouse Gas Emissions-Phase 3 Rule;[99,100] and

2. A scenario that additionally accounts for New Mexico's New Motor Vehicle Emission Standards (NMVES) passed in late 2023 under 20.2.91 NMAC, as permitted under Section 177 of the federal Clean Air Act.[101,102]

In the NMVES scenario, the percentage of new sales that will be comprised of zero-emission vehicles (ZEVs) will equal annual targets for original equipment manufacturers of vehicles brought into the state for sale under NMVES. This method largely follows the assumptions in the 2023 Benefit-Cost Analysis forecast for New Mexico's vehicle fleet produced as an exhibit for the NMVES rulemaking.[103] Starting in model year (MY) 2027, the model assumes a composition of new motor vehicle sales in the state that matches the ZEV adoption requirement of NMVES. After MY 2032 - the final light-duty delivery requirement of NMVES – the forecast includes the assumption that new ZEV sales remain flat at 82 percent.

Table A-1 shows the assumed fractions of the ICEV and ZEV vehicle fleet that were PHEVs and FCEVs, respectively. The medium- and heavy-duty FCEV fractions are pulled directly from EPA's Phase 3 Rule while the light-duty PHEV and FCEV fractions were previously derived for New Mexico's NMVES based on data from California's latest clean car program. BRG staff assumed that the VMT for these vehicle types were proportional to their shares of these fleets for modeling in the FCMM.

Table A-1. Assumed fractions of plug-in hybrid electric vehicles (PHEVs) and fuel-cell electric vehicles (FCEVs) in MOVES5 modeling, 2020-2050

	PHEV fraction (of gasoline ICEVs)		FCEV fraction (of ZEVs)		
Year	***LDV***	***LDT***	***LDV***	***MHD***	***HHD***
2020	0.031	0.012	0.001	0	0
2025	0.031	0.012	0.026	0	0

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[99] US Environmental Protection Agency. "Final Rule: Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3." Overviews and Factsheets. https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-greenhouse-gas-emissions-standards-heavy-duty.

[100] US Environmental Protection Agency. "Final Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles." Other Policies and Guidance. https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-multi-pollutant-emissions-standards-model.

[101] Office of Law Revision Counsel. New Motor Vehicle Emission Standards in Nonattainment Areas. US Code, laws in effect on May 28, 2025. Vol. 42 USC §7507. https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title42-section7507&num=0&edition=prelim.

[102] New Mexico State Records Center and Archives. "NEW MOTOR VEHICLE EMISSION STANDARDS." New Mexico Administrative Code. Title 20, Chapter 2, Part 91. December 31, 2023. https://www.srca.nm.gov/parts/title20/20.002.0091.html.

[103] See **Footnote 31**.

2030	0.043	0.034	0.027	0.035	0.160
2035	0.052	0.053	0.027	0.035	0.160
2040	0.057	0.067	0.027	0.035	0.160
2050	0.057	0.067	0.027	0.035	0.160

A.1 Vehicle Population Projections

Under both the default and NMVES scenarios, BRG staff incorporated historical BEV and PHEV sales data into the FCMM for each population projection prior to 2024. BRG staff benchmarked these projections in the FCMM to the existing New Mexico BEV and PHEV fleets using registration data supplied from the New Mexico Motor Vehicle Division for BEVs and PHEVs supplied through the Atlas Public Policy EValuateNM tool (EValuateNM).[104]

For light duty cars and trucks, BRG staff incorporated into the FCMM historical data on BEV and PHEV populations through 2024. BRG staff applied the BEV and PHEV population growth rate between 2023 and 2024 BEV and PHEV populations in 2025 and 2026. BRG staff then estimated the number of light-duty cars and trucks that are BEVs and PHEVs for the FCMM as a product of the total overall light-duty car and truck populations reported in EValuateNM and their respectively assigned annual BEV and PHEV percentages under MOVES5.

BRG staff limited the absolute number of BEV and PHEV sales in the FCMM by assuming that New Mexico drivers slowly turn the vehicle population from ICE vehicles to ZEVs. This assumption comes from the relatively greater observed time between vehicle purchase and retirement in New Mexico compared to the US average.[105]

For both scenarios beginning in 2027, BRG staff use the FCMM to forecast the number of BEVs that are light duty cars and light duty trucks, respectively, as the sum of:

1) The minimum of either the prior year’s light duty BEVs plus new BEV additions in a vehicle class in MOVES5, less average scrappage of BEVs over the subsequent five- or ten-year period, or the number of BEVs in the MOVES5 forecast;[106] and
2) Any light-duty hydrogen present in the MOVES5 forecast for the vehicle class.

For both scenarios beginning in 2027, BRG staff use the FCMM to forecast the number of PHEVs that are light duty cars and light duty trucks, respectively, as the minimum of:

1) The prior year’s light-duty PHEVs in a vehicle class, plus the greater of the MOVES5 PHEV sales forecast or the 2024 new PHEV registrations in EValuateNM; or

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[104] Atlas Public Policy 2023. “EValuateNM.” Atlas Public Policy (blog). October 13, 2023. https://atlaspolicy.com/evaluatenm/. Queried as of January 3, 2025

[105] Koupal, John, Timothy DeFries, Cindy Palacios, Allison DenBleyker, and Heather Perez. 2015. “Improvement of Default Local MOVES Input Data for the 2011 National Emissions Inventory.” In https://trid.trb.org/View/1339047.

[106] Until the next interpolated MOVES run

2) The MOVES5 PHEV forecast for that year.

This post-processing methodology ensures that the NMVES forecast and federal baseline forecast remain consistent with these policies, but with conservative assumptions about the growth rate of BEVs and PHEVs prior to their implementation. This post-processing results in a lower absolute number of BEVs and PHEVs than the initial MOVES5 output for all light duty vehicles.[107] This is because for both scenarios, BRG staff incorporated MOVES5 BEV and PHEV scrappage rate assumptions in the FCMM. However, it reduces the pre-2027 BEV additions, leading to fewer absolute BEV additions each year when applying MOVES5 growth rates. The result is fewer net light-duty BEV and PHEV additions in each future year.

Under both scenarios, BRG staff reclassified all light-duty hydrogen fuel cell vehicles (HFCVs) as BEVs in the FCMM. BRG staff assume in the FCMM that hydrogen is a fuel for medium and heavy-duty vehicles only. BRG staff adjusted the population of light-duty internal combustion engine (ICE) vehicles in the FCMM to offset the adjustments to BEVs, PHEVs, and HFCVs in each vehicle class such that overall vehicle class populations match those from the original MOVES5 runs.

For Class 2b-8 vehicles (light/heavy duty to heavy duty vehicles), BRG staff used EValuateNM data for ZEV vehicle populations from 2020-2024 in the FCMM. To these totals, the model applies projections for other drivetrain types based upon output from MOVES5 through 2030. BRG staff programmed the FCMM to interpolate ZEVs for Class 2b-8 vehicles using a mix of sales targets from EValuateNM sales data for 2025 and 2026 alongside NMVES sales targets (by MY) for 2027-2030. As was done for light-duty vehicles, BRG staff adjusts the population of ICE vehicles in the FCMM to offset the adjustments to BEVs, PHEVs, and HFCVs in each vehicle class such that overall vehicle class populations match those from the MOVES5 output. All projections for these vehicle classes from 2030 onwards are derived directly from MOVES5. The interpolation changes in both scenarios have the effect of slowing the growth of Class 2b-8 ZEVs in both scenarios until 2030.

Figure A-1 and **Figure A-2** show the vehicle populations that BRG staff assumed for the NMVES (and NMVES + CTFP) and the federal baseline policy assumption in the FCMM for light-duty and medium/heavy duty vehicles, respectively.

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[107] Note that the model reclassifies light-duty hydrogen fuel cell vehicles (HFCVs) as BEVs.

Figure A-1. Light-Duty Vehicle Population By Year and Policy Assumption in the FCMM

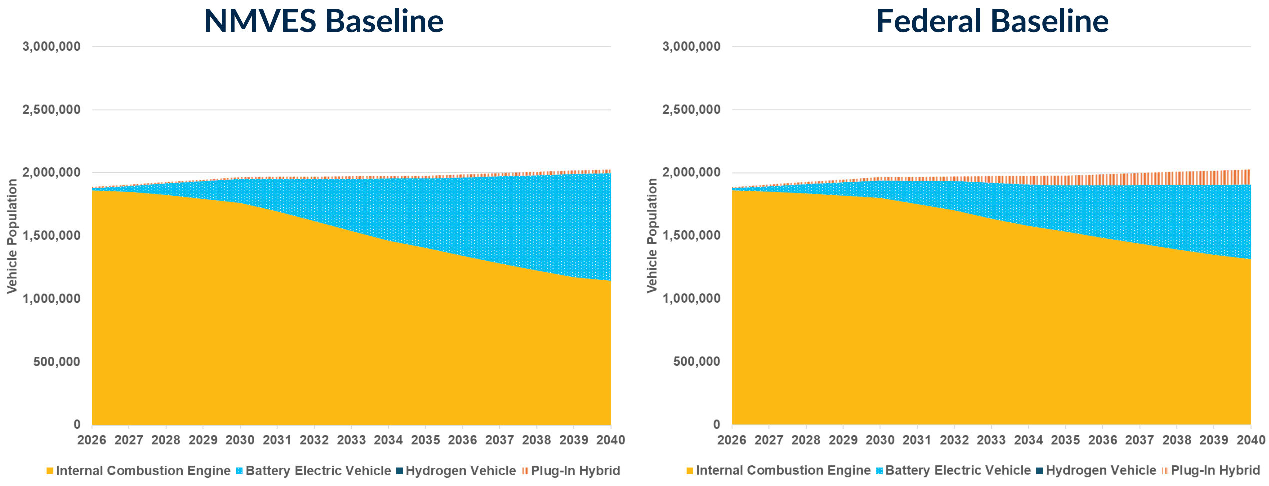
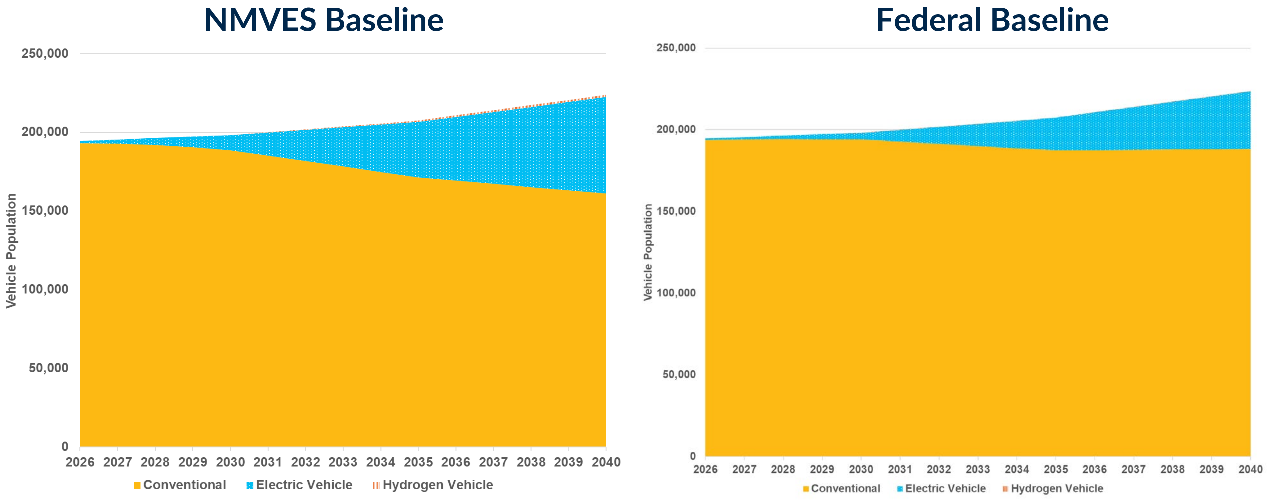


Figure A-2. Medium/Heavy Duty Vehicle Population By Year and Policy Assumption in the FCMM



A.2 Vehicle Miles Travelled Projections

For the FCMM, BRG staff used MOVES5 runs to forecast for VMT for each vehicle class. To ensure consistency across fuel types, BRG staff used the average VMT per vehicle for each individual vehicle class as a single value that applies across vehicle drivetrain types within that class. One exception, however, is that BRG staff adjusted VMT per vehicle for light duty cars and trucks in the FCMM to account for a lower VMT per vehicle observed in survey data for BEVs than for ICE vehicles and a higher VMT per vehicle for PHEVs than for ICE vehicles, while preserving the overall VMT per vehicle from MOVES5 output. [108] BRG staff conservatively applied this adjustment throughout the forecast period in the FCMM. As such, the FCMM did not consider the prospect that BEV VMT per vehicle may rise relative to other drivetrain as the disproportionately urban (rather than rural) concentration of current EV consumers narrows over time and as greater BEV range means that all BEV owners increasingly use these vehicles for longer trips.

MOVES5 output for 2020 subsumes lower VMT per vehicle during the early period of the COVID-19 pandemic. This caused interpolations done with MOVES5 VMT output from 2020 to 2030 to result in lower VMT in the earlier part of the 2020s than took place during the post-COVID recovery and high, ahistorical linear rate of increase across all years to reach 2030 projections. To correct for this, BRG staff had the FCMM benchmark VMT in 2022 to Bureau of Transportation Statistics actual observations.[109] BRG staff then applied a diminishing factor from 2022 to 2029 in the FCMM to match the same 2030 VMT results as under MOVES5 while better matching the timing of the post-COVID VMT recovery to actual observations from the early 2020s.

BRG staff used the FCMM to calculate Federal Baseline VMT using the same VMT per vehicle as NMVES forecasts, adjusted proportionately so that VMT per vehicle class are equivalent to the NMVES scenario.

B Fuel and Credit Quantities and Market Modeling

B.1 Key modelling relationships

The FCMM analyzes a variety of critical relationships in the New Mexico transportation sector that are regulated under the CTFP and NMVES. In turn these relationships determine how CTFP and NMVES reshape transportation fuel and energy in the state.

B.1.1 Fleet and Vehicle Miles Travelled (VMT)

BRG staff integrated assumptions on VMT and statewide vehicle population (“fleet”) from **Appendix A** as FCMM inputs. Fuel economy and non-road fuel consumption forecasts come from MOVES5. Population projections also come from MOVES5, with benchmarking from the US Department of Transportation’s Federal Highway Administration (FHWA).

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[108] US DOE Vehicle Technologies Office. “Fact of the Week # 1337.” April 8, 2024. https://www.energy.gov/eere/vehicles/articles/fotw-1337-april-8-2024-diesel-vehicles-traveled-more-miles-other-household.

[109] https://www.bts.gov/browse-statistical-products-and-data/state-transportation-statistics/state-highway-travel

B.1.2 Fuel Economy

To translate VMT into fuel quantities, BRG staff incorporate MOVES5 fuel economy data by vehicle class. BRG staff supplemented this data with FHWA fuel economy data as appropriate.

B.1.3 Energy Density

BRG staff incorporated energy density from Table 7 of Subsection (G) of the Revised Proposed New Rule 20.2.92.701 NMAC for each of the transportation fuels modeled. These values denote the amount of energy content that each transportation fuel contains per unit of fuel quantity. BRG staff applied these energy densities to the fuel quantities calculated using the fuel economies in **Subsection B.1.2** and the VMT calculated in Section A. Doing so yielded energy quantities consumed by transportation fuel in energy units.

B.1.4 Energy Economy Ratio (EER)

The Energy Economy Ratio (EER) is a factor that represents the efficiency with which each transportation fuel converts energy into distance relative to gasoline and diesel used in comparable ICE vehicle drivetrains. Alternative transportation fuels with an EER greater than one can power the drivetrain of a vehicle to a greater degree than the same energy quantity of traditional gasoline and diesel used in comparable ICE vehicle. For example, an EER of two means that an alternative transportation fuel can achieve double the output in its drivetrain as an equal energy unit of gasoline and diesel used in comparable ICE vehicle. This, in turn, means that it would require twice as much energy from gasoline or diesel in a comparable ICE vehicle to do the same amount of work.

As a result, to accurately compare the CI of an alternative fuel to the CTFS for gasoline and diesel in **Subsection B.1.5**, it is necessary to divide the CTFS by the alternative fuel's EER. Doing so produces an "EER-adjusted" CI comparison that more fully and accurately accounts for the GHG impact an alternative fuel energy unit. Similarly, it is necessary to multiply the energy consumption of a fuel with an EER different than 1 by the EER to make comparable energy consumptions that accurately account for the VMT enabled by a fuel's consumption. To make this comparison, BRG staff had the FCMM take the EER adjustment factors from the Table 8 of Subsection (H) of the Revised Proposed New Rule 20.2.92.701 NMAC.

B.1.5 Carbon Intensity (CI)

Each transportation fuel's final credit or deficit generation by year will depend upon its energy quantity as adjusted for energy density in **Subsection B.1.3** and EER in **Subsection B.1.4**, as well as its carbon intensity (CI) relative to each year's CTFS. The CI comparison involves the calculation of each fuel's "CI delta." The CI delta measures the degree to which each credit-generating transportation fuel's CI falls below the CTFS or each deficit-generating transportation fuel's CI exceeds the CTFS.

BRG staff used CI values for each transportation fuel from Tables 4 and 5 of Subsections (D) and (E) of the Revised Proposed New Rule 20.2.92.701 NMAC in the FCMM, other than for electricity, hydrogen, and BBDs as detailed in **Section B.3**. Each year's standard CI comes from Tables 1 and 2 of Subsections (A) and (B) of the Revised Proposed New Rule 20.2.92.701 NMAC for gasoline and gasoline substitutes or diesel and diesel substitutes, respectively. As noted in **Subsection B.1.4**, the CTFP divides the CTFS from Tables 1 and 2 of Subsections (A) and (B) of the Revised Proposed New Rule 20.2.92.701 NMAC by the alternative fuel's EER from Table 8 of Subsection (H) of the Revised Proposed New Rule 20.2.92.701 NMAC. This ensures that each transportation fuel's CI delta accurately accounts for the GHG impact of each energy unit of it that a regulated party produces, imports, or dispenses for use in New Mexico under the CTFP.

Table B-1 shows the forecasted carbon intensity of fuels used in the FCMM. Note that these values are prior to any incremental REC retirement for electricity.

Table B-1. Forecasted Carbon Intensity (gCO_2e/MJ) of Fuels Used in the FCMM

Year	Clear Gasoline	Ethanol	Clear Diesel	Biodiesel	Renewable Diesel	Electricity	Hydrogen	Fossil CNG	RNG	LPG
2026	96.90	69.60	95.30	35.28	42.39	62.32	46.10	74.30	21.40	87.00
2027	96.90	69.60	95.30	35.28	42.39	61.25	46.10	74.30	21.40	87.00
2028	96.90	69.60	95.30	35.28	42.39	60.47	46.10	74.30	21.40	87.00
2029	96.90	69.60	95.30	35.28	42.39	58.89	46.10	74.30	21.40	87.00
2030	96.90	69.60	95.30	35.28	42.39	48.88	46.10	74.30	21.40	87.00
2031	96.90	69.60	95.30	35.28	42.39	34.54	42.92	74.30	21.40	87.00
2032	96.90	69.60	95.30	35.28	42.39	24.38	39.74	74.30	21.40	87.00
2033	96.90	69.60	95.30	35.28	42.39	22.70	36.56	74.30	21.40	87.00
2034	96.90	69.60	95.30	35.28	42.39	22.38	33.38	74.30	21.40	87.00
2035	96.90	69.60	95.30	35.28	42.39	19.85	30.20	74.30	21.40	87.00
2036	96.90	69.60	95.30	35.28	42.39	18.51	27.02	74.30	21.40	87.00
2037	96.90	69.60	95.30	35.28	42.39	16.76	23.84	74.30	21.40	87.00
2038	96.90	69.60	95.30	35.28	42.39	16.89	20.66	74.30	21.40	87.00
2039	96.90	69.60	95.30	35.28	42.39	17.18	17.48	74.30	21.40	87.00
2040	96.90	69.60	95.30	35.28	42.39	14.44	14.30	74.30	21.40	87.00

B.2 VMT and fuel modelling assumptions by fuel type

For the FCMM, BRG staff developed energy demand forecast projections for finished gasoline, finished diesel, compressed natural gas, electricity, hydrogen, and Liquified Petroleum Gas (LPG) using the projections for VMT, fuel economy, and non-road fuel consumption described above. As noted, BRG staff programmed the FCMM to convert fuel-specific quantity measurements to account energy density as well as EER adjustments when calculating each fuel's energy quantity as well as its CI delta. BRG staff also had the FCMM make a specific set of assumptions for each fuel type detailed below. Unless otherwise noted, these assumptions apply across all policy scenarios.

B.2.1 Finished gasoline

BRG staff had the FCMM assume the production of finished gasoline for use in ICE vehicles from blending clear gasoline (the petroleum-derived component of gasoline) and ethanol. BRG staff limited ethanol blending to 10 percent by volume (approximately 6.9 percent on an energy basis) in the FCMM due to historical EPA limits on the sale of gasoline blends with higher ethanol blend rates. This finished gasoline with up to 10 percent ethanol by volume is known as E10. EPA rules allow the blending of up to 15 percent ethanol by volume in vehicle model years after 2000 (US EPA 2019).[110] The EPA has increasingly issued summer waivers for the nationwide sale of E15 since 2022.[111] In April 2025, the EPA announced that it will allow nationwide E15 sales year-round.[112] However, BRG staff conservatively assumes in the FCMM that New Mexico's finished gasoline continues to blend at the state's historically observed 10 percent volume. This is "conservative" (low-benefit / high-compliance cost) because this limited ethanol blending into finished gasoline increases its CI. This increases net deficits generated from finished gasoline and increases net program costs because the switching of gasoline to ethanol is a low-to-no cost way to reduce net deficit generation. This reduced blending in the FCMM thus increases the need for regulated parties to purchase credits for CTFP compliance.

It is possible for regulated parties to use other lower-carbon technologies like renewable gasoline and renewable naphtha to lower the CI of finished gasoline. However, BRG staff had the FCMM assume that regulated parties do not take advantage of these technologies, in line with conservative assumptions and their limited use in the three West Coast states with CTFP-like programs (Oregon, Washington, and California). This exclusion of lower-carbon technologies also conservatively tightens credit markets.

BRG staff included in the FCMM a small number of flex fuel vehicles using E85 (a blended fuel of up to 85 percent ethanol by volume, with the balance being clear gasoline), based on the MOVES5 modeling. BRG staff had the FCMM assume that 3.1 percent of VMT for these vehicles occurs when they consume E85, with consumption of traditional E10 blends accounting for the remaining 96.9 percent of their VMT. This assumption does not change between the scenarios with or without CTFP.

B.2.2 Finished diesel

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[110] US EPA, OAR 2019. "Final Rulemaking for Modifications to Fuel Regulations to Provide Flexibility for E15 and to Elements of the Renewable Identification Number Compliance System." Other Policies and Guidance. https://www.epa.gov/renewable-fuel-standardprogram/final-rulemaking-modifications-fuel-regulations-provide-flexibility.

[111] https://www.epa.gov/gasoline-standards/fuel-waivers.

[112] https://www.epa.gov/newsreleases/epa-addresses-e-10-standards-allows-nationwide-year-round-e15-sales.

BRG staff allowed the FCMM to assume a mix of fossil-derived diesel and biomass-based diesels (BBDs) in the pool of diesel dispensed at retail locations. BBDs include renewable diesel (RD) and biodiesel (BD) that can serve as “drop-in” substitutes for fossil diesel, subject to BD blending limits. In the FCMM, BRG staff limited BD blending to five percent by volume (B5). No such restrictions apply to RD, which is chemically identical to fossil diesel. RD and fossil diesel thus comprise 95 percent or more of the final diesel pool. The five percent limit to BD blending is a conservative assumption because BD has a lower CI than fossil diesel and many diesel engines can use BD blended to up to 20 percent by volume (B20).

For the purpose of modeling statewide CTFP credit generation, BRG staff assumed that regulated parties would blend RD and BD into the New Mexico diesel pool at a single, uniform statewide rate to determine their annual credits in the FCMM. However, to model criteria air pollutant (CAP) emissions for the COBRA and health benefits analysis discussed in Appendix C, ERG assumed that regulated parties would produce, import, or dispense all finished diesel volumes for use in New Mexico as either B0 (100 percent clear diesel), B5 (95 percent clear diesel blended with 5 percent biodiesel), or R100 (100 percent renewable diesel). BRG worked with ERG staff to ensure that quantities that regulated parties supplied of these finished diesel blends for use in New Mexico resulted in an annual volume and weighted average portion of RD and BD in New Mexico’s diesel pool that matched the totals in the FCMM.

B.2.3 CNG, LNG, and L-CNG

BRG staff had the FCMM assume that all natural gas vehicles in the state use compressed natural gas (CNG). As a result, there are no explicitly modeled quantities in the FCMM of natural gas transportation use in other physical states like liquified natural gas (LNG) or liquified compressed natural gas (L-CNG). Rather, BRG staff subsumed LNG and L-CNG quantities in the projections for CNG. This is broadly consistent with observations from states with CTFP-like programs, where CNG demand has typically represented over 90 percent of demand from natural gas vehicles. BRG staff account for this by having the FCMM serve all natural gas demand with fossil-derived CNG (hereafter referred to as fossil CNG) and bio-based CNG (hereafter referred to as renewable natural gas or RNG).

B.2.4 Electricity

BRG staff assumed that all electricity consumed as fuel for Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs) in the FCMM came from the power grid

As discussed in **Subsection 3.4**, BRG staff estimated the CI for grid electricity that regulated parties produce, import, or dispense to charge BEVs and PHEVs in the FCMM using either the statewide CI value for grid-based electricity or zero-CI electricity for offsite renewable electricity generation. BRG staff programmed the FCMM to assume that regulated parties could obtain a zero-CI value for offsite renewable electricity generation via book-and-claim as allowed in Subsection (E) of the Revised Proposed New Rule 20.2.92.206 NMAC. Regulated parties can do this via the incremental retirement of Renewable Energy Certificates ("incremental RECs") allowing them to claim a quantity of electricity used for BEV or PHEV charging to be zero-CI. Any remaining quantity of electricity that the regulated party provides for BEV or PHEV charging above the quantity associated with these incremental RECs will have the grid-based CI in the FCMM.

Regulated parties must pay a cost to purchase and retire incremental RECs. BRG staff assumed for the FCMM that the cost of doing this equaled what EDUs and other electricity service providers in the Western Electricity Coordinating Council (WECC) would pay to purchase and retire them to meet their respective Renewable Portfolio Standard (RPS) requirements. Regulated parties purchasing incremental RECs for the CTFP directly compete with such entities. **Subsection B.3** discusses this matter in greater detail, while **Subsection B.5.3** provides additional information on the assumptions around incremental REC retirement.

For PHEVs, which can use either gasoline or electricity, BRG staff incorporated in the FCMM assumptions about PHEV VMT based upon the annual PHEV fraction of the gasoline ICE vehicle (ICEV) population assumed for ERG's MOVES5 modeling runs, as shown in **Table A-1**.

B.2.5 Hydrogen

For FCEVs that consume hydrogen, BRG staff incorporated in the FCMM assumptions about FCEV VMT based upon the annual FCEV fraction of the ZEV population assumed for ERG's MOVES5 modeling runs, as shown in **Table A-1**. BRG staff used a single hydrogen supply option in the FCMM whose feedstock changes over time as CTFP credit market price signals incentivize a switch to lower-CI options. **Section B.3.3** provides additional information on the FCMM's hydrogen assumptions.

B.2.6 Dyed fuels

BRG staff incorporated the CTFP's stated policy that all non-road (dyed) fuels become regulated in 2029 in the FCMM, as well as MOVES5 data on non-road finished gasoline, finished diesel, CNG, and LPG quantities to populate demand for each respective fuel. **Table B-2** shows the dyed fuel demand in FCMM by year, which begins to be regulated in 2029.

Table B-2. Dyed Fuel Demand in FCMM by Year

Year	Finished Gasoline (GGE)	CNG (GGE)	LPG (GGE)	Finished Diesel (DGE)
2026	32,064,570	9,317,487	8,014,948	90,860,112
2027	32,283,706	9,465,300	8,283,396	91,267,580
2028	32,502,843	9,613,114	8,551,844	91,675,047
2029	32,721,979	9,760,928	8,820,292	92,082,514
2030	32,941,115	9,908,742	9,088,741	92,489,982
2031	33,154,470	10,089,484	9,463,520	93,195,526
2032	33,367,824	10,270,226	9,838,299	93,901,071

2033	33,581,178	10,450,968	10,213,079	94,606,615
2034	33,794,532	10,631,710	10,587,858	95,312,159
2035	34,007,886	10,812,452	10,962,638	96,017,704
2036	34,243,451	11,023,551	11,425,623	96,898,103
2037	34,479,016	11,234,650	11,888,607	97,778,502
2038	34,714,580	11,445,748	12,351,592	98,658,901
2039	34,950,145	11,656,847	12,814,577	99,539,300
2040	35,185,709	11,867,946	13,277,562	100,419,699

B.3 CI Assumptions

As noted in **Subsection B.1.5**, BRG staff generally uses the FCMM to determine the annual credits or deficits that each alternative transportation fuel generates by comparing that fuel's CI with the product of the annual standard CI from Tables 1 and 2 of Subsections (A) and (B) of the Revised Proposed New Rule 20.2.92.701 NMAC for gasoline and gasoline substitutes or diesel and diesel substitutes, respectively, and its EER from Table 8 of Subsection (H) of the Revised Proposed New Rule 20.2.92.701 NMAC. This comparison generates a "CI delta" for each credit- or deficit-generating fuel. This section describes in greater detail how BRG staff used the FCMM to determine each transportation fuel's CI for use in this calculation.

B.3.1 General approach

Except as noted in this section, BRG staff had the FCMM assume a CI for each transportation fuel produced, imported, or dispensed for use in New Mexico from Tables 4 and 5 of Subsections (D) and (E) of the Revised Proposed New Rule 20.2.92.701 NMAC as follows:

- BRG staff incorporated in the FCMM statewide lookup CI values for clear gasoline, clear diesel, fossil CNG, and LPG from Table 4 of Subsection (D) of the Revised Proposed New Rule 20.2.92.701 NMAC. BRG staff similarly incorporated per the proposed Table 4 that CI of electricity accompanied by a REC retirement in the FCMM is zero (assuming that it is zero-carbon).
- BRG staff sourced temporary CI projections in the FCMM for corn ethanol, RNG, and hydrogen from Table 5 of Subsection (E) of the Revised Proposed New Rule 20.2.92.701 NMAC.

B.3.2 RNG

In the FCMM, BRG staff assumed that regulated parties sourced all RNG from landfills or wastewater treatment plants (WWTPs). This is a conservative assumption because the temporary CI for RNG from landfills and WWTPs in Table 5 of Subsection (E) of the Revised Proposed New Rule 20.2.92.701 NMAC equals 21.4 grams of carbon dioxide equivalent

(gCO_2e) GHG emissions per megajoule of energy consumes (gCO_2e/MJ). This is a significantly higher CI than the negative CI (-27.3 gCO_2e/MJ) for RNG derived from anaerobic digestion (AD) of manure in agricultural operations. The CI for this activity is negative because it accounts for the counterfactual of avoided methane emissions from that livestock manure under common regulated practice without AD. The FCMM's assumption that BRG staff included of no RNG sourced from livestock manure AD reduced the credits generated from this RNG. This tightens credits relative to deficits under the CTFP.

B.3.3 Hydrogen

BRG staff had the FCMM assume that hydrogen produced, imported, or dispensed for use as transportation fuel in New Mexico comes from steam methane reforming of landfill and WWTP RNG through 2030. In the FCMM, BRG staff assumed a linear decrease in the overall average CI of hydrogen produced, imported, or dispensed for use as transportation fuel in New Mexico from the CI of hydrogen from steam methane reforming of landfill and WWTP RNG (46.1 gCO_2e/MJ) in 2030 to the CI of hydrogen from electrolysis using renewable sources (14.3 gCO_2e/MJ) by 2040. Like for RNG in **Subsection B.3.2**, the assumption that hydrogen from steam methane reforming uses RNG landfills and WWTPs rather than from AD of livestock manure is conservative because it does not allow for any CI reductions from avoided methane emissions, tightening CTFP credit markets.

B.3.4 Electricity

Electricity dispensed into BEVs and PHEVs in New Mexico is one of two exceptions to the FCMM's overall approach of using CI values from Tables 4 and 5 of Subsections (D) and (E) of the Revised Proposed New Rule 20.2.92.701 NMAC. For grid-based electricity, BRG staff used a statewide average CI in the FCMM encompassing two regions in New Mexico:

1. The Western Interconnection Electricity Coordinating Council (WECC), which approximately covers the portions of the state west of the Pecos River Valley or north of the Canadian River; and
2. The Southwest Power Pool (SPP), which covers all portions of New Mexico to the east of the WECC region.

Both the WECC and SPP regions in New Mexico contain a variety of EDUs and other electric load serving entities, including investor-owned utilities (IOUs), cooperatives, municipal utilities, and tribal authorities. For both regions, BRG staff estimated in the FCMM average grid CI using a weighting formula for all electric load-serving entities and annual changes to CI values that are forecasted from utility integrated resource plans (IRPs) and other data.

B.3.4.1 Historical CI assignment

BRG staff assigned a historical CI in the FCMM to each load serving entity by establishing the annual greenhouse gas (GHG) emissions in its service area. These GHG include both direct emissions from the combustion of thermal fuels and upstream gas emissions calculated from the 2020 New Mexico Oil and Gas Greenhouse Gas Emissions Inventory.[113] BRG staff programmed the FCMM to distribute GHG emissions across each service territory's electricity demand, accounting for imports and exports. This final CI applied to grid charging that is not offset by an incremental REC retirement.

B.3.4.2 CI changes

To forecast the rate of change in each region's grid CI, BRG staff used the FCMM to analyze IRPs from the state's four main EDUs. In the WECC region, BRG staff used the FCMM to calculate future changes as a meter-weighted average of the change in CI each year from two of the state's three IOUs (El Paso Electric or EPE and Public Service Company of New Mexico or PNM) and the Tri-State Generation and Transmission Association (Tri-State) in the WECC region, and Xcel Energy, the state's third IOU, in the SPP region.[114] Collectively these four EDUs account for 87 percent of the state's total meter count. BRG staff assumed in the FCMM that the 13 percent of the state's meters served by other entities have the regional average CIs for either WECC or SPP depending upon the entity's location.[115]

The level of detail in each EDUs filings varies, requiring different estimation methods. **Table B-3** lists the reports that each of New Mexico's four EDUs uses in forecasting CIs.

Table B-3. Source Documents for Carbon Intensity Derivations

Electricity Provider	Source Documents[116]
Public Service Company of New Mexico (PNM)	2023 PNM IRP
El Paso Electric (EPE)	2021 EPE IRP

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[113] Eastern Research Group, Inc. "New Mexico Oil and Gas Greenhouse Gas Emissions Inventory for Year 2020." Report prepared for the New Mexico Environment Department and the Colorado State University Center for a New Energy Economy. August 31, 2022. https://www.env.nm.gov/air-quality/wp-content/uploads/sites/2/2022/12/NewMexico-2020-Oil-and-Gas-GreenhouseGas-Inventory-2022-08-31.pdf.

[114] Xcel Energy is formerly known as Southwestern Public Service Company. BRG staff incorporated into the FCMM an Integrated Resource Plan (IRP) filed under the Southwestern Public Service Company name; there is no practical difference between each when referring to the company's load-serving utility operations within New Mexico.

[115] The largest of these by meter count are: City of Farmington, Kit Carson Electric Cooperative, Navajo Tribal Utility Authority, Los Alamos County, and the Western Farmers Electric Cooperative (WFEC) member cooperatives (Farmers Electric Cooperative, Lea County Electric Cooperative, Roosevelt County Electric Cooperative, and Central Valley Electric Cooperative). The WFEC member cooperatives are in SPP, the remaining utilities above are in WECC.

[116] PNM: https://gridworks.org/wp-content/uploads/2023/12/PNMs-2023-Integrated-Resource-Plan-1.pdf
https://gridworks.org/wp-content/uploads/2023/12/PNM-2023-IRP-Appendices-Volume-1.pdf
EPE: https://www.epelectric.com/files/html/EPE%202021%20Integrated%20Resource%20Plan.pdf
Tri-State: https://www.powermag.com/wp-content/uploads/2023/12/tri-state-2023-erp-hearing-exhibit-101-lkt-1-erp-report.pdf
FERC Form No. 714 Annual Electric Balancing Authority Area and Planning Area Report for the Year ending December 31, 2023. Tri-State G & T Assn., Inc, filed 5/16/2024
SPS: https://gridworks.org/wp-content/uploads/2023/10/2023-SPS-IRP-Plan.pdf

Tri-State Generation and Transmission Association (Tri-State)	2023 Tri-State ERP, 2023 FERC 714 Filing
Southwestern Public Service Company (SPS)	2023 SPS IRP

Additionally, the New Mexico Energy Transition Act (ETA, codified under 62-9, 62-15, 62-16, and 62-18 NMSA 1978) creates a renewable portfolio standard (RPS) mandate for all of New Mexico's IOUs and rural cooperatives to reach grid electricity mixes that are 100 percent carbon free and 80 percent renewable by 2050.[117] The ETA has faster targets for IOUs than cooperatives, as shown in **Table B-4**. To ensure compliance in the FCMM, CI reductions occur at annual rates needed for each IOU and cooperative to meet its RPS targets under the ETA. In effect, this means that BRG staff had the FCMM assume that all IOUs will have CIs of 0 by 2045 and all cooperatives will have CIs of 0 by 2050.

Table B-4. New Mexico RPS / Zero Carbon Resource Targets by Service Provider Class

	IOUs	Rural Cooperatives
2025	40%/40%	40%/40%
2030	50%/50%	50%/50%
2040	80%/80%	50%/50%
2045	80%/100%	50%/50%
2050	80%/100%	80%/100%

Note: RPS targets for IOUs are set under §§ 62-16-4 NMSA 1978 for public utilities other than rural electric cooperatives and municipalities. RPS targets for Rural Cooperatives are set under §§ 62-15-34 NMSA 1978.[118]

B.3.4.1 Weighting formula

Next, BRG staff aggregated projected annual CIs projected for all applicable electric load serving entities in the FCMM to produce a statewide average CI across the entire forecast period. BRG staff assigned a weight in the FCMM to each load-serving entity to calculate a meter-weighted average in the WECC and SPP regions. In the FCMM, BRG staff estimated each entity's weighting factor using the reported 2022 meter count from the Form EIA-861 as

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[117] The ETA sets RPS targets for public utilities other than rural electric cooperatives and municipalities (referred to as "Investor-Owned Utilities" or "IOUs") and distribution cooperatives organized pursuant to the Rural Electric Cooperatives Act (referred to as "Rural Cooperatives"). The ETA does not apply to municipal load-serving entities.

[118] https://nmonesource.com/nmos/nmsa/en/item/4407/index.do#62-15-34, https://nmonesource.com/nmos/nmsa/en/item/4407/index.do#62-16-4.

a percentage of the total EIA-861 commercial and residential meter count in each load-serving entity's power region.[119,120]

B.3.5 BBDs

The other exception BRG staff's overall approach in the FCMM of using CI values from Tables 4 and 5 of Subsections (D) and (E) of the Revised Proposed New Rule 20.2.92.701 NMAC is for BBDs. The temporary CIs in the proposed Table 5 contain CIs for BD and RD derived either from non-palm virgin plant oil or waste oil and animal fats. However, the feedstock source for BBDs from non-palm virgin plant oil will impact their CI scores, which are inclusive of values for indirect land use change (ILUC). ILUC represents a change to the CI of a biofuel based upon GHG emissions resulting from increased acreage set aside to cultivate its feedstock. ILUC values will vary for BD and RD from different feedstocks, causing a commensurate change in the CI of different BBDs. This required BRG staff to make more explicit assumptions in the FCMM about the types of BD and RD and their related CIs.

Given the diversity of available feedstocks for BBDs available in the United States, including soybean oil, canola oil, distiller's corn oil (an ethanol byproduct), tallow, and used cooking oil, BRG staff had the FCMM consider BBD feedstocks from heterogenous sources. Although many of these BBD feedstocks have ILUC values listed in Table 9 of Subsection (I) of the Revised Proposed New Rule 20.2.92.701 NMAC that Table 5 of Subsection (E) of the Revised Proposed New Rule 20.2.92.701 NMAC incorporates, others like distiller's corn oil do not.

To model the CI of the existing mix of BBDs available for purchase, BRG staff had the FCMM assume that New Mexico BD and RD have the historically observed 2023 quantity-weighted average CI for these fuels in states with CTFP-like programs. This leads to CIs of 35.3 gCO_2e/MJ for BD and 42.4 gCO_2e/MJ for RD, which in each case are above the temporary CIs for the respective biofuels derived from animal fat or waste oil and below the temporary CIs for the respective biofuels derived from virgin plant oil in the proposed Table 5 of the CTFP. In practice, many BBDs sold to New Mexico are likely to be established pathways that use these modeled CIs obtained in other states under the Revised Proposed New Rule 20.2.92.204 NMAC.

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[119] Of the twenty-one electricity providers with service territories that include New Mexico and report their meter count in the Energy Information Agency (US EIA) Form EIA 861, nine publish sufficient information which allows for CIs to be estimated. Tri-State Generation and Transmission Association (Tri-State) is a generation and transmission cooperative which provides power to six of the electricity providers (Central New Mexico Electric Cooperative, Continental Divide Electric Cooperative, Jemez Mountains Electric Cooperative, Otero County Electric Cooperative, Southwestern Electric Cooperative, and Springer Electric Cooperative).

[120] Note that there are some utilities which do not report meter counts in New Mexico in the 2022 EIA 861. These include the cooperatives Columbus Electric Cooperative, Mora-San Miguel Electric Cooperative, Northern Rio Arriba Electric Cooperative, Socorro Electric Cooperative, and Sierra Electric Cooperative, as well as City of Aztec, City of Gallup, City of Raton, Town of Springer, and City of Truth or Consequences. BRG staff did not consider these in developing the FCMM's calculation of statewide forecasted average grid CI for electricity.

B.4 Accounting for Other Policies

BRG staff assumed in the FCMM that current state and federal legislation and regulation would remain in place for the life of the analysis. Except as noted, BRG staff used an "on-the-books" approach that assumes state and federal legislation and regulation that is legally applicable and excludes actions that may signal an intent to change laws and legal code. BRG staff did not have the FCMM consider preliminary orders, legislation that is drafted or in progress, or laws and executive actions that are announced or under legal review. Such measures may or may not prove determinative to the policy context for the CTFP, but BRG staff established a minimum threshold of certainty before accounting for such changes in the FCMM. This is an important method to account for high degrees of legal and regulatory uncertainty that often accompany policy change.

This section details BRG staff's assumed policy approach in the FCMM at the state and federal levels, as well as policy in other US states.

B.4.1 State Policy

BRG staff programmed the FCMM to assume that NMVES remain in place, including the ACCII, the Advanced Clean Trucks (ACT), and the Heavy-Duty Omnibus (HDO) rules. BRG staff assumed in the FCMM that ZEV new sales percentage targets remained constant at respective levels after NMVES policy expired as ERG did in its NMVES economic, health, and environmental impact assessment.[121] BRG staff also had the FCMM assume that New Mexico's power sector emissions and renewable energy policies, including the ETA, Renewable Energy Act (REA),[122] and 17.9.572 NMAC (Rule 572) remain in place. Collectively, these policies establish an RPS for electricity in New Mexico. This reduces the CI of grid electricity statewide, as discussed in **Subsection B.3.4**. BRG staff incorporated into the FCMM the assumption that the New Mexico Department of Agriculture continues to annually suspend the state's biodiesel mandate (57-19-28 and 57-19-29 NMSA 1978). This has occurred every year since the biodiesel mandate's adoption in 2007.

B.4.2 Federal Policy

BRG staff developed the FCMM using the assumption that the federal Renewable Fuel Standard (RFS) remained in place in its present form. This includes the buying and selling of RFS compliance credits called renewable identification numbers (RINs). Under the RFS, these RINs are counted towards regulated parties' renewable volume obligations (RVOs). BRG staff assumed in the FCMM that the RFS continued to set RVOs for:

- Cellulosic biofuels (met by D3/D7 RINs);
- BBDs (met by D4 RINs);

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[121] See **Footnote 31**.

[122] §§ 62-16-1 et seq. NMSA 1978

- Advanced biofuels (met by D5 RINs); and
- Renewable fuels (met by D6 RINs).

BRG staff also assumed in the FCMM that the RFS continued to set a binding RVO for cellulosic biofuels. This created a higher value for D3 RINs traded to meet this RVO. BRG staff assumed in the FCMM that pathway Q of the RFS, which allows RNG to qualify for D3 RINs, remained in place. **Subsection B.5.2** provides more information on RIN pricing assumptions.

In the FCMM, BRG staff did not attribute any value to the Clean Fuel Production Tax Credit under US Code of Federal Regulations (CFR Title 26, § 1.45Z (henceforth referred to as the "45Z" tax credit) in calculating fuel supply costs. This credit could materially reduce the cost of supplying certain biofuels, which could cause compliance costs to be lower than what this analysis models. However, BRG staff did not include this in FCMM due to policy uncertainty at the time that BRG staff finalized the BCA assumptions surrounding the credit and the need to maintain conservative CTFP credit market assumptions. Subsequent to BCA modeling assumptions finalization, House Resolution 1 clarified that no ILUC values can be used for CI determination under 45Z, which generally increases the 45Z credits available, particularly BBDs from virgin oil-based feedstocks. Not considering the greater federal support likely available to such fuels from this provision maintains tighter CTFP credit markets under the FCMM than may occur.

BRG staff assumed in the FCMM that current trade policy at the time of the forecast would remain in place. This meant that current domestically available feedstocks or biofuels did not need to be diverted to backfill foreign imported feedstocks or biofuels.

B.4.3 Other states

BRG staff had the FCMM assume that the Oregon Clean Fuels Program, the Washington Clean Fuel Standard, and the California Low Carbon Fuel Standard would remain in place for the duration of the forecast, with no other states adopting CTFS-like policies.

B.5 Supply Curve Assumptions

Using the FCMM, BRG staff calculated the CTFP credit market price by determining the price at which regulated parties can provide a CTFP credit that is "marginal." A CTFP credit that is marginal represents the final credit needed to ensure program compliance in the current and future years.[123] The CTFP measures program credits in metric tons of carbon dioxide equivalent ($MTCO_2e$), and credit prices in dollars per $MTCO_2e$ ($\$/MTCO_2e$).

BRG staff assumed in the FCMM that there are vehicle-specific fuels as outlined in **Subsection B.5.1**. Vehicle-specific fuels receive CTFP credits and thus shape the CTFP credit market. However, the use of these vehicle-specific fuels depends only on the evolution of New

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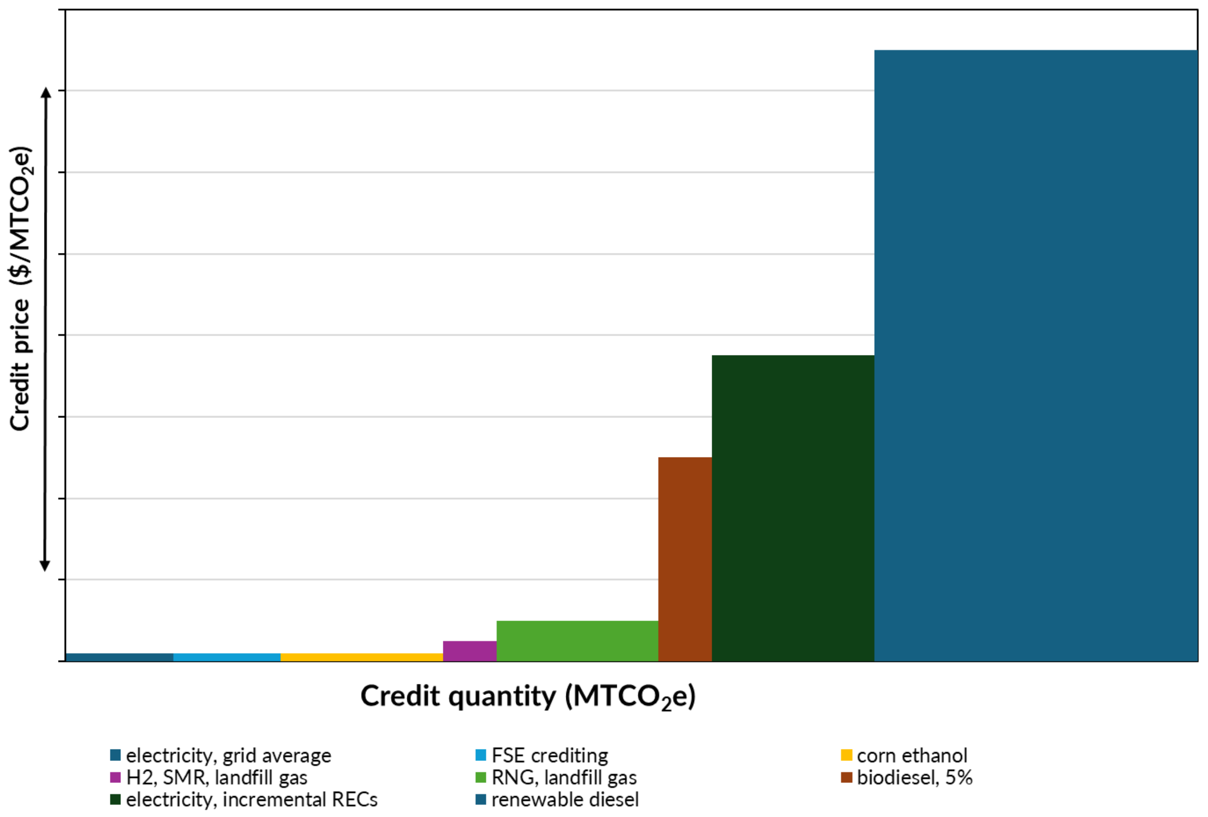
[123] Regulated parties can buy and sell CTFP credits for compliance in future years via banking.

Mexico’s vehicle fleet and VMT as detailed in Appendix A. This is largely due to policies like the NMVES. Such policies determine the share of vehicles in New Mexico’s fleet that consume vehicle-specific fuels, like BEV, PHEVs, hydrogen fuel cell vehicles (HFCVs), and natural gas vehicles (NGVs). Such policies, combined with assumptions about VMT, determine the credits or deficits that they generate, irrespective of CTFP credit markets. The degree to which New Mexicans travel in such vehicles thus shapes credit markets under the FCMM in a manner that is “exogenous” or external to the CTFP itself.

In addition to supplying fleet-specific fuels, **Subsection B.5.2** details how regulated parties can generate CTFP credits by supplying “drop-in” transportation fuels like ethanol, BBDs, and RNG. Drop-in transportation fuels can directly blend with traditional fossil gasoline and diesel for use in ICE vehicles. In the FCMM, BRG staff treated CTFP credits generated from some of these drop-in transportation fuels including RNG and BBDs as “incremental” because regulated parties can generate incrementally more of these credits from such fuels in response to CTFP credit prices. BRG staff assumed that regulated parties can also earn incremental CTFP credits by purchasing and retiring incremental RECs under the program as detailed in **Subsection B.5.3**. By contrast, in the FCMM BRG staff treated CTFP credits that regulated parties generated from supplying vehicle-specific fuels as “non-incremental.” Fleet and VMT assumptions under the NMVES baseline policy projection determine the credits that regulated parties generate from such options in the FCMM, with no incremental effect from the CTFP. BRG staff conservatively projected in the FCMM that such options would generate the same number of CTFP credits with a credit price of \$0/MTCO$_2$e as they would with the maximum credit price. This also applied to ethanol, which the CTFP treats as a non-incremental drop-in fuel as detailed in **Subsection B.5.2**, as well as FSE credits as detailed in **Subsection B.5.4**.

Once regulated parties exhaust credits generated from non-incremental options, BRG staff programmed the FCMM to assume that they would offset any remaining compliance obligation by generating and selling incremental credits as justified by CTFP credit prices. BRG staff had the FCMM assume that regulated parties with a CTFP compliance obligation will seek to purchase the least costly incremental credits available to satisfy program requirements. This creates competition for low-CI fuels under the CTFP that limit the program’s cost. When regulated parties generate more CTFP deficits relative to credits this leads to “tight” credit markets in which they must generate, purchase, and retire relatively more incremental CTFP credits. The greater quantities of incremental CTFP credits needed requires a higher CTFP credit price. This forms an upward-sloping “supply curve” relationship between credits and prices, as shown in **Figure B-1**.

Figure B-1. Illustrative supply curve for credit-generating transportation fuels in New Mexico under the CTFP for a given year



Note: Landfill and wastewater RNG economics is heavily dependent on the US federal RFS, and hydrogen is heavily dependent on federal subsidy and NMVES requirements.
Note: Graph is for illustrative purposes only and does not reflect any projected credit quantities from the FCMM.

Ultimately, the quantity of credit-generating transportation fuels supplied into New Mexico's market each year will generate enough credits to satisfy the statewide annual compliance obligation, after accounting for credit "banking." As discussed in **Section B.6**, BRG staff programmed the FCMM to allow regulated parties to generate credits that they bank to sell to other regulated parties in later periods ("banked for sale"). Regulated parties may also bank credits that they have generated or purchased to retire in a later period for CTFP compliance ("banked for compliance").[124]

The supply curve used to determine the cost of the incremental CTFP credits needed to ensure CTFP compliance is thus somewhat more complicated than what is shown in **Figure B-1**. Because of banking, regulated parties may generate credits that exceed deficits in one year

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[124] Although not explicitly modeled in the FCMM, regulated parties may also serve as intermediaries that purchase CTFP credits from one regulated party, bank them, and sell them to another regulated party in a later period ("banked for arbitrage").

to build a “bank balance” and may draw from this bank balance in future years to satisfy net deficits. This market represents a choice that regulated parties make to best satisfy compliance obligations over time. **Section B.6** describes how BRG staff modeled this decision in the FCMM. As a result, regulated parties in the FCMM consider not only the current CTFP credit market supply curve but also how it might evolve in response to known regulatory changes like the CTFS and other CTFP provisions.

In any given year, the supply curve will be shaped by numerous factors, such as technological and process innovation, vehicle purchasing and use, infrastructure and logistics, global trends, and policy that is “on the books” as outlined in **Section B.4**. In developing the FCMM, BRG staff considered the final (highest-cost) incremental CTFP credit needed for regulated parties to satisfy present and to some degree future compliance obligations to be the “marginal” credit that balances the supply of and demand for CTFP credits. The “market-clearing” CTFP credit price at which this occurs is received by not only the seller of the marginal CTFP credit, but by all CTFP credit sellers. When reasonable, BRG staff programmed conservative assumptions about these factors into the FCMM. Such assumptions tightened CTFP credit markets and made the market-clearing CTFP credit price higher than it may turn out to be in practice. BRG staff did this to minimize the risk of overstating program benefits relative to costs.

B.5.1 Fleet-Specific Fuels

In this BCA, BRG staff considered vehicle-specific fuels to be fuels which must be used in vehicles with a particular powertrain type. These include electricity used in BEVs and PHEVs, hydrogen used in HFCVs, CNG used in NGVs, and LPGs. Regulated parties that produce, import, or dispense these fuels for use in New Mexico can generate credits or deficits, depending upon the CI of these fuels relative to the CTFS. However, because New Mexico drivers use these fuels in their respective vehicles, BRG staff programmed the FCMM to assume that their use resulted only from the quantity required to serve the VMT by vehicle type projected under the Federal and NMVES baseline policy projections. Since the FCMM scenario with CTFP policy implementation included both that policy and the NMVES, it projects the same annual energy units consumed of these fuels as the NMVES Baseline.[125]

Assuming no change in the quantity of vehicle-specific transportation fuels from the NMVES baseline under CTFP is a conservative assumption that serves to tighten the CTFP credit market. There are ways that the CTFP can support greater ownership of and travel with BEVs, PHEVS, HFCVs, and NGVs that do not receive consideration under the FCMM scenario with CTFP implementation. However, it is clear that the CTFP will play an important role in supporting NMVES with credits for the buildout of fuel supply equipment (FSE) needed to support using such vehicles for longer trips, paired with credits for the continued supply of fuel from FSE to ensure the longevity and reliability of this infrastructure. Further, the CTFP requires the reinvestment of credit revenue from residential BEV and PHEV charging into

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[125] However, the FCMM does assume that regulated parties can generate marginal CTFP credits through incremental REC retirements as discussed in **Subsection B.5.3**.

distribution, grid modernization, infrastructure and other transportation decarbonization projects. This logic is why BRG staff treat the CTFP-only scenario as a lower-bound estimate of the program's true impact in this BCA, while separately modeling an NMVES + CTFP upper-bound scenario to account for the CTFP's role in supporting the NMVES.

Statewide uptake of vehicle-specific fuels in response to incentives in the Revised Proposed New Rule may prove modest compared to increased uptake of drop-in gasoline and diesel substitutes. Even so, it is likely that CTFP provisions will have some impact on statewide adoption of non-ICE vehicles and thus demand for their fuels. For example, residential BEV and PHEV charging credit recipients could reinvest their revenue by providing direct, cash-on-the-hood rebates for the purchase of ZEV vehicles in New Mexico, which directly contribute to their population growth. Additionally, the additional fueling infrastructure and fuel supply incentivized under CTFP could encourage non-ICE vehicles to take longer trips, likely increasing their VMT. In assuming that none of this occurs to a greater degree under the CTFP than under the NMVES baseline, BRG staff intentionally designed the FCMM to place greater pressure on incremental credit-generating options to achieve CTFP compliance. These options, like drop-in fuels (**Subsection B.5.2**) and incremental REC retirements (**Subsection B.5.3**), require higher CTFP credit prices to profitably generate credits. Increasing reliance upon them under tight CTFP credit markets thus pushes up credit prices in a manner which may overstate this BCA's estimates of fuel market costs under the program.

B.5.2 Drop-In Fuels

Regulated parties that produce, import, or dispense drop-in fuels like ethanol, RNG, and BBDs for use in New Mexico are the main generators of the incremental CTFP credits. BRG staff determine CTFP credit prices under the FCMM based on what will incentivize the quantities of these fuels that would allow regulated parties to satisfy their CTFP compliance obligation.

As shown in **Table B-5** below, some drop-in fuels like ethanol and BD are "blendwall-constrained." Their "blendwall" refers to a limit to the volumetric proportion that regulated parties can blend ethanol and BD into the pool of gasoline or diesel, respectively, that they produce, import, or dispense for use in New Mexico. As noted in **Subsection B.2.1**, BRG staff incorporate into the FCMM an assumed ethanol blending limit of 10 percent by volume (approximately 6.9 percent on an energy basis), in line with historical blending quantities. And as noted in **Subsection B.2.2**, BRG staff incorporate into the FCMM an assumed BD blending limit of five percent by volume (B5).

Table B-5. Constraint categories for each drop-in fuel under FCMM assumptions

		Use-constrained?*	
		Yes	No
Blendwall-constrained?	Yes		***Ethanol, Biodiesel***
	No	***RNG***	***Renewable Diesel***

**Effectively, all drop-in fuels are use constrained in that they can all generate credits under the CTFP only to the degree that they can substitute for the quantities that are produced, imported, or dispensed for use in New Mexico each year. The difference for RNG is that it is limited to the consumption of a vehicle-specific fuel in CNG that places a far more binding limit on its ability to generate credits under the CTFP than drop-in substitutes for gasoline and diesel, such that it is the only fuel categorized as "use-constrained" for purposes of the FCMM.*

By contrast, RD and RNG are not blendwall-constrained, because they are each close enough to being chemically identical to their fossil-derived counterparts that they can effectively substitute for them at any ratio. BRG staff assume that a regulated party can blend RD into a pool of finished fossil diesel at any desired rate that they find economical in the FCMM, in the same way they could blend RNG into their pool of fossil CNG. However, RNG is relatively more "use-constrained" because regulated parties can only claim credits for it to the degree that it replaced relatively low quantities of CNG, a vehicle-specific fuel for NGVs. RD is relatively less use-constrained because fossil diesel is one of the two major transportation fuels in New Mexico listed in Tables 1 and 2 from Subsections (A) and (B) of the Revised Proposed New Rule 20.2.92.701 NMAC, reflecting its position as one of the two largest sources of GHG emissions in the New Mexico land-based motor vehicle transportation sector. Under the FCMM, this allows for RD blending to generate CTFP credits that are "marginal" because they balance final supply and demand after accounting for credits from other pathways. This is particularly the case in earlier years of the program when the CTFP "binds." As discussed in **Section B.7** this occurs when baseline use of vehicle-specific transportation fuels and non-incremental drop-in fuels do not generate sufficient credits to satisfy CTFP compliance obligations.

B.5.2.1 Ethanol

As discussed in **Section B.1** and **Section B.2**, BRG staff developed the FCMM to limit ethanol blending to 10 percent ethanol by volume in line with historical observations, even under CTFP implementation.[126,127] While states with CTFP-like programs have seen reductions in the CI of ethanol after policy implementation,[128] BRG staff developed the FCMM with the conservative assumption that ethanol CIs remain at the temporary level shown in Table 5 from Subsection (E) of the Revised Proposed New Rule 20.2.92.701 NMAC.

As a result, FCMM results did not account for the possibility of greater ethanol blending nor the possibility that regulated parties could produce, import, or distribute for use in New Mexico any ethanol from lower-CI feedstocks under the CTFP relative to scenarios without it. This makes ethanol a "non-incremental" transportation fuel under the CTFP. Due to the

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[126] US Energy Information Administration. State Energy Data System (SEDS). https://www.eia.gov/state/seds/seds-data-complete.php?sid=US.

[127] This occurs because ethanol is generally cheaper than gasoline on a volumetric basis, once accounting for D6 RIN value under the federal RFS.

[128] https://ww2.arb.ca.gov/sites/default/files/2025-05/quarterlysummary_Q42024_0.xlsx
https://www.oregon.gov/deq/ghgp/Documents/cfpQ42024.xlsx
https://www.ezview.wa.gov/Portals/_1962/Documents/clean-fuel-data/CFSquarterlysummary_Q42024.xlsx.

relationship between the assumed CI of ethanol and the decreasing CTFP standard CI in future years, ethanol goes from a credit-generating fuel to a deficit-generating fuel in 2037.

B.5.2.2 RNG

Similarly, BRG staff incorporated in the FCMM the assumption that regulated parties can produce, import, or dispense for use in New Mexico natural gas that they capture from landfills and WWTPs to compress and use as a transportation fuel at a reasonable cost. This assumption principally derives from the federal RFS policy assumptions discussed in **Subsection B.4.2**, where RFS revenue covers a large majority of the RNG production cost.[129]

Based on observation from states with CTFP-like programs, BRG staff assumed in the FCMM that regulated parties producing, importing, or dispensing RNG for use in New Mexico will benefit from the flexibility that "book-and-claim" accounting offers them. Under a book-and-claim system, RNG commingled other natural gas in a shared transportation and distribution system can receive credits for its CI attributes under the CTFP. This is critical for natural gas where such a system – pipelines – are the primary mode of transport and distribution. As a result of this accounting method, RNG has accounted for a large majority of regulated CNG volumes under existing CTFS-like programs in other states.

RNG is effectively a drop-in substitute for CNG in NGVs. Like other drop-in fuels, this allows regulated parties to claim credits for RNG quantities under book-and-claim by originating or purchasing thermal renewable energy certificates ("thermal RECs") that they retire under the CTFP. Regulated parties producing, importing, or dispensing CNG for sale in New Mexico can use thermal RECs under the CTFP to reduce the CI of CNG in much the same way that load serving entities can use traditional RECs to reduce the CI of grid electricity. As with traditional RECs, regulated parties can originate or purchase and retire thermal RECs when CTFP prices justify the cost.[130] Also as with traditional RECs, the degree with which regulated parties can purchase and retire thermal RECs will be limited by the quantity of CNG that is produced, imported, or dispensed for use in New Mexico in each period. Thus, although regulated parties generate incremental credits from RNG, it is generally not a source of CTFP credits that are "marginal" because they are use-constrained and unlikely to be the final credit needed for full compliance that sets the CTFP credit price.

B.5.2.3 BBDs

B.5.2.3.1 Significance to the FCMM

In the FCMM, BRG staff treat BBDs (and specifically RD) as fuels that generate the final, marginal credits in CTFP credit markets during the 2020s and early 2030s. Like ethanol and RNG, BD is a drop-in substitute that regulated parties can directly blend with fossil-derived

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[129] Under pathway Q of the RFS RNG is eligible to generate lucrative and undersupplied D3 RINs.

[130] Experience from states with CTFP-like programs suggests that the credit price needed may be low.

transportation fuel whose use is limited. BD is more like ethanol than RNG because both BD and ethanol are "blendwall-constrained" or limited by the portion of it that regulated parties can blend into finished fuel. By contrast, RD, like RNG, is not blendwall constrained, because it is very chemically similar to its fossil-derived counterpart.[131,132,133] A regulated party can blend RD into a pool of finished fossil diesel at any desired rate that they find economical in the FCMM, in the same way they could blend RNG into their pool of fossil CNG.

However, as shows, RD differs from RNG in that it is not use-constrained. As a BBD, regulated parties blend RD with diesel, which is one of the two major transportation fuels in New Mexico listed in Tables 1 and 2 from Subsections (A) and (B) of the Revised Proposed New Rule 20.2.92.701 NMAC. This differs from RNG which can only generate credits for regulated parties to the degree that they produce, import, or dispense CNG for use in New Mexico. Since CNG is a vehicle-specific fuel for NGVs, this limits RNG's credit-generating potential under the CTFP. By contrast, FCMM modeling outputs show that there will be enough overall diesel demand in New Mexico for RD blending to generate CTFP credits that are marginal and can satisfy any CTFP compliance obligations that remain after accounting for vehicle-specific fuels and other drop-in fuels that are blendwall- or use-constrained given the targets under CTFS.

BRG staff programmed the FCMM to assume that regulated parties will produce, import, or dispense BBD for use in New Mexico when it earns a greater premium for over fossil diesel relative to other states. Revenue from BBD comes primarily from four sources:

1. Its post-tax revenue at point of sale.
    a. This is assumed to roughly equal the value of fossil-derived diesel, with consumers assumed to be indifferent between the two given identical quality;
2. Revenue from D4 RINs for BBDs that regulated parties sell under the federal RFS;
3. The value of federal production tax credits like the Clean Fuel Production Tax Credit; and
4. Credit revenue under the CTFP or similar state policies.

Revenue sources (2) and (3) will not vary by state. By contrast, revenue from source (1) will depend on each state's overall diesel prices, and revenue from source (4) will depend upon how each state's environmental policies shape revenue for BBDs.

The main cost drivers for BBD are:

5. Production costs – the main production cost driver for BBD.

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[131] This is because, unlike BD, RD is produced from hydrotreating BBD feedstocks. https://www.eia.gov/tools/glossary/index.php?id=renewable%20diesel.

[132] Transportation fuels that are hydroprocessed esters and fatty acids (HEFA) are nearly indistinguishable from their petroleum counterparts. As a result, they can substitute for fossil diesel at any blend rate in diesel engines, and can comprise the entire diesel pool (R100).

[133] Brown, Bill and Tony Radich. "New biofuels eliminate need for blending with petroleum fuels." US Energy Information Administration. *Today in Energy*. November 9, 2015. https://www.eia.gov/todayinenergy/detail.php?id=23692.

    a. Feedstock costs depend largely upon agricultural commodity prices, the cost of production inputs like natural gas, electricity, hydrogen, water, and/or chemicals, and other factors.
    b. BRG staff used these feedstock costs as well as capital recovery costs for BBD refining capacity to calculate a production cost difference in the FCMM between BBDs and fossil diesel.
6. The transportation cost differential between BBDs and fossil diesel; and
7. The "opportunity-cost" of blending BBDs into New Mexico's diesel pool
    a. BRG staff valued this "opportunity-cost" in the FCMM as the highest "premium" or profitability of BBDs over fossil diesel that a regulated party can receive from blending BBDs into a diesel pool at a location outside of New Mexico when considering all factors listed above.

The feedstock cost from item (5.b), the transportation cost difference from item (6) above, and any remaining opportunity-cost under item (7a) comprise the "incremental cost" of supplying BBDs in New Mexico. RFS revenue from RIN sales under item (2) and federal tax credits under item (3) above will cover some portion of this incremental cost for blending BBDs into New Mexico's diesel pool, though as noted in **Subsection B.4.2** item (3) is not considered in FCMM.[134] CTFP credit revenue under item (4) above must cover the remaining incremental cost (5b + 6 + 7a – 2 – 3) per unit of BBD that regulated parties produce, import, or dispense for use in New Mexico (which BRG staff calculated in the FCMM as 5b + 6 + 7a – 2. Note that BRG staff did not program the FCMM calculation to consider item (3) (the Clean Fuel Production Tax Credit).

This "incremental cost" is a pure cost of the CTFP in terms of statewide fuel markets. It is not a transfer of CT-FP credit revenue from one regulated party to another, as would occur for credit revenue received and reinvested by an EDU for electricity supply, for example. Rather, it is an amount received by a regulated party to do a like-for-like swap of BBDs for fossil diesel. Such substitution via blending can have many benefits for air quality, health, the environment, and even jobs associated with BBD supply. However, in fuel markets the credit revenue that regulated parties receive for BBD quantities purely covers their cost of provision. This credit revenue does not provide any additional earnings to regulated parties above what is needed to compensate them for the incremental cost of substituting BBDs for fossil diesel in their New Mexico blending pool. It does not increase the profitability of supplying them to provide an additional value stream as occurs for other credit-generating transportation fuels. This is also the case for CTFP credit revenues that cover the cost of supplying RNG for use as CNG as discussed above, as well as the incremental REC retirements discussed in **Section B.5.3**.

The incremental cost calculations are particularly important for RD. As noted above, FCMM results show that RD is the fuel that generates CTFP credits that are marginal in the 2020s and early 2030s. As a like-for-like diesel substitute that is neither blendwall-constrained nor

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[134] Both BBDs and fossil diesel will receive revenue from sales as part of the diesel pool under item (1). This fuel sales revenue does not apply to the comparison of incremental costs and the overall economics of BBDs versus fossil diesel because it is received by regulated parties for the supply of both fuels.

subject to effective use constraints, RD acts as the fuel that regulated parties can produce, import, or dispense for use in New Mexico to generate the final CTFP credits needed to meet compliance obligations after accounting for vehicle-specific fuels and other drop-in fuels. The increased quantities of RD needed each year in the calculations that BRG staff developed for the FCMM in-turn affect the feedstock costs under item (5) and transport costs under item (6). As a result, greater volumes of RD to satisfy CTFP compliance require incrementally higher CTFP credit prices in the FCMM, increasing the incremental cost of the program. As discussed in this section, previous sections, and **Subsection** , BRG staff did not incorporate any assumptions into the FCMM that consider potential opportunities to lessen the need for RD as a marginal fuel in the program. This makes the FCMM's output more conservative in that they require higher credit prices and a greater incremental cost in fuel markets for regulated parties to generate enough credits for compliance. The cost of such marginal RD quantities to ensure program compliance factor directly into the fuel market costs that BRG staff modeled to generate the final BCA calculations of this analysis in **Appendix E**.

B.5.2.3.2 Data and methods

BRG staff developed the FCMM's BBD supply model to incorporate input assumptions from the EPA's in the Draft Regulatory Impact Analysis of the RFS standards for 2023-2025 to calculate the production cost of BD and RD described in item (5) above.[135] The formulae that BRG staff developed for the FCMM adjusts feedstock costs for each biofuel. These feedstock costs typically represent the majority of production costs for each fuel, using the soybean oil price forecasts from the United States Department of Agriculture (USDA) in the USDA Agricultural Projections to 2033.[136,137,138] BRG staff incorporated into the FCMM assumptions from the EPA's RFS Regulatory Impact Analysis for BD and RD feedstock yields (measured in pounds of oil feedstock required to produce a gallon of BD or RD, respectively), as well as the EPA's assumptions of the transportation cost differential between BD and fossil diesel.[139]

For diesel prices under item (1) above, BRG staff incorporated the 2023 US EIA Mountain region wholesale diesel price forecast into the FCMM to calculate the incremental cost of BBDs above clear diesel. The forecasted value of RINs from the federal RFS under item (2) above reduces the portion of this incremental cost that CTFP credit revenue must cover for

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[135] https://www.epa.gov/system/files/documents/2022-12/420d22003.pdf

[136] https://www.usda.gov/sites/default/files/documents/USDA-Agricultural-Projections-to-2033.pdf

[137] Note that the FCMM uses the 2024 USDA Agricultural Projections to 2033 for soybean oil forecasts. In the 2025 USDA Agricultural Projections to 2034, https://ers.usda.gov/sites/default/files/_laserfiche/outlooks/110966/OCE-2025-1.pdf?v=55461, which were published after this assumption was finalized in the analysis, long-term soybean oil prices are lower. Using these more up to date prices would reduce the FCMM cost of program compliance.

[138] Note that USDA forecasts do not include an assumption for increased RVOs under the federal RFS after 2025. The BCA assumptions were finalized prior to RVO finalization for 2026 and 2027, and assume the same both for calculation of soybean oil prices and RIN prices under the RFS. While increased RVOs may cause an increase in soybean oil prices relative to what was published in the USDA forecasts, this increase in soybean oil prices would be generally expected to be accompanied by a corresponding increase in RIN prices above what was assumed in this study.

[139] The FCMM uses the biodiesel transportation cost for renewable diesel due to a lack of data for the latter.

their production, import, or dispensing for use in New Mexico. BRG staff programmed the FCMM to forecast the supply of RINs using a simple ordinary least squares regression of D4 RIN prices using wholesale diesel prices by refiners from July 2010 to March 2022 and historical soybean oil prices and D4 RIN prices over the same period.[140,141]

BRG staff incorporated into the FCMM a conservative assumption that RIN values do not increase in response to replacement of the Biodiesel Mixture Excise Tax Credit with lower Section 45Z tax credits.[142] Such RIN value increases would serve to compensate for any lost tax credit values and incent BBD production at levels needed to satisfy RVOs for parties regulated under the federal RFS. An assumption that D4 RIN prices increase due to the replacement of the Biodiesel Mixture Excise Tax Credit with 45Z tax credits would reduce the net cost of BBDs needed for program compliance in CTFP credit markets.

B.5.3 Incremental REC Retirements

B.5.3.1 Significance to the FCMM

In the FCMM, BRG staff allowed EDUs and other providers of electricity as a transportation fuel to retire RECs to reduce the CI of such electricity, relative to the forecasted grid electricity CI. RECs are the primary compliance instrument under the ETA. Each REC is a tradable, market-based instrument representing a megawatt hour (MWh) of renewable electricity generation. EDUs and other electricity providers in New Mexico and throughout the Western Energy Coordinating Council (WECC) can retire RECs each year each year under the Western Renewable Energy Generation Information System (WREGIS) to verify the portion of their electricity that is renewable. Any EDU or other electricity provider in New Mexico that has retired sufficient RECs to verify compliance with the ETA's RPS requirement in any year may retire RECs under the CTFP that are "incremental" or above the required amount.

When regulated parties purchase and retire RECs to generate credits under the CTFP, this leaves fewer RECs available for other electricity providers in New Mexico to purchase and retire for RPS compliance, and fewer RECs available for electricity providers in other WECC states with RPS programs that also trade in WREGIS. RPS compliance is generally not optional. Thus, as RECs are retired for incremental CTFP credit generation purposes, other RECs (and

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[140] D4 RIN prices are sourced from the EPA: https://www.epa.gov/fuels-registration-reporting-and-compliance-help/rin-trades-and-price-information
Soybean oil prices are sourced from the USDA Economic Research Service Oil Crops Yearbooks: https://ers.usda.gov/sites/default/files/_laserfiche/DataFiles/52218/Soy.xlsx?v=14534
Wholesale diesel prices are sourced from the US EIA: https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMA_EPD2D_PWG_NUS_DPG&f=M.

[141] BRG staff assume that RIN prices have a floor of $0.35 (in US$ 2023), based on the rounded minimum D4 RIN prices observed in the data. In calculating RIN value, BRG staff used biodiesel RIN equivalence values of 1.5 and renewable diesel RIN equivalence values of 1.7 in the FCMM. From CFR Title 40, §80.1425: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-80/subpart-M/section-80.1415..

[142] The Biodiesel Mixture Excise Tax Credit is also known as the Biodiesel Blender's Tax Credit

correspondingly new renewable electricity facilities) become needed to meet RPS requirements in the ETA and other state programs.

As a result, CTFP credits from incremental RECs have an “incremental cost,” like BBDs that BRG staff programmed the FCMM to consider to be a pure CTFP program cost from the standpoint of fuel markets. Zero-carbon renewable power projects that generate incremental RECs may have significant benefits for emissions, health, and job creation. However, from a fuel markets perspective the cost to purchase these credits for retirement in the CTFP only makes suppliers of these credits whole for the cost of generating them. The transfer of such credit revenue thus does not improve profitability to the credit generator nor create a new value stream that parties consuming, producing, importing, or dispensing transportation fuel for use in New Mexico can share.

Like RNG, these incremental RECs are use-constrained during the early compliance years of the program in the FCMM by the quantity of electricity consumed for BEVs and PHEVs. The value of incremental REC retirements for CTFP compliance purposes falls over time as grid electricity CIs fall when electric service entities in New Mexico and its regional neighbors become subject to stricter RPS requirements under the ETA. This causes the breakeven price of incremental REC retirement to rise over time to the point that REC prices eventually greatly exceed the CTFP credit revenue that they provide for regulated parties.

B.5.3.2 Data and methods

In the FCMM, BRG staff assumed that a regulated party must use a REC under the CTFP that is “bundled” with the renewable electricity provided. This means that to retire an incremental REC, the regulated party must do so within three quarters of the REC’s generation at a facility that is in the same US EPA Emissions and Generation Resource Integrated Database (EPA-eGRID) subregion as the FSE that dispenses electricity as transportation fuel. Meeting these and other requirements under Subsection (E) of the Revised Proposed New Rule 20.2.92.206 NMAC means that each incremental REC retired under the CTFP is a bundled REC.

BRG staff programmed the FCMM to assume a “bundled” REC price of $17.93/Megawatt-hour (MWh) ($2025), derived from the 2025 PNM proposed RPS rider.[143] In the FCMM, BRG staff estimated the bundled REC price with this derivation rather than direct market data. This is to address issues with a lack of such direct market data. Most RECs are typically bundled with energy in power purchase agreements (PPAs) or are bilaterally traded in transactions that do not have publicly observable trading prices.

BRG staff’s use of the bundled REC price for PNM in the FCMM is a conservative assumption because PNM and other New Mexico utilities in WECC tend to have substantially higher REC costs than New Mexico utilities in the Southwest Power Pool (SPP). SPP utilities lie in New

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[143] https://www.prc.nm.gov/wp-content/uploads/2024/07/RPS-Report-6-28-Final.pdf.

Mexico's portion of the Eastern Interconnect. They can purchase and retire excess RECs created principally from wind generation in the Texas portion of the Xcel service territory and neighboring portions of the SPP balancing authority.[144] In assuming WECC bundled REC prices for incremental RECs retired under the CTFP, BRG staff did not factor the opportunity for economically generated incremental RECs from the Eastern Interconnect that could serve to loosen CTFP credit markets and lower CTFP incremental compliance costs in the FCMM.

BRG staff calculated the offer price for REC retirement in the FCMM's CTFP credit supply curve (in \$/MTCO$_2$e) as the PNM bundled REC price (\$/MWh), divided by the product of:

1. The EER-adjusted CI delta of grid electricity compared to the CTFS (in MTCO$_2$e/MJ);[145] and
2. The energy density of electricity (in MJ/MWh).

This calculation conservatively uses in Item (1) the EER associated with grid electricity used to charge light-duty vehicles (LDVs). This is conservative because LDVs have a lower EER than HDVs for electricity. As a result, the CI delta for grid electricity used to charge LDVs comes from subtracting it from a lower EER-adjusted standard CI. This lower CI delta limits regulated parties' ability to generate CTFP credits from incremental REC retirements. This increases the cost of each CTFP credit earned from each incremental REC that a regulated party purchases and retires. This assumption tightens CTFP credit markets.

As discussed in **Section B.3**, BRG staff incorporated in the FCMM a single composite average statewide electricity for all demand in the state. If there is greater growth in EV demand in New Mexico electric service territories with a grid CI that is lower than the composite statewide average, then using this statewide average will serve to underestimate credits from BEV and PHEV charging generated in later years under the CTFP. In addition, using a statewide average grid CI limits the opportunities for New Mexico service territories with higher-than-average grid CIs to retire incremental RECs. If BRG staff had the FCMM model incremental REC retirements using utility-specific CIs, it is likely that this would result in a net increase in incremental REC retirements, and that the ratio of CTFP credit generation from incremental REC retirements compared to the cost of those retirements would increase. This is because higher-CI utilities would increase incremental retirements to a greater degree than lower-CI utilities would decrease their incremental REC retirements. Thus, running the FCMM using a single statewide average grid CI rather than utility-specific CIs reduces credit-generating opportunities both from shifting charging to areas with lower grid CIs and incremental REC retirements to areas with higher grid CIs. This conservative assumption in the FCMM limits credit generation from BEV and PHEV charging under the CTFP and increases the proportional cost.

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[144] Texas long ago surpassed its RPS requirements, meaning that the marginal alternative economic value of RECs in the region is for lower-value voluntary compliance markets like the Center for Resource Solutions Green-e REC program.

[145] EER-adjusted using the light-duty vehicle EER of 3.4.

B.5.4 Fuel Supply Equipment Credits

BRG staff programmed the FCMM to assume that Fuel Supply Equipment (FSE) credits are generated beginning in 2027 (the second year of the policy), with up to five percent of a prior year's deficit generation being eligible for credit generation in the subsequent year for each of light-duty FSE and medium/heavy-duty FSE. The percentage limit on FSE credits means that although they are made more economically attractive under high CTFP credit prices, they are use-constrained and treated as a non-incremental fuel in the FCMM.

B.6 Credit Banking

BRG staff assumed in the FCMM that regulated parties may use banked credits for CTFP compliance without limitations on their age.[146] BRG staff considered four main factors in using the FCMM to model regulated parties. As noted in **Section B.5**, the FCMM accounts for CTFP provisions under that allow regulated parties to generate credits that they bank to sell to other regulated parties in later periods ("banked for sale"). Regulated parties may also bank credits that they have generated or purchased to retire in a later period for CTFP compliance ("banked for compliance"). Although not explicitly modeled in the FCMM, regulated parties may also serve as intermediaries that purchase CTFP credits from one regulated party, bank them, and sell them to another regulated party in a later period ("banked for arbitrage").

BRG staff assumed in the FCMM that regulated parties may use banked credits for CTFP compliance without limitations on their age.[147] BRG staff considered four main factors in using the FCMM to model regulated parties decision of whether to bank credits – two benefits to regulated parties from factors (1) and (2), and two costs from factors (3) and (4):

1. **Compliance flexibility** Regulated parties can generate more credits than they or other regulated parties need for program compliance in earlier years of the CTFP. They can do this because the CTFP allows them to bank any surplus credits to sell or retire in later program years when the CI standard is stricter.

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[146] This is also true under the CTFP with the caveat that regulated parties under Paragraph (4) of Subsection (I) of the Revised Proposed New Rule 20.2.92.507 NMAC must pledge any credits banked for more than five years into a credit clearance market (CCM). In the CCM, however, regulated parties only need to sell their pledged credits if they receive the maximum credit price of $270 in 2026, adjusted for inflation in later years. BRG staff assume in the FCMM that this provision is non-binding on the vintage of banked credits because modeled credit prices do not reach this point, and regulated parties would likely sell all banked credits at a lower price point.

[147] This is also true under the CTFP with the caveat that regulated parties under Paragraph (4) of Subsection (I) of the Revised Proposed New Rule 20.2.92.507 NMAC must pledge any credits banked for more than five years into a credit clearance market (CCM). In the CCM, however, regulated parties only need to sell their pledged credits if they receive the maximum credit price of $270 in 2026, adjusted for inflation in later years. BRG staff assume in the FCMM that this provision is non-binding on the vintage of banked credits because modeled credit prices do not reach this point, and regulated parties would likely sell all banked credits at a lower price point.

   a. This provides regulated parties with “compliance flexibility” when they can economically generate or purchase credits in the current period, even if they exceed current CTFP compliance obligations, and still sell or retire them later.

2. **Option value** Banking credits for sale or arbitrage can allow a regulated party to sell them during periods of high credit prices to make a profit. In addition, banking for compliance can allow a regulated party to retire credits during high-credit price periods when purchasing them is more expensive.
   a. In both cases, banking provides an “option value” to regulated parties. This represents banking’s value as a way for regulated parties to prepare for increased future credit prices – either to make money from them (by banking for sale or arbitrage) or as a hedge (protection) from their effects (banking for compliance).
3. **Option risk** The “option risk” to a banked credit is converse to its option value. It represents the risk that a regulated party takes from holding banked CTFP credits if there turns out to be a loose supply-demand balance in future periods. This would result from high supply of credits relative to regulated parties’ compliance obligations and would have the effect of depressing CTFP credit prices over time.
   a. Depressed CTFP credit prices over time would impact all regulated parties that hold banked credits. Regulated parties that bank for sale or arbitrage would lose nominal value from selling CTFP credits at a lower future price. Regulated parties banking for compliance would experience an opportunity cost. For them, there is an economic loss from retiring banked CTFP credits in a later period when they are inexpensive relative to the value that they sacrificed to obtain them.
4. **Carrying cost** Regulated parties that hold credits exceeding their compliance obligation can either sell credits now to other regulated parties or bank them to sell or retire later.[148] A regulated party that decides to bank for sale or bank for arbitrage may receive a greater price from selling their banked credit as noted under factor (2). However, they are also foregoing revenue from selling the credit now.
   a. The “carrying cost” represents the lost value of money that the regulated party could have received from selling the credit in the current period. It can represent eroded value of that amount from inflation, foregone interest from lending or investing that drives revenue today, among other factors.
   b. Whereas the option risk outlined it factor (3) represents the risk of lost nominal value for a banked credit over time, the “carrying cost” represents the lost real value of the dollars that a banked credit could receive today over time.

B.6.2 Banking practice

Regulated parties are better able to understand some of the items listed in **subsection B.6.1** compared to others. They generally have a good idea of the compliance flexibility that credit banking offers in factor (1) and the carrying cost of holding banked credits in factor (4). By

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[148] Even in periods where the number of credits generated exceeds regulated parties’ total CTFP compliance obligation, regulated parties can still sell credits to other regulated parties that can bank them.

contrast, the option value and option risk represented by factors (2) and (3) will vary based upon a regulated party's foresight and expectations.

In practice, regulated parties in states with CTFP-like programs have recently encountered option risk (factor 3) more than option value (factor 2) in holding banked credits. In California and Washington, policy efforts have focused on mechanisms to strengthen programmatic CI reduction targets in cases where credit prices are structurally low. The initial cost-benefit analysis in the Washington CFS rulemaking found similar long-term potential for write-downs of bank balances due to a looser supply-demand balance in future credit markets.

However, even when there has been a reasonable expectation of option risk, regulated entities in states with CTFP-like programs have empirically banked credits in early years. This suggests that many regulated parties attribute significant weight to the compliance the compliance flexibility in item (1) and the option value in item (2) of holding banked credits. Regulated parties have even maintained bank balances into periods of declining credit prices.[149]

B.6.3 Banking assumptions

To account for both the factors outlined in **Subsection B.6.1** and the observed practices discussed in **Subsection B.6.2**, the FCMM establishes banking targets to model these factors influencing credit banking behavior.

The FCMM assumes that regulated parties have imperfect foresight over CTFP credit prices. It operates on the assumption that regulated parties understand that demand for CTFP credits will rise based upon publicly observable factors like the program's proposed CI curve, but do not have perfect insight into future credit prices. Specifically, the FCMM models final CTFP credit banking quantities and final credit prices using an "imperfect foresight" 50/50 interpolation between the credit banking volumes that would occur under "perfect foresight" and "minimal foresight" scenarios as described below. The "imperfect foresight" represents an arithmetic average between outcomes for banked CTFP credit quantities and CTFP credit prices under the modeled "perfect foresight" and "minimal foresight" projections.

Under "perfect foresight," BRG staff assumed regulated parties know exactly what CTFP credit prices will be and bank accordingly. Under "minimal foresight," BRG staff assumed that regulated parties have only a basic understanding of the market and publicly available information like the CTFP's annual CI decline curve.

The main difference between the two is that under "perfect foresight" regulated parties can know how their own and one another's banking decisions, as well as other factors like feedstock and petroleum prices, cause future CTFP credit prices to change and can adjust their

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[149] One possible explanation for this is that there is an option value in item (2) from regulated parties' risk-aversion to the cost of compliance rising periods of tight credit market that goes beyond its likelihood of occurring. If so, this would ensure a market for credit banking even if loose credit markets and their associated option risk under item (3) were the more likely future outcome.

banking decisions accordingly. If CTFP credit prices enter a period of decline, this results less banking and relatively higher future CTFP credit demand under "perfect foresight" than under "minimal foresight." Under "minimal foresight," regulated parties know what future CTFP credit demand will be due to tightening CI standards but do not have any information about future CTFP credit prices. During periods of falling CTFP credit prices, a "minimal foresight" scenario results in a degree of "over-banking" that reduces future CTFP credit demand. Although this exacerbates the "option risk" of banking from factor (3) and increases the "carrying cost" of banking from factor (4) in **Subsection B.6.1**, the outcomes under "imperfect foresight" more closely match the observed from states with CTFP-like programs discussed in **Subsection B.6.2**.

Thus, although the "perfect foresight" outcomes more closely align with expectations for regulated parties that are profit-maximizing and cost-minimizing if they have perfect information, the "imperfect foresight" outcomes hem closer to empirically observed experience. Some divergence between theoretical and observed outcomes in states with a CTFP-like program may be due to a greater than expected value to CTFP-credit banking as a hedge (part of its option value in factor 2), combined with regulated parties genuinely having only imperfect foresight.

B.6.4 Results

In the FCMM, BRG staff projected under the "imperfect foresight" interpolated scenario shows that the quantity of banked CTFP credits peaks in 2030. One reason for this is that the CTFP's proposed CI reduction targets rise at an accelerated rate until 2030. This induces regulated parties to generate and bank greater CTFP credit quantities each year in anticipation of these accelerated CI reductions. Because New Mexico's ZEV penetration rates are lower in these earlier years of the program as discussed in **Appendix A**, much of this banked credit generation comes from increased BBD blending. This is particularly true for RD since it serves as the marginal credit-generating fuel as discussed in **Subsection B.5.2**.

Beginning in 2030, CTFP CI targets decline at a flat rate of one percentage point each year. This linear decrease, combined with greater credits from vehicle-specific fuels as ZEV penetration increases, mean that regulated parties no longer over-generate CTFP credits with BBD blending. As a result, there are net withdrawals of banked credits after 2030. Credit prices fall as the linear decrease in CI reduction targets, available banked credits, and greater contribution of vehicle-specific fuels serve to loosen CTFP credit markets.[150] Regulated parties respond to the lower CTFP credit prices after 2030 by reducing BBD blend rates, as well as RNG blending and incremental REC purchasing and retirement. In 2035 the program becomes "non-binding" as regulated parties meet their compliance targets with a combination credits

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[150] Although under "perfect foresight" regulated parties can reduce pre-2030 credit over-generation and banking in anticipation of this, their ability to do so is limited under "imperfect foresight" and in the observed outcomes in states with CTFP-like programs.

generated from the consumption of vehicle-specific fuels and, in 2036 only, FSE credits. **Section B.7** describes this in more detail.

B.7 Why and When Policy Binds

The CTFP "binds" in the FCMM when regulated parties must supply incremental credits to meet their compliance obligation for current and future years. For a single year, this occurs when regulated parties generate enough non-incremental credits to cover their deficits. As discussed in **Section B.5**, non-incremental credits are credits from sources like fleet-specific fuel quantities that do not explicitly increase or decrease as a function of the CTFP credit market. However, because BRG staff included the banking component in the FCMM discussed in **Section B.6**, there is an additional layer of complexity. BRG staff deemed that the CTFP was binding in the FCMM when regulated parties cannot cover current and anticipated future compliance obligations using their available credit bank balance plus current and anticipated future non-incremental credits. When this occurs, regulated parties must purchase CTFP credits from incremental sources like RNG, BBDs, and incremental REC retirements that are only feasible with program revenue. Regulated parties purchase these incremental CTFP credits either to cover current deficits or to build a credit bank balance that allows them to more economically do so in the future.

When the CTFP does not bind in the FCMM, this means that regulated parties can cover all current and future compliance obligations with a combination of their credit bank balance and non-incremental credits in the current and future periods. When this occurred, BRG staff had the FCMM modeled all credits that regulated parties need to meet their compliance obligation as available at no additional cost. A combination of vehicle-specific fuel use, ethanol blending, credit bank balances, and capacity credits generated from existing FSE satisfy the need for CTFP credits. In the FCMM, BRG staff assumed that CTFP program revenue is not a relevant or determining factor in the supply of credits that regulated parties generate from such non-incremental sources. As a result, regulated parties can achieve program compliance with credits from these sources while effectively bargaining the CTFP credit price down to zero. This causes the CTFP credit market to "collapse" or become "non-binding."

Given assumptions about credit banking, statewide travel patterns, and assumptions about policies working alongside the CTFP affecting statewide grid cleanliness and ZEV uptake, BRG staff found in the FCMM that the CTFP is binding through 2035. Major factors in this period include lower ZEV penetration rates, a higher-CI statewide electric power grid, and an accelerated annual increase in reductions to the CI standard through the 2020s. As a result, regulated parties need a positive CTFP credit price to generate incremental credits for current and future use through the 2020s. However, large banked-credit inventory builds, and a lower-CI statewide power grid under the ETA combined with greater statewide ZEV use under the NMVES cause the incremental CTFP credit demand to decline annually as the credit supply-demand balance loosens into the 2030s. In the 2030s there is a flattening in the rate of reductions to the CI standard that further loosens CTFP credit markets and causes BBD blending rates to decline beginning in 2032. This trend continues until 2035. After that year, the CTFP becomes non-binding as regulated parties can use non-incremental credits to achieve CTFP compliance at a credit price that "collapses" towards $0/MTCO$_2$e. This remains the case through the policy's final CI standard reduction year of 2040.

B.8 Discussion of Conservative Assumptions

B.8.1 Use in FCMM

As discussed throughout this Appendix, BRG staff layered on numerous conservative (low-benefit / high-cost) assumptions into the FCMM. Generally, when there is an issue that is uncertain, BRG staff programmed assumptions into the FCMM that increase the cost to regulated parties of generating, purchasing, and retiring CTFP credits to satisfy their program compliance obligation.

Often, such assumptions resulted in transportation fuels generating fewer credits in the FCMM than in other states or that they may ultimately generate in New Mexico. For example, BRG staff had the FCMM assume that regulated parties source all RNG credited with thermal RECs under the CTFP from WWTP and landfill methane gas capture. Biomethane from such facilities generates fewer credits when claimed by a regulated party that produces, imports, or dispenses CNG under the CTFP when compared to biomethane from lower-CI biomethane captured from dairy operations. As discussed in **Subsection B.5.2** credit generation from RNG is "use-constrained" because it is limited to the CNG quantities that regulated parties produce, import, or dispense for use in New Mexico each year. Thus, limiting the credits generated from each thermal REC places a binding limit on the total CTFP credits that RNG can provide each year under the program that tightens CTFP credit markets, leading to higher credit prices.

Such conservative assumptions can also result from a high assumed cost of generating, purchasing, or retiring credits themselves under the CTFP. An example of this is BRG staff's FCMM modeling assumption that regulated parties will pay the bundled price for RECs from the 2025 PNM proposed RPS rider. As noted in **Subsection B.5.3**, this assumes a high price for purchasing incremental RECs because PNM is in the WECC region. The WECC includes numerous states where electric service providers must purchase RECs to satisfy stringent RPS requirements, increasing their costs relative to any incremental RECs purchased in the SPP. In this case, it is the high price of RECs themselves that increases CTFP credit costs by not accounting for CTFP credits from RECs that regulated parties may purchase and retire more cheaply in the Eastern Interconnect.

BRG staff used the FCMM to model CTFP credit markets with these conservative assumptions alongside an "on-the-books" policy approach, as detailed in **Section B.4**. This approach assumes state and federal legislation and regulation that is legally applicable and it excludes actions that may signal an intent to change laws and legal code. For the FCMM, BRG staff did not consider preliminary orders, legislation that is drafted or in progress, or laws and executive actions that are announced or under legal review. Establishing such a minimum threshold for policy to consider is important because it prevents the inclusion of any policy choices that may prove transitory and the need to constantly remodel or update the findings of this report with each headline or shift in the political landscape.

In some cases, the “on-the-books” approach could rule out policy shifts that may serve to tighten CTFP credit markets. These include for example the reinitiation of tariffs that could increase the cost of imported unused cooking oil (UCO) or tallow used to produce BBDs in states with CTFP-like programs, or the adoption of CTFP-like programs in additional jurisdictions. Such changes could increase demand for BBDs and make incremental CTFP credits more expensive. However, in the case of global trade barriers, it could also reduce the price of BBDs from soy-based feedstocks if domestic soy prices fell in response to reduced US soy exports. Thus, in different cases, the “on-the-books” approach may or may not result in conservative CTFP assumptions. Nonetheless, BRG staff incorporated this approach into the FCMM to establish a minimum threshold for what changes to model.

B.8.2 Application to Specific Transportation Fuels

B.8.2.1 Fleet and VMT assumptions

As discussed in **Appendix A** and **Subsection B.1.1**, BRG staff programmed the FCMM to assume no change in fleet or travel by vehicle class or type from an NMVES baseline. BRG staff developed the FCMM to operate on the assumption that drivers did not drive fewer miles with vehicles that use deficit-generating fuels nor more miles in vehicles that use vehicle-specific credit-generating fuels, despite the CTFP’s impact on the economics of each. Any change in fleet composition or VMT in New Mexico in response to CTFP fuel market economics would likely loosen credit markets by increasing the quantity of available program credits relative to program deficits.

Instead, by assuming no change in underlying fleet and VMT by vehicle class and type from the NMVES baseline, BRG staff had the FCMM require that regulated parties generate sufficient credits for CTFP compliance from producing, importing, or dispensing for use in New Mexico increased quantities of credit-generating drop-in fuels, incremental REC retirements, and FSE credits, as discussed in this section.[151] Of these, the only options that BRG staff included in the FCMM that are marginal and not always blendwall- or use-constrained are RD and incremental RECs. The accelerated rise in the breakeven cost of credit generation with incremental RECs effectively makes RD the marginal credit generator in the FCMM.

The explicit limits on credits from vehicle-specific fuels over the NMVES baseline that BRG staff incorporated into the FCMM, as well as the ability of other drop-in fuels to satisfy CTFP compliance obligations created a relatively greater need for RD to fill the gap between CTFP credits and deficits. This was particularly important in early program years when the CTFP was

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[151] BRG staff made adjustments to the NMVES baseline in the FCMM that increase this effect. These adjustments result in fewer BEVs and more ICE vehicles fleet upward from MOVES5 output to better reflect pre-NMVES vehicle sales data.

"binding" because vehicle-specific transportation fuels and non-BBD drop-in fuels do not generate sufficient credits to satisfy CTFP compliance obligations, as discussed in **Section B.7**. Because RD requires greater CTFP credit prices for regulated parties to profitably blend it into their diesel pool, this is a conservative assumption that results in higher CTFP credit prices than might otherwise occur in the FCMM.

B.8.2.2 Fuel assumptions

BRG staff incorporated conservative assumptions into the FCMM about fleet and VMT that increase reliance on incrementally more expensive RD volumes in early program years when the CTFP binds. In addition, BRG staff included transportation fuel assumptions in the FCMM that added to its conservative bent. Below is a list of the most prominent of these assumptions, discussed throughout this Appendix:

- For ethanol, BRG staff had the FCMM assume that the blend wall is retained at 10 percent by volume. It does not account for any increased blending rates due to EPA waivers. BRG staff also did not consider in developing the FCMM the possibility that regulated parties could produce, import, or dispense lower-CI ethanol for use in New Mexico. This was despite incentives under the CTFP for regulated parties to generate credit revenue from doing so, in addition to empirical evidence that such activity has occurred in other states which have adopted CTFS-like policies.
- For RNG, BRG staff incorporated the assumption that regulated parties in the FCMM could only generate RNG credits from biomethane captured from landfills or WWTPs.[152] BRG staff did not have the FCMM account for greater credit-generating opportunities via biomethane captured from ADs in livestock operations. In practice, this can increase the quantity of credits provided from use-constrained RNG quantities. This has occurred in states with CTFP-like programs in response to this pathway's lower CI score that accounts for avoided methane emissions that occur under traditional (non-AD) livestock practices. BRG staff's decision to preclude such avoided emission crediting tightens the FCMM's CTFP credit market.
- For grid electricity, BRG staff had the FCMM assume a single statewide CI average. This assumption, together with assumptions regarding REC pricing and credit-generating potential, reduced the average quantity and feasibility of incremental RECs retired under the CTFP in the FCMM, while increasing the average cost of incremental REC retirement.
- For BD and RD, BRG staff incorporated conservative assumptions into the FCMM about support from RINs generated, traded, and retired under the federal RPS and federal 45Z tax credit. This increased the portion of BD and RD costs that CTFP credit prices needed to cover for regulated parties to feasibly produce, import, and dispense BBDs for use in New Mexico. In years when the CTFP policy was binding, requiring credits from BBD quantities to satisfy compliance obligations, this increased CTFP

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[152] Under the CTFP, regulated parties can generate such RNG credits via either direct RNG fuel delivery or from trading and retiring thermal RECs using book-and-claim per Paragraph (C) of Revised Proposed New Rule 20.2.92.201 NMAC.

program costs. Passage of House Resolution 1 under the 119th Congress in July 2025 removes ILUC values from consideration under 45Z which further makes exclusion of 45Z from BBD production costs a conservative assumption.[153]
    - In the FCMM, BRG staff also conservatively assumed that regulated parties did not produce, import, or dispense BD for use in New Mexico at blending rates that exceed five percent of New Mexico's diesel blending pool. This B5 blendwall limited credits from BD in years when the CTFP was binding, despite evidence of BD blending beyond B5 in states with CTFP-like programs.[154,155,156]
- BRG staff did not program the FCMM to assume any credit generation opportunities from regulated parties that decide to "opt-in" for transportation fuels that they produced, imported, or dispensed for exempt uses in New Mexico. Such exempt uses under the CTFP pursuant to the Revised Proposed New Rule 20.2.92.102 NMAC included transportation fuel for agricultural or industrial equipment (e.g. dyed fuel suppliers) until 2029, as well as transportation fuel for locomotives, aircraft, electrified fixed guideway vehicles, or offload electric equipment like forklifts, transport refrigeration units, or cargo handling equipment at railroads through the duration of the program.
    - Regulated parties have generated significant credits in states with CTFP-like programs from producing, importing, or dispensing transportation fuels for such "opt-in" uses. However, BRG staff conservatively assumed in the FCMM that regulated parties could not benefit from such options in New Mexico even when such options may prove feasible, tightening modeled credit markets.
- Although BRG staff programmed the FCMM to consider CTFP credits in binding years from regulated parties producing, importing, or dispensing BBDs for use in New Mexico's diesel blending pool, BRG staff did not program the FCMM to make any such assumptions about the use of renewable gasoline blendstocks like renewable gasoline or renewable naphtha in New Mexico's gasoline blending pool.
    - Such renewable gasoline blendstocks are far less prevalent than BBDs. However, regulated parties have produced, imported, or dispensed empirically observed quantities of renewable gasoline blendstocks to generate credits in states with CTFP-like programs.
- In the FCMM, BRG staff conservatively assumed that regulated parties did not generate any "project credits" from projects to lower the CI of deficit-generating transportation fuels in New Mexico. Under the CTFP, regulated parties may apply for such project credits after 2030 pursuant to the Revised Proposed New Rule 20.2.92.306 NMAC.

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[153] See **Section B.4.2**

[154] In 2024, BD volumes accounted for approximately nine percent of the diesel blending pool in Oregon and seven percent of California's diesel blending pool.

[155] California Air Resources Board. "quarterlysummary_Q42024." Spreadsheet. May 2025. https://ww2.arb.ca.gov/sites/default/files/2025-05/quarterlysummary_Q42024_0.xlsx.

[156] Oregon Department of Environmental Quality. "Quarter 4 Spreadsheet." Spreadsheet. https://www.oregon.gov/deq/ghgp/Documents/cfpQ42024.xlsx.

This list of conservative assumptions is non-exhaustive. However, it serves to highlight many of the ways in which the CTFP program cost results from the FCMM lean towards generating high program costs whenever doing so is consistent with the model's overall logic. This contributes to the BCA's overall approach of using conservative assumptions in modeling the CTFP's overall impact.

B.9 GHG Impacts and the Social Cost of GHGs

B.9.1 Social Cost of Carbon

This section outlines the methodology for estimating the value of GHG reductions under the CTFP-only and NMVES + CTFP scenarios. In the FCMM, BRG staff established a value for these GHG reductions using the social cost of carbon (SCC). The SCC measures the net near- and long-term modeled effects on global human well-being from each unit of GHG emissions (in CO_2e) and the commensurate impact of reducing such emissions. The net effect for the purpose of this analysis refers to a "net harm" equal to the difference between negative and positive future GHG impacts. These include changes in net agricultural productivity, human health effects, property damage from increased flood risk, changes in the frequency and severity of natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services. Such effects are limited to those with observable data for modeling and are thus not fully comprehensive.[157]

In 2009, the Office of Management and Budget (OMB) and the Council of Economic Advisors (CEA) established the Interagency Working Group on the Social Cost of Carbon (IWG-SCC) to establish guidelines for assessing the SCC. The IWG-SCC produced a Technical Support Document (TSD) in 2010 and revised estimates in 2013.[158] In 2023, the US EPA built on the IWG-SCC's work in the EPA Report on the Social Cost of Greenhouse Gases (SC-GHG). The SC-GHG report references IWG's 2021 TSD, which standardized estimates in $2020 USD and provided a methodology to convert them to future years.[159]

For this BCA, BRG staff incorporated into the FCMM the SC-GHG report's value of $190/MTCO$_2$e (in $2020 USD) for the social cost of carbon dioxide (SC-CO_2) assuming a two-percent net present value discounting rate.[160] The $190/MTCO$_2$e value is an average of values from the University of Chicago Climate Impact Lab's Data-driven Spatial Climate Impact

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[157] US Environmental Protection Agency. "Supplementary Material for the Regulatory Impact Analysis for the Final Rulemaking, 'Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review.'" November 2023. Docket ID No. EPA-HQ-OAR-2021-0317. https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf.

[158] US Government Accountability Office (GAO). "Regulatory Impact Analysis: Development of Social Cost of Carbon Estimates." GAO-14-663. August 25, 2014. https://www.gao.gov/products/gao-14-663.

[159] Source in **Footnote 157**.

[160] Source in **Footnote 157**. Table 4.1.1: Estimates of the Social Cost of Greenhouse Gases (SC-GHG), 2020-2080 (in 2020 dollars per metric ton). Page 101.

Model (CIL-DSCIM),[161,162,163] Resources for the Future's Greenhouse Gas Impact Value Estimator (RFF-GIVE) model,[164] and a meta-analysis-based global damage function.[165] The US-EPA's analysis provides an overview of each of these models and how their findings contribute to final results. BRG staff took the SCC for 2020, 2030, and 2040 respectively, from Table 4.1.1 in the SC-GHG report for CO_2 (SC-CO_2), converted these values from 2020$ to 2024$,[166] and interpolated them annually for purposes of GHG benefit calculation. **Table B-6** shows the resulting SCC values from this calculation used in this BCA.

Table B-6. Social Cost of Carbon used for GHG impact quantification (2024$/MT)

Year	Social Cost of Carbon
2026	$252.98
2027	$257.71
2028	$262.44
2029	$267.17
2030	$271.90
2031	$276.63
2032	$281.35
2033	$286.08
2034	$290.81
2035	$295.54
2036	$300.27
2037	$305.00
2038	$309.73
2039	$314.46

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[161] Climate Impact Lab (CIL), 2023. Documentation for Data-driven Spatial Climate Impact Model (DSCIM), Version 092023-EPA. https://impactlab.org/research/data-driven-spatial-climate-impact-model-user-manual-version-092023-epa/.

[162] Carleton, T., Jina, A., Delgado, M., Greenstone, M., Houser, T., Hsiang, S., Hultgren, A., Kopp, R.E., McCusker, K.E., Nath, I., Rising, J., Ashwin, A., Seo, H., Viaene, A., Yaun, J., and Zhang, A., 2022. 110 Valuing the Global Mortality Consequences of Climate Change Accounting for Adaptation Costs and Benefits. The Quarterly Journal of Economics, 137(4), pp. 2037–2105. https://gspp.berkeley.edu/assets/uploads/research/pdf/SSRN-id3224365.pdf.

[163] Rode, A., Carleton, T., Delgado, M., Greenstone, M., Houser, T., Hsiang, S., Hultgren, A., Jina, A., Kopp, R.E., McCusker, K.E. and Nath, I., 2021. Estimating a social cost of carbon for global energy consumption. Nature, 598(7880), pp.308-314. https://www.nature.com/articles/s41586-021-03883-8.

[164] Rennert, K., Errickson, F., Prest, B.C., Rennels, L., Newell, R., Pizer, W., Kingdon, C., Wingenroth, J., Cooke, R., Parthum, B., Smith, D., Cromar, K., Diaz, D., Moore, F., Müller, U., Plevin, R., Raftery, A., Ševčíková, H., Sheets, H., Stock, J., Tan, T., Watson, M., Wong, T., and Anthoff, D., 2022. Comprehensive evidence implies a higher social cost of CO2. Nature. 610(7933), 687-692. https://www.nature.com/articles/s41586-022-05224-9.

[165] Howard, P.H. and Sterner, T., 2017. Few and not so far between: a meta-analysis of climate damage estimates. Environmental and Resource Economics, 68(1), pp.197-225. https://www.researchgate.net/publication/317975532_Few_and_Not_So_Far_Between_A_Meta-analysis_of_Climate_Damage_Estimates.

[166] Converted using the US Bureau of Economic Analysis Personal Consumption Expenditures Price Index (PCEPI). See **Footnote 61** for source.

2040	$319.18

B.9.2 Total GHG impact

With SCC values, BRG staff could use the FCMM to calculate the effect of GHG emissions reductions from the CTFP-only and from the NMVES + CTFP policy suite scenarios. To do this, BRG staff programmed the FCMM to consider GHG emissions from the federal baseline projection, the NMVES baseline projection, and the FCMM modeling for the CTFP policy projection as shown in **Figure 13** of the main report. For each modeling year, BRG staff first used the FCMM to calculate each policy's impact on GHG emissions from each transportation fuel pathway in a policy projection. Each fuel pathway's GHG emissions are the product of its CI and the quantity of fuel in the pathway that regulated parties produce, import, or dispense for use in New Mexico. Adding the GHG emissions across all fuel pathways produces total GHG emissions for each of the three policy projections. The difference in total GHG emissions between the CTFP policy projection and the NMVES baseline provides GHG reductions from the CTFP-only scenario, while the difference in total GHG emissions between the CTFP policy projection and the Federal baseline projection provides GHG reductions from the NMVES + CTFP policy suite scenario.

The final step to determine the value of GHG reductions in the CTFP-only and the NMVES + CTFP policy suite scenarios is to multiply their respective GHG reductions by the SCC. For each year, BRG staff used the FCMM to convert the final values from $2020 USD to $2024 USD to match all other BCA benefits and costs. To do this, BRG staff incorporated the Personal Indexes for Personal Consumption Expenditures by Major Type of Product from U.S Bureau of Economic Analysis (BEA) into the FCMM.[167]

C COBRA Modeling of Health Impacts

C.1 Background

C.1.1 Adverse health effects from vehicle emissions

New Mexico's clean transportation fuel program (CTFP), if enacted, will help reduce statewide transportation emissions by lowering the overall CI of the transportation fuel supply through a clean fuel credit market. The reduction of vehicle tailpipe emissions will mitigate criteria air pollutants and precursors that exacerbate respiratory symptoms, thereby improving health outcomes. These outcomes include mitigating asthma onset and aggravation, cardiovascular

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[167] See **Footnote 61**.

disease, reduced lung function, and premature death. Adverse health impacts are especially harmful to vulnerable populations including older adults, children, and pregnant individuals.[168]

Asthma is one of the most common chronic diseases in New Mexico, with an estimated 9.7 percent of adults afflicted by the disease.[169] Asthma can require hospitalization, routine checkups, medications, and missed work days, which can be costly to the individual and New Mexico's economy.[170] Criteria and precursor pollutant reductions can yield health benefits that are economically quantifiable in monetary (dollar) units. For example, a study in California between 1993 and 2014 found that fine PM and NO_x reductions could reduce the risk of incident asthma in children by up to 20 percent.[171]

C.1.2 Monetization of health impacts

ERG input emissions changes, as shown in Table 4-12 from Chapter 4, into EPA's Co-Benefits Risk Assessment (COBRA) Health Impacts Screening and Mapping Tool to assess the CTFP's statewide health impacts.[172] Once a COBRA user inputs potential emission increases or decreases, COBRA conducts multiple modeling steps to monetize health benefits and/or damages. COBRA uses the Source Receptor (S-R) Matrix, an air quality model, to estimate changes in total ambient concentrations of air pollutants that are known to be harmful to human health.[173] COBRA uses peer-reviewed epidemiological literature to estimate how changes in outdoor air quality affect the incidence of various health outcomes.[174] COBRA then multiplies the change in incidence by a monetary value associated with the health outcomes like the average cost of an emergency room visits for exacerbated asthma symptoms. Detailed descriptions of these monetization processes can be found in COBRA's User Manual.[175]

C.2 Modelling

C.2.1 COBRA description

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[168] New Mexico Environmental Public Health Tracking, "NM-Tracking - Asthma," Asthma, May 2025, https://nmtracking.doh.nm.gov/health/breathing/Asthma.html.

[169] New Mexico Environmental Health Tracking.

[170] NMIBIS, "NM-IBIS - Summary Health Indicator Report - Asthma Prevalence among Adults," accessed May 23, 2025, https://ibis.doh.nm.gov/indicator/summary/AsthmaPrevAdult.html.

[171] Erika Garcia et al., "Association of Changes in Air Quality With Incident Asthma in Children in California, 1993-2014," JAMA 321, no. 19 (May 21, 2019): 1906–15, https://doi.org/10.1001/jama.2019.5357.

[172] OAR US EPA, "CO-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA)," Collections and Lists, April 22, 2020, https://www.epa.gov/cobra.

[173] OAR US EPA, "COBRA Questions and Answers," Data and Tools, March 17, 2021, https://www.epa.gov/cobra/cobra-questions-and-answers.

[174] OAR US EPA, "User's Manual for the CO - Benefits Risk Assessment (COBRA) Screening Model," Data and Tools, June 26, 2017, https://www.epa.gov/cobra/users-manual-co-benefits-risk-assessment-cobra-screening-model.

[175] See Footnote 90.

COBRA allows users to better understand how changes in air pollution from clean energy and fuel programs can impact human health.[176] ERG analyzed the potential health impacts of the CTFP on New Mexico residents under the "CTFP-only" and "NMVES + CTFP" scenarios described in Subsection 4.1. Under CTFP-only, health impacts occurred from calendar year 2026 to 2035, the final year that the CTFP projected to be "binding" on New Mexico transportation fuel markets.[177] The second scenario includes combined health impacts under NMVES + CTFP, which accounts for CTFP's impacts as a standalone policy as well as a supporting policy for the NMVES. This analysis modeled NMVES + CTFP scenario effects from calendar year 2026 to 2040 under the assumption that CTFP-supported infrastructure and other measures continue to support NMVES fleet and VMT impacts even after the CTFP ceases to bind on regulated parties.

ERG ran COBRA each calendar year with tailored human population projections and analyzed four criteria air pollutants across New Mexico: 1) particulate matter with diameters of 2.5 microns or less ($PM_{2.5}$), sulfur dioxide (SO_2), 3) nitrogen oxides (NO_x), and 4) volatile organic compounds (VOC). All results are presented in 2024 $US using a discount rate of 2%.

With changes in pollutants input, COBRA exports results for the following health outcome categories:

- Mortality [low and high estimates]

- Asthma
  - Symptoms
  - Asthma onset

- Emergency room visits
  - Respiratory
  - All cardiac outcomes
  - Asthma

- Hospital admittance
  - Respiratory
  - Cardio cerebral and peripheral vascular disease
  - Alzheimer's Disease
  - Parkinson's Disease
  - Stroke incidence
  - Out of hospital cardiac arrest incidence

- Onset
  - Hay fever/rhinitis incidence
  - Nonfatal heart attacks
  - Lung cancer incidence

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[176] US EPA, "What Is COBRA?"

[177] For more information on when and why the CTFP "binds," see Subsection 5.1.3 and Appendix B.7.

- Other impacts
    - Minor restricted activity days
    - Work loss days
    - School loss days

C.2.2 Model updates and enhancements

ERG used the COBRA Desktop Edition version 5.1.[178] This version includes an updated Source-Receptor (SR) matrix and health impacts associated with ozone formation. This allowed for additional health outcome categories such as school loss days, asthma symptoms, and hospital admittance for illnesses including Alzheimer's Disease and Parkinson's Disease. These categories are additional to those that ERG modeled for NMVES.[179]

C.2.3 Custom population data for New Mexico

ERG imported custom annual population projections into COBRA for 2026-2040 to estimate health benefits from future emission changes. EPA provides Environmental Benefits Mapping and Analysis Program (BenMAP) population datasets that ERG formatted for COBRA.[180] The BenMAP data is provided in five-year increments from 2030-2050. ERG utilized the BenMAP data because COBRA requires population data with projections for each age and county. However, the BenMAP data is national and the estimates for New Mexico were higher than projections from state-level sources.

ERG tailored the BenMAP data to align with the University of New Mexico's (UNM) population projections, which include projections for each county in New Mexico from 2010-2050 in five-year increments.[12] UNM's projections from 2025-2040 are displayed in **Table C-1**. To estimate New Mexico's projected county-level population in years outside of those five-year increments, ERG calculated the population each year between 2025 and 2040 using a series of linear regressions for each 5-year increment. ERG adjusted BenMAP's age-specific population projections to be proportional to the UNM county-level population estimates for New Mexico. Although national health benefits were not evaluated, ERG ran COBRA with the national estimates for other states to allow for flexibility if other state impacts were assessed.

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[178] OAR US EPA, "COBRA Revision History," Data and Tools, February 14, 2022, https://www.epa.gov/cobra/cobra-revision-history.

[179] See **Footnote 31**.

[180] OAR US EPA, "COBRA Future Input Files," Data and Tools, April 22, 2024, https://www.epa.gov/cobra/cobra-future-input-files.

Table C-1. UNM Population Projections for New Mexico for 2025, 2030, 2035, and 2040

County	Projected 2025	Projected 2030	Projected 2035	Projected 2040
Bernalillo	680,584	683,372	684,673	684,461
Catron	3,539	3,454	3,340	3,193
Chaves	64,822	64,303	63,626	62,740
Cibola	27,045	26,917	26,751	26,536
Colfax	11,859	11,156	10,275	9,170
Curry	48,474	48,504	48,524	48,532
De Baca	1,568	1,417	1,233	1,006
Dona Ana	224,218	228,058	230,554	231,449
Eddy	65,964	69,139	70,992	71,376
Grant	27,482	26,599	25,491	24,077
Guadalupe	4,326	4,179	3,996	3,762
Harding	646	624	596	560
Hidalgo	3,826	3,466	3,030	2,497
Lea	78,781	82,337	84,395	84,796
Lincoln	20,255	20,123	19,945	19,716
Los Alamos	19,857	20,439	20,791	20,883
Luna	25,500	25,593	25,658	25,687
McKinley	72,972	72,761	72,486	72,203
Mora	3,933	3,599	3,190	2,684
Otero	68,287	68,736	68,780	68,821
Quay	8,536	8,356	8,128	7,835
Rio Arriba	40,266	40,247	40,217	40,185
Roosevelt	19,095	18,986	18,712	18,421
Sandoval	157,468	164,648	169,117	170,460
San Juan	119,657	117,590	113,548	109,362
San Miguel	26,064	24,902	23,435	21,577
Santa Fe	160,347	164,745	167,424	168,148
Sierra	11,323	11,064	10,735	10,313
Socorro	16,008	15,408	14,713	13,992
Taos	35,367	35,949	36,300	36,391
Torrance	14,575	13,947	13,145	12,126
Union	3,895	3,709	3,444	3,178
Valencia	77,118	77,320	77,536	77,825
State Total	**2,143,658**	**2,161,645**	**2,164,780**	**2,153,964**

Table C-2 presents an example of New Mexico population data that ERG inputted into COBRA, after adjusting BenMAP's data to be proportional to UNM's total population estimates per county. While the tailored population data has estimates for each individual age, provides a more condensed overview of the age distributions. According to UNM, New Mexico's current population is aging, and the overall population is expected to start declining by 2035.[181] From 2026 to 2040, the largest increases in percentage terms are expected for the 85 and over age group. This is particularly relevant to the health benefits because older adults are more susceptible to respiratory illness caused by criteria and precursor pollutants.[182]

Table C-2. Customized New Mexico Population for 2026 and 2040 for COBRA

Age Group	2026	2040	Percent Change
0	29,419	27,141	-8%
1 to 4	119,367	109,378	-8%
5 to 9	148,969	138,328	-7%
10 to 14	147,204	140,769	-4%
15 to 19	118,111	142,373	21%
20 to 24	132,390	137,139	4%
25 to 29	123,627	120,020	-3%
30 to 34	125,769	124,558	-1%
35 to 39	156,191	124,643	-20%
40 to 44	138,569	123,842	-11%
45 to 49	129,708	138,605	7%
50 to 54	107,758	132,058	23%
55 to 59	104,494	122,996	18%
60 to 64	111,706	107,482	-4%
65 to 69	135,993	98,038	-28%
70 to 74	122,938	94,089	-23%
75 to 79	95,055	96,255	1%
80 to 84	67,342	82,585	23%
85 and over	44,530	93,663	110%

C.2.4 On-road and off-road fuel assumptions

For the CTFP scenario, ERG ran COBRA separately for the on-road and off-road changes in emissions to appropriately assign emission categories. ERG used the Highway Vehicles category for the on-road CTFP emissions and for all NMVES emissions. For the off-road component of the CTFP emissions, ERG used the Off-Highway category. ERG used the highest emission categories opposed to more granular categories by fuel type because this program is

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[181] The University of New Mexico, "Population Projections: Geospatial and Population Studies | The University of New Mexico," accessed May 23, 2025, https://gps.unm.edu/pop/population-projections.html.

[182] Association, "Who Is Most Affected by Outdoor Air Pollution?"

designed to be fuel agnostic. Running COBRA separately for on-road and off-road also allowed ERG to analyze the on-road and off-road results independently.

Because off-road fuels become regulated fuels under the CTFP in 2029 under Paragraph (2) of Subsection (A) of the Revised Proposed New Rule 20.2.92.102 NMAC, ERG included them in quantifying the COBRA and health benefits impacts of the CTFP. Although off-road fuels are unaffected by the CTFP prior to 2029, ERG examined their CAP emissions in the 2026-2028 period to ensure consideration of all statewide transportation sector emissions across the whole period of analysis. From 2026-2028, ERG assumed that regulated parties blended biofuel into off-road fuels at the same rates under NMVES-only and NMVES + CTFP. Beginning in 2029, ERG assumed that regulated parties continued to blend biofuels into offroad fuels at baseline rates under the NMVES-only policy projection, and at the same rate as they blended biofuels into on-road fuels under the NMVES + CTFP policy projection.

C.3 Results

C.3.1 Quantified health outcomes

Emission reductions under the CTFP-only and NMVES + CTFP scenarios reduce the incidence of respiratory and other conditions. The cumulative avoided incidence values from 2026 to 2035 for the CTFP-only scenario, along with the cumulative avoided incidence values from 2026 to 2040 for the NMVES + CTFP scenario, are shown in for each health outcome. These avoided incidences then translate to monetary values, as detailed below in **Table C-3**.

Table C-3. Avoided Incidence for CTFP-only and NMVES + CTFP Scenarios (cumulative through 2040)

Health Outcome Category	Cumulative Avoided Incidence for CTFP-only Scenario	Cumulative Avoided Incidence for NMVES + CTFP Scenario
Total mortality (low estimate)	0.6	2.0
Total mortality (high estimate)	1.2	2.8
Total asthma symptoms	336.7	1,462.8
Total asthma onset	1.9	8.9
Total emergency room visits	0.7	3.0
Total hospital admittance	0.4	0.6
Total onset*	12.6	59.4
Minor restricted activity days	353.0	466.4
Work loss days	59.9	79.0
School loss days	58.6	712.9

* Includes onset of hay fever/rhinitis, nonfatal heart attacks, and lung cancer.

The total monetized health benefits are presented as a lower- and upper-bound estimate because COBRA has a low and high estimate for mortality. The low estimate is based on an evaluation of $PM_{2.5}$ impacts on mortality by the Harvard T.H. Chan School of Public Health.[183] The high estimate represents $PM_{2.5}$ results based on a study from the Environmental Health Perspectives journal.[184] Presenting low-to-high monetary benefits range is EPA's standard practice.[185] All health outcomes other than those for $PM_{2.5}$ are as point estimates, but the total is a range because it includes the range of mortality incidence values.

Table C-4 shows the total cumulative monetized health benefits in New Mexico from reduced CAP emissions. For the CTFP-only scenario (2026-2035), cumulative benefits range from an estimated $11.0 to $20.8 million, whereas cumulative benefits of the combined NMVES + CTFP scenario (2026-2040) range from $38.2-$51.5 million.

Table C-4. Cumulative statewide health benefits from reduced pollutants by scenario (million $2024)

Scenario	Timeframe	Cumulative Net Benefits (lower-upper bound)
CTFP-only	2026-2035	$11.0-$20.8
NMVES + CTFP	2026-2040	$38.2-$51.5

Note: Includes health benefits from both on-road and off-road fuel use beginning in 2029.

ERG ran COBRA separately for the on-road and off-road CTFP cases to identify health benefits separately. As displayed in **Table C-5**, the on-road total health cumulative benefits range from $9.3 to $17 million. The off-road total cumulative health benefits start in 2029 due to the inclusion that year of dyed fuels under the CTFP pursuant to Paragraph (2) of Subsection (A) of the Revised Proposed New Rule 20.2.92.102 NMAC. Cumulative off-road health benefits range from $1.7 to $3.2 million. On-road contributions account for nearly 85% of the total CTFP benefits and the remaining 15% of total benefits are attributed to off-road.

Table C-5. Cumulative statewide health benefits from reduced pollutants in the CTPF-only scenario (in million $2024)

Calendar Year	$ On-road Total Health Benefits (lower-upper bound)	$ Off-road Total Health Benefits (lower-upper bound)	$ Total Health Benefits (lower-upper bound)
2026	$1.1 - $2.1		$1.1 - $2.1
2027	$1.2 - $2.3		$1.2 - $2.3
2028	$1.4 - $2.5		$1.4 - $2.5
2029	$1.4 - $2.6	$0.4 - $0.7	$1.8 - $3.3
2030	$1.3 - $2.3	$0.4 - $0.7	$1.6 - $3.0
2031	$1.1 - $2.1	$0.3 - $0.7	$1.5 - $2.7

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[183] X. Wu et al., "Evaluating the Impact of Long-Term Exposure to Fine Particulate Matter on Mortality among the Elderly," Science Advances 6, no. 29 (July 2020): eaba5692, https://doi.org/10.1126/sciadv.aba5692.

[184] C. Arden Pope et al., "Mortality Risk and Fine Particulate Air Pollution in a Large, Representative Cohort of U.S. Adults," Environmental Health Perspectives 127, no. 7 (July 2019): 77007, https://doi.org/10.1289/EHP4438.

[185] US EPA, "COBRA Questions and Answers." https://www.epa.gov/cobra/cobra-questions-and-answers.

2032	$1.0 - $1.8	$0.3 - $0.6	$1.3 - $2.4
2033	$0.6 - $1.0	$0.2 - $0.4	$0.8 - $1.4
2034	$0.3 - $0.5	$0.1 - $0.2	$0.4 - $0.7
2035	$0.1 - $0.2	$0.0 - $0.1	$0.1 - $0.2
Cumulative	$9.3 - $17.5	$1.7 - $3.3	$11.0 - $20.8

The cumulative total health benefits for the NMVES + CTFP scenario range from an estimated $38.2 to $51.5 million. Within an individual year, the annual total health benefits are highest in 2040 and range from $3.5 to $3.9 million, as shown in **Table C-6**.

Table C-6. Annual statewide health benefits for the NMVES + CTFP scenario (in million $2024)

Calendar Year	$ Total Health Benefits (lower-upper bound)
2026	$1.1 - $2.1
2027	$1.7 - $2.9
2028	$2.0 - $3.3
2029	$2.5 - $4.2
2030	$2.5 - $4.0
2031	$2.6 - $4.0
2032	$2.8 - $4.0
2033	$2.6 - $3.5
2034	$2.5 - $3.1
2035	$2.7 - $3.1
2036	$2.7 - $3.1
2037	$2.9 - $3.2
2038	$3.1 - $3.4
2039	$3.2 - $3.6
2040	$3.5 - $3.9
Cumulative	$38.2 - $51.5

C.3.2 Health impacts for the Benefit-Cost Analysis

In addition to benefits, **Table C-7** shows marginal costs in 2035 due to increased emissions. In 2035, there is an increase in NO_x emissions for both the CTFP on-road and off-road cases, contributing to the $1,328 cost. While the CTFP on-road scenario has modest SO_2 increases for each year (2026-2035), these did not result in costs.

Table C-7. Annual statewide health benefits and costs for the CTFP-only scenario (in million $2024)

Calendar Year	$ Benefits (lower-upper bound)	$ Costs	$ Net Benefits (lower-upper bound)
2026	$1.057- $2.149	$0	$1.057- $2.149
2027	$1.176- $2.293	$0	$1.176- $2.293
2028	$1.351- $2.538	$0	$1.351- $2.538
2029	$1.800- $3.3350	$0	$1.800- $3.350
2030	$1.648- $3.050	$0	$1.648- $3.050
2031	$1.469- $2.714	$0	$1.469- $2.714
2032	$1.274- $2.351	$0	$1.274- $2.351
2033	$0.755- $1.414	$0	$0.755- $1.414
2034	$0.358- $0.696	$0	$0.358- $0.696
2035	$0.109- $0.237	-$0.001	$0.108- $0.236
Cumulative	$10.997- $20.794	-$0.001	$10.996- $20.793

As described above, mortality is the only health impact category with lower and upper bounds. There were no health damages associated with the mortality category, therefore, the cost is reported as a point estimate. For NMVES + CTFP, shown in **Table C-8**, there are no costs.

Table C-8. Annual statewide health benefits and costs for the NMVES + CTFP scenario (in million $2024)

Calendar Year	$ Benefits (lower-upper bound)	$ Costs	$ Net Benefits (lower-upper bound)
2026	$1.1- $2.1	$0	$1.1- $2.1
2027	$1.7- $2.9	$0	$1.7- $2.9
2028	$2.0- $3.3	$0	$2.0- $3.3
2029	$2.5- $4.2	$0	$2.5- $4.2
2030	$2.5- $4.0	$0	$2.5- $4.0
2031	$2.6- $4.0	$0	$2.6- $4.0
2032	$2.8- $4.0	$0	$2.8- $4.0
2033	$2.6- $3.5	$0	$2.6- $3.5
2034	$2.5- $3.1	$0	$2.5- $3.1
2035	$2.7- $3.1	$0	$2.7- $3.1
2036	$2.7- $3.1	$0	$2.7- $3.1
2037	$2.9- $3.2	$0	$2.9- $3.2
2038	$3.1- $3.4	$0	$3.1- $3.4
2039	$3.2- $3.6	$0	$3.2- $3.6
2040	$3.5- $3.9	$0	$3.5- $3.9
Cumulative	$38.2- $51.5	$0	$38.2- $51.5

D Input-Output Modeling

D.1 Direct Impacts from Fuel and Health Modelling

The I-O model in this BCA takes as inputs fuel and credit quantities from Appendix . Appendix describes the multiple factors that contribute to these fuel and credit quantities. Such factors include fuel use in New Mexico, fuel carbon intensities, credit and deficit generation by fuel type, credit prices, the cost of supplying additional biofuels into New Mexico and of additional renewable electricity certificates (RECs) in New Mexico supported by CTFP credit revenues, and credit banking dynamics. In addition, the I-O model takes as inputs health cost savings of the CTFP.

Appendix C details the calculation of health cost savings, with inputs based upon criteria air pollutant (CAP) emissions from vehicle miles traveled (VMT) and fuel consumption by vehicle drivetrain type and class in New Mexico. The health impacts analysis uses the US EPA's CO-Benefits Risk Assessment (COBRA) Health Impacts Screening and Mapping Tool to translate this data into final dollarized health effects.[186]

D.2 Direct Jobs from Fuel Supply Equipment

D.2.1 Overview

This BCA evaluates job impacts from the CTFP accounting only for the permitting, construction, operation, and maintenance of new fuel supply equipment (FSE) under the program. FSE refers to stations that can fuel zero-emissions vehicles (ZEVs) like Battery Electric Vehicles (BEVs) and hydrogen fuel cell vehicles (HFCVs), as well as fueling stations for vehicles using compressed natural gas (CNG) and other alternative fuels. Accounting for jobs from providing FSE is consistent with a conservative accounting of CTFP benefits because such equipment directly receives funds under the CTFP and must be installed and operated in New Mexico. To examine the prospect of CTFP job creation above this minimum threshold, NMED separately contracted Adelante Consulting to examine additional, non-FSE jobs that the CTFP may support in New Mexico. **NMED Exhibit ___** details this analysis and its findings.

The focus of the section is on the quantification of the direct full-time equivalent (FTE) jobs associated with the construction, operation, and servicing of FSE through 2050, where an FTE represents the employment of one full-time employee for one year. Across all job types, this analysis estimates the number of FTE each year as the number of workdays divided by an assumed 240 workdays per year for each FTE.

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[186] https://www.epa.gov/cobra.

Due to limited data availability for HFCV and CNG vehicle equipment, this analysis proxies the number of jobs from installation and maintenance of HFCV and CNG fueling equipment using job estimates for the installation of Direct Current Fast Chargers (DCFCs). FSE FTE from installing HFCV and CNG FSE may exceed estimates from this approximation because of the need to build supporting networks that may be in place to a greater degree for DCFCs.

There are two different ways to examine CTFP program impacts. One way is to examine only the additional impact of the CTFP with the "CTFP-only" scenario. The second is to examine the impact of the CTFP as inclusive of the support that it provides for the Motor Vehicle Emission Standards (NMVES) with the "NMVES + CTFP" scenario.

The EIB ratified NMVES in late 2023 under the New Mexico Administrative Code (NMAC), Title 20, Chapter 2, Part 91 (20.2.91), as permitted under Section 177 of the U.S. Clean Air Act. The NMVES sets new delivery targets for zero-emission vehicles (ZEVs). The CTFP will support these policies by incentivizing the fueling infrastructure needed to make ZEV ownership viable and supporting the production, import, and dispensing of low-carbon fuels – including ZEV fuels – for use in New Mexico. The NMVES + CTFP scenario accounts for these complementarities whereas the CTFP-only scenario looks only at CTFP's additional impact as a standalone /policy.

It is possible to illustrate the difference between these two scenarios when looking at how they each account for the creation of new jobs generated from installing FSE in New Mexico. The CTFP-only scenario only attributes to the CTFP FTE to build and install FSE facilities that money from FSE credits under the CTFP directly supports. By contrast, the NMVES + CTFP scenario assesses all direct FTE generated to install FSE funded by FSE credits, plus additional FSE needed to serve statewide ZEV growth that results from NMVES, all of which will dispense fuels that benefit from CTFP fuel credits.

D.2.2 Key Assumptions – NMVES + CTFP

There are two key assumptions that this analysis used connect the number of direct FSE installation jobs across both scenarios based upon New Mexico's vehicle fleet: The number of FSE needed per vehicle and the number of jobs to build each FSE.

D.2.2.1 FSE per vehicle

This analysis estimates the number of Level 1 Residential Chargers per BEV and PHEV as a ratio of the number of Level 1 Single-Family chargers that the National Renewable Energy Laboratory (NREL) '2030 Charging Network' estimates for New Mexico through 2030, divided by the estimated number of BEVs and PHEVs in the state that year.[187] Similarly, the FSE

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[187] Wood, Eric, Brennan Borlaug, Matthew Moniot, Dong-Yeon Lee, Yanbo Ge, Fan Yang, and Zhaocai Liu. 2023. "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure."

estimate for the number of Level 2 residential chargers per vehicle factors in the number of Single-Family, Multifamily and Workplace residential chargers that NREL estimates for all private charging networks in New Mexico through 2030 divided by the projected number of BEVs and PHEVs in the state that year. **Table D-1** shows the residential FSE per vehicle ratios from these calculations.

Table D-1. Estimated Residential Fuel Supply Equipment (FSE) Deployment per Vehicle, by FSE Type

Term	Value
Level 1 Residential Charger per vehicle	0.27
Level 2 Residential Charger per vehicle	0.73
Percent of Plug-In Electric Vehicles with Home Charger	0.90
Level 2 Single-Family per Plug-in Electric Vehicle	0.59
Level 2 Multifamily & Workplace per Plug-in Electric Vehicle	0.02

Source: Wood, Eric, Brennan Borlaug, Matthew Moniot, Dong-Yeon Lee, Yanbo Ge, Fan Yang, and Zhaocai Liu. 2023. "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure." NREL/FS-5400-85970. National Renewable Energy Laboratory (NREL), Golden, CO (United States). https://www.osti.gov/biblio/1988038.

Non-residential charger estimates depend on New Mexico's projected demand for electricity, hydrogen and CNG blend transportation fuels. This analysis projects New Mexico's demand for these transportation fuels based upon their growth in Oregon under that state's clean fuels program (CFP). This analysis chose the Oregon CFP as a proxy because this program is a comparable program to the New Mexico CTFP but more mature, in a state with a relatively comparable population size and urban/rural distribution. This analysis benchmarks New Mexico's non-residential Level 2 charger and DCFC to the ratio of these public FSE types in Oregon to historical non-residential EV electricity consumption there.[188]

D.2.2.2 FTE per FSE

Under both scenarios (CTFP-only and NMVES + CTFP), FTE estimates per FSE differ by FSE type. There are different employment levels per FSE for residential Level 1 and Level 2 chargers and public Direct Current Fast Charger (DCFC) stations for BEV and PHEV charging. This analysis assumes that Level 1 chargers do not lead to additional employment, whereas Level 2 chargers contribute to employment in both residential and non-residential sectors due to more complex installation requirements. DCFC charger installation creates even more FTE per FSE because of additional needs for installing them in non-residential settings. This analysis further segments job creation by charger use in single-family versus multi-family residences for Level 2 chargers, and public versus commercial sites for Level 2 chargers and

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NREL/FS-5400-85970. National Renewable Energy Laboratory (NREL), Golden, CO (United States). www.osti.gov. https://www.osti.gov/biblio/1988038.

[188] State of Oregon, Department of Environmental Quality. "Clean Fuels Program Third Quarter 2023 Data." 2024. https://www.oregon.gov/deq/ghgp/Documents/CFPQ42023DataSummary.pdf.

DCFC. This analysis proxies the number of jobs from installation and maintenance of HFCV and CNG fueling equipment using job estimates for the installation of DCFCs.

With this information, this analysis estimates the total number of non-residential and residential FSE each year. For construction and installation jobs that are finished upon completion of an FSE like Planning and Design, Electrical Installation, Charger Assembly, and General Construction labor, this analysis uses the annual increases in each FSE type to estimate new direct workdays each year. For ongoing jobs required for FSE operations, like Electrical and Software Maintenance and Repair, this analysis uses the cumulative number of FSE in service each year.

D.2.3 Key Assumptions – CTFP-only

For the CTFP-only scenario, BRG staff considered only incremental charger installations from 2027 to 2035 and excluded job impacts from residential and non-residential Level 2 charger installations. BRG staff exclusively considered FSE jobs from FSE for HFCV or CNG that directly receive funding from FSE credits under the CTFP. CTFP program FSE credit awarding limits these credits to no more than one FSE station serving light-duty vehicles (LDVs) and one FSE station serving medium-/heavy-duty vehicles (MHDVs) per ZIP code. This caps the number of FSE stations for any fuel type supported with CTFP FSE credits at 850 stations for the 425 ZIP codes in New Mexico. The conservative jobs estimate in this analysis do not attribute any additional direct jobs from building, installing, servicing, and maintaining FSE stations beyond these amounts in New Mexico to the CTFP.

D.2.4 Key Assumptions – Shared

D.2.4.1 FTE classification

For this analysis, BRG staff categorized the FTE created to build each FSE into Blue-Collar and White-Collar Roles. Blue-Collar Roles include electrical installation, general construction, and site preparation. BRG staff excluded Blue-Collar Roles to assemble the parts used in FSE construction, which it conservatively assumes are all imported from out-of-state. White-Collar Roles include FSE project planning, permitting, legal, and administrative functions. These roles are site-specific and must be in New Mexico. BRG staff conservatively excluded all Software Maintenance and Repair jobs since they can be done out-of-state, even if some may turn out to be done locally.

Table D-2 shows the count of jobs per day per FSE type from the International Council on Clean Transportation's (ICTT) 'Charging Up America' report. BRG staff used these estimates to evaluate expected FTE from FSE construction in New Mexico.[189]

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[189] Bauer, Gordon, Chih-Wei Hsu, Mike Nicholas, and Nic Lutsey. 2021. "Charging up America: Assessing the Growing Need for U.S. Charging Infrastructure through 2030." White Paper. The International Council on Clean Transportation. https://theicct.org/sites/default/files/publications/charging-up-america-jul2021.pdf.

Table D-2. Jobs per day per charger for Light-Duty and Medium/Heavy-Duty Vehicles

Job Type	Public		Workplace	Multi-Family Home	Single-Family Home
	DCFC	Level 2	Level 2	Level 2	Level 2
Blue-collar Jobs					
Electrical Installation	10.00	4.20	4.20	4.20	1.25
Electrical Maintenance and Repair	0.65	0.65	0.65	0.65	0.65
Charger Assembly	0.00	0.00	0.00	0.00	0.00
General Construction Labor	2.98	2.31	2.31	2.31	0.00
White-collar Jobs					
Software Maintenance and Repair	0.00	0.00	0.00	0.00	0.00
Planning and Design	3.98	3.70	3.70	3.70	0.00
Administration and Legal	1.54	1.08	1.08	1.08	0.00

Source: Bauer, Gordon, Chih-Wei Hsu, Mike Nicholas, and Nic Lutsey. 2021. "Charging up America: Assessing the Growing Need for U.S. Charging Infrastructure through 2030." White Paper. The International Council on Clean Transportation. https://theicct.org/sites/default/files/publications/charging-up-america-jul2021.pdf.

D.3 Employment Opportunities

D.3.1 CTFP-only scenario

BRG staff estimate that under the CTFP-only scenario the policy generates 284 total FTE for building, installing, servicing, and maintaining DCFC charger installations, 253 total FTE for HFCV stations, and 44 total FTE for CNG-serving FSE through 2040. With construction ending in 2035, ongoing service, maintenance, and repair become the primary FTE source, accounting for all FSE FTE beyond 2035, as maintenance continues for existing FSE. **Table D-3** shows the cumulative FST FTE through 2030 by category and FSE type, and **Table D-4** shows cumulative FST FTE through 2040 by category and FSE type for the CTFP-only scenario.

Table D-3. Cumulative FSE FTE through 2030 by category and FSE type under CTFP-only scenario

Year	DCFC	HFCV	CNG	Total by Job Type
Electric Installation	106	0	17	**123**
Electric Maintenance & Repair	18	0	3	**21**
General Construction Labor	32	0	5	**37**
Planning and design	42	0	7	**49**
Administration and legal	16	0	3	**19**
Total FTE by FSE Fuel Type	**215**	**0**	**33**	**248**

Table D-4. Cumulative FSE FTE through 2040 by job category and FSE type under CTFP-only scenario

Year	DCFC	HFCV	CNG	Total by Job Type
Electric Installation	106	106	17	**229**
Electric Maintenance & Repair	87	56	14	**157**
General Construction Labor	32	32	5	**68**
Planning and design	42	42	7	**91**
Administration and legal	16	16	3	**35**
Total FTE by FSE Fuel Type	**284**	**253**	**44**	**581**

D.3.2 NMVES + CTFP scenario

Under the NMVES + CTFP scenario, a combination of the two policies results in 1,566 cumulative FTE through 2040. The majority of these are FTE in electrical installation, followed by electrical maintenance and repair and general construction labor. The NMVES + CTFP scenario estimates 599 total FTE for building, installing, servicing, and maintaining DCFC charger installations, 341 total FTE for non-residential Level 2 chargers, and 625 total FTE for residential Level 2 chargers through 2040.

Whereas under the CTFP-only scenario ongoing service, maintenance, and repair become the primary source of job creation in future years, accounting for all FSE employment beyond 2035, construction and installation continue to produce new FTE under the NMVES + CTFP scenario. The NMVES + CTFP scenario considers continued construction and installation of FSE beyond CTFP program limits are needed to service additional ZEVs sold as a result of NMVES but that supply fuel that receives CTFP fuel credits.[190]

The relatively greater importance of FSE construction and installation FTE under the NMVES + CTFP scenario is augmented by the fact that unlike the CTFP-only scenario, it accounts for FSE FTE from residential Level 2 BEV and PHEV charging installations. Such facilities primarily generate electrical installation jobs and require minimal ongoing maintenance. They also involve limited planning and design work, typically only for multi-family residences. They generally do not generate administrative or legal jobs since they are built on private property without comparable permitting requirements.

Table D-5 shows the cumulative FST FTE through 2030 by category and FSE type, and **Table D-6** shows cumulative FST FTE through 2040 by category and FSE type for the NMVES + CTFP scenario.

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[190] The installation of public charging stations also necessitates support from planning, administrative, legal and design professionals.

Table D-5. Cumulative FSE FTE through 2030 by category and FSE type under NMVES + CTFP scenario

Job Type	DCFC and Equivalents	Non-Residential Level 2	Residential Level 2	Total by Job Type
Electric Installation	13	23	121	**157**
Electric Maintenance & Repair	0	8	2	**10**
General Construction Labor	4	12	3	**19**
Planning and design	5	20	5	**30**
Administration and legal	2	6	1	**9**
Total FSE FTE	**24**	**69**	**132**	**225**

Table D-6. Cumulative FSE FTE through 2040 by category and FSE type under NMVES + CTFP scenario

Job Type	DCFC and Equivalents	Non-Residential Level 2	Residential Level 2	Total by Job Type
Electric Installation	266	88	550	**904**
Electric Maintenance & Repair	107	105	32	**244**
General Construction Labor	79	48	14	**142**
Planning and design	106	77	22	**206**
Administration and legal	41	23	7	**70**
Total FSE FTE	599	**341**	**625**	**1,566**

D.4 IMPLAN, and Indirect and Induced Impacts Modelling

This benefits-cost analysis (BCA) calculates economic impact using IMPLAN, a widely used and publicly licensable input-output (I-O) model.[191] IMPLAN takes direct impacts from the fuel and credit quantities and market modeling (**Appendix B**), the modeling of Health Impacts from criteria pollutants (**Appendix C**), and direct FTE quantification described in **Subsection D.2**. This BCA calculates GHG reduction benefits separately from the I-O modeling discussed here. BRG staff measured the value of those GHG reductions following a Social Cost of Carbon (SCC) methodology that accounts for indirect and induced effects on a global scale.

The I-O model in this BCA takes as inputs fuel and credit quantities from **Appendix B**. **Appendix B** describes the multiple factors that contribute to these fuel and credit quantities. Such factors include fuel use in New Mexico, fuel carbon intensities, credit and deficit generation by fuel type, credit prices, the cost of supplying additional biofuels into New Mexico and of additional renewable electricity certificates (RECs) in New Mexico supported by CTFP credit revenues, and credit banking dynamics. In addition, the I-O model takes as inputs health cost savings of the CTFP.

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[191] https://implan.com/.

Appendix C details the calculation of health cost savings, with inputs based upon criterial air pollutant (CAP) emissions from vehicle miles traveled (VMT) and fuel consumption by vehicle drivetrain type and class in New Mexico. The health impacts analysis uses the US EPA's CO-Benefits Risk Assessment (COBRA) Health Impacts Screening and Mapping Tool translates this data into final dollarized health effects.[192]

D.4.1 I-O Scenarios and Assumptions

Eastern Research Group, LLC (ERG) used the direct FSE jobs outputs under the CTFP-only and NMVES + CTFP scenarios discussed in **Subsection D.2** as an input for a larger Economic Impact Analyses using IMPLAN, an input-output (I-O) model.[193]

Typically, Economic Impact Analyses measure the economic effect of a market shock in a specified geographic area, such as the CTFP. Economic Impact Analyses using IMPLAN model three core components of economic activity:

1. Direct effects from IMPLAN show the immediate impact of a change on its own sector. These direct effects come from the FCMM and from the CO-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA) modeling described in **Appendix B** and **Appendix C**, respectively.
2. Indirect effects describe the effect of direct impacts to a sector on the economic sectors that support that sector (e.g., if a hydrogen FSE is built, the maintenance sector that supports hydrogen FSE will see increased revenue).
3. Induced effects show how changes in labor income due to direct and indirect effects result in additional economic impacts (e.g., staff who work at a facility that generates hydrogen and get paid then spend that money within the local economy, which boosts any industry from which they make purchases such as grocery, restaurants, and retail).

ERG's I-O modelling considered the following three aspects of the CTFP:

1. Impacts on New Mexico transportation fuel users and regulated parties from credit revenue and deficit expenditures under the CTFP, associated transportation fuel quantity changes, and incremental changes like biofuel imports and REC retirements to generate credits;
2. Employment effects of infrastructure built with revenue supported by Fuel Supply Equipment (FSE) credits equaling up to 10 percent of previous-period deficits;[194] and

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[192] https://www.epa.gov/cobra.

[193] https://implan.com/introduction-to-economic-impact-analysis/.

[194] Because this analysis uses an annual timestep, it assumes that deficits equal 10 percent of previous-year deficits rather than the 10 percent of previous-quarter deficits specified in the CTFP.

3. Health benefits from reduced criteria air pollutant (CAP) emissions that harm air quality and public health in New Mexico in response to the CTFP.[195] This analysis finds that reducing CAP emissions would lead to reduced hospitalizations and lost workdays due to the adverse effects of tailpipe exhaust.

In conducting this modeling, ERG considered the widest likely array of potential pass-through rate (PTR) assumptions by modeling outcomes under two scenarios:

1. A 100-percent PTR scenario, in which all revenue changes from credits and deficits are reflected in retail fuel prices; and
2. A 0-percent PTR scenario, in which the industries absorb all revenue changes as a change in operating costs that in turn affects profit margins. The following section outlines how these assumptions influenced the modeling approach.

The PTR scenarios only affect fuel market modeling outputs from ERG. They do not affect the economic impact of FSE construction, installation, operation or maintenance, nor the impact of health benefits from CAP pollutant reductions. The FSE and CAP impacts of the CTFP are the same under 100-percent and 0-percent PTR scenarios.

D.4.2 I-O Modelling of FSE Impacts

ERG conducted a series of EIAs accounting for projected CTFP economic costs and benefits each year between 2026 and 2040, with the geographic scope bound to the state of New Mexico. **NMED Exhibit ___** describes ERG's I-O modeling methods and results.

In its I-O analysis for FSE employment, ERG only modeled FTE that would be filled by someone in New Mexico and did not account for additional FTE that would occur outside of the state. For this analysis, ERG calculated direct FTE from FSE credits on a net basis and only considers FTE to the degree that they would be based in New Mexico. shows the job categories considered and the industry used to determine indirect and induced effects of each for the I-O analysis in IMPLAN.

Table D-7. Direct FTE mapping of FSE roles to IMPLAN industries from ERG's I-O analysis

Job	IMPLAN Industry
Fuel station installation	323 - All other miscellaneous electrical equipment and component manufacturing
Fuel station maintenance & repair	55 - Maintenance and repair construction of nonresidential structures

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[195] CAP emissions include ozone (O_3) precursor pollutants like oxides of nitrogen (NO_x) and volatile organic compounds (VOCs), as well as other harmful pollutants like particulate matter measuring 2.5 micrometers or less in diameter ($PM_{2.5}$) and sulfur dioxide (SO_2). This analysis quantifies the health benefits from reducing these CAP emissions.

Job	IMPLAN Industry
General construction labor	47 - Construction of new power and communication structures
Planning and design	439 - Architectural, engineering, and related services
Administration and legal	437 - Legal services

D.4.3 Macroeconomic Impact Results

D.4.3.1 FSE

Table D-8 shows the net number of direct FTE under the CTFP-only scenario when including indirect and induced effect from the FTE totals discussed in **Subsection D.2**.

Table D-8. Net direct FTE created annually from FSE credits under the CTFP-only scenario

Year	Fuel Station Installation	Fuel Station Maintenance & Repair	General Construction Labor	Planning and design	Administration and legal
2027	26.8	1.7	8.0	10.7	4.1
2028	37.5	4.2	11.2	14.9	5.8
2029	44.2	7.1	13.2	17.6	6.8
2030	14.3	8.0	4.2	5.7	2.2
2031	22.8	9.5	6.8	9.1	3.5
2032	22.7	10.9	6.8	9.0	3.5
2033	22.6	12.4	6.7	9.0	3.5
2034	22.5	13.9	6.7	9.0	3.5
2035	15.6	14.9	4.7	6.2	2.4
2036-2050	0	14.9	0	0	0

The ERG analysis finds that direct impacts from FSE credits ranged between $7 and $21 million until 2035. Starting 2036 and onwards, the only remaining FTE supported by the FSE credits are fuel station maintenance jobs, which are assumed to be constant until 2040.

Table D-9 represents the monetary value of these job market changes from FSE credits in terms of the value of output from direct, indirect, and induced jobs that result under the CTFP-only scenario.

Table D-9. Annual output resulting from direct, indirect, and induced FSE FTE under the CTFP-only scenario, 2025-2040

Year	Direct	Indirect	Induced
2027	$12,436,042	$2,757,102	$2,587,195
2028	$17,729,622	$3,959,808	$3,702,316
2029	$21,338,555	$4,800,605	$4,472,471
2030	$8,005,849	$1,892,714	$1,721,567
2031	$12,144,437	$2,825,715	$2,589,915
2032	$12,398,228	$2,906,704	$2,654,473
2033	$12,649,566	$2,987,056	$2,718,477
2034	$12,898,514	$3,066,782	$2,781,938
2035	$9,996,850	$2,447,912	$2,189,898
2036- 2040	$2,949,311	$902,421	$731,797

D.4.3.2 Total

ERG's I-O analysis combines the FSE FTE impacts discussed above with health and fuel market impacts to produce a final estimate of the CTFP's final macroeconomic impact using the CTFP-only scenario. The totals in **Table D-10** incorporate direct, indirect, and induced effects of the CTFP through 2040 as discussed in **Subsection D.4**, while the totals in **Table D-11** incorporate them through 2030.

Table D-10. Effect of the CTFP as an individual policy and as part of a suite with the NMVES through 2040 (in $US 2024 million, discounted at a three-percent real discount rate)

	Benefits	Costs	Net
Fuel Markets[196]	N/A	-$959	-$959
Health Effects[197]	$16	N/A	$16
GHG Emissions	$2,436	N/A	$2,436
Direct Jobs from FSE	$162	N/A	$162
CTFP Total	**$2,614**	**-$959**	**$1,654**
NMVES Total[198]	*$188*	*N/A*	*$188*
NMVES + CTFP Suite	**$2,802**	**-959**	**$1,842**

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[196] The fuel market impacts are the 50 percent pass-through scenario that averages the results from the 0 percent and 100 percent passthrough scenarios.

[197] Interpolated average of lower- and upper-bound estimates.

[198] Accounts for indirect and induced consumer effects and baseline of EPA Multi-Pollutant and Phase 3 Heavy-Duty Rules; health benefits averaged.

Table D-11. Effect of the CTFP as an individual policy and as part of a suite with the NMVES through 2030 (in $US 2024 million, discounted at a three-percent real discount rate)

	Benefits	Costs	Net
Fuel Markets[199]	N/A	-$481	-$481
Health Effects[200]	$10	N/A	$10
GHG Emissions	$1,228	N/A	$1,228
Direct Jobs from FSE	$77	N/A	$77
CTFP Total	**$1,315**	**-$481**	**$834**
NMVES Total[201]	*N/A*	*-398*	*$-398*
NMVES + CTFP Suite	**$1,315**	**-$879**	**$437**

Health impacts include hospitalization and productivity cost changes. A healthier population in New Mexico from fewer CAP emissions under CTFP-only leads to greater productivity as fewer New Mexicans miss workdays due to hospitalization. There is some offsetting negative impact from this in the form of lower revenue for hospitals due to reduced hospital utilization in New Mexico. However, ERG's analysis finds that the positive productivity increase effects from the CTFP rapidly overtake the negative economic impact of reduced hospital visits. Like the jobs from FSE construction, installation, operation, and maintenance, the health impacts from the CTFP do not vary between the two PTR scenarios that ERG modeled.

For fuel markets, ERG's analysis under the 100-percent PTR scenario assumes that fuel dispensers in New Mexico incorporate the full amount of credit revenue or deficit expenditures per unit of the fuel that they dispense to New Mexico consumers. In such cases, regulated parties would fully account for the revenue and expenditures resulting from CTFP compliance across all stages of the supply chain up to and including when retailers dispense fuel to consumers, such that retail prices fully incorporate the program's full fuel market effect. Regulated parties see no change in profit margins and fuel consumers internalize all CTFP fuel market impacts from retail price changes.

By contrast, under the 0-percent PTR scenario, ERG's analysis assumes that retail transportation fuel prices do not fall in response to CTFP credit market revenue or rise in response to CTFP credit market expenditures. Regulated parties do not pass through any CTFP revenue or expenditures to the point of retail. As a result, regulated parties fully internalize the CTFP's fuel market effects in the form of commensurate changes to profit margins across the transportation fuel value chain. Such effects include the incremental cost of BBDs as well as the cost of incremental REC retirement costs and impairment costs from CTFP credit banking. In this scenario, New Mexico fuel consumers are unaffected by the CTFP.

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[199] The fuel market impacts are the 50 percent pass-through scenario that averages the results from the 0 percent and 100 percent passthrough scenarios.

[200] Interpolated average of lower- and upper-bound estimates.

[201] Accounts for indirect and induced consumer effects and baseline of EPA Multi-Pollutant and Phase 3 Heavy-Duty Rules; health benefits averaged.

The 0-percent and 100-percent PTR scenarios bookend a range of possible assumptions regarding PTRs under the CTFP. NMED testimony includes a PTR analysis that more fully explores the research and understanding of the degree to which CTFP policies translate into retail fuel price changes. adds the direct, indirect and induced FSE job and health effects to an interpolated average value between the two PTR scenarios of the program's fuel market effects to assess the program's final effects using the CTFP-only scenario.

About BRG

Berkeley Research Group, LLC (BRG) is a global consulting firm that helps leading organizations advance in three key areas: economics, disputes, and investigations; corporate finance; and performance improvement and advisory. Headquartered in California with offices around the world, we are an integrated group of experts, industry leaders, academics, data scientists, and professionals working across borders and disciplines. We harness our collective expertise to deliver the inspired insights and practical strategies our clients need to stay ahead of what’s next.

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Fuel and Credit Market Model

Blendstock Energy % by Class

Blended Fuel	Finished Gasoline	Finished Gasoline	Finished Diesel	Finished Diesel	Finished Diesel	Electricity	Hydrogen	CNG	CNG	E85	E85	LPG
Blendstock	Clear Gasoline	Ethanol	Clear Diesel	Biodiesel	Renewable Diesel	Electricity	Hydrogen	Fossil CNG	RNG	Clear Gasoline	Ethanol	LPG
2020												
2021												
2022												
2023												
2024												
2025	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2026	93.1%	6.9%	89.0%	4.4%	6.6%	100.0%	100.0%	0.0%	100.0%	28.9%	71.1%	100.0%
2027	93.1%	6.9%	86.1%	4.2%	9.7%	100.0%	100.0%	0.0%	100.0%	28.9%	71.1%	100.0%
2028	93.1%	6.9%	81.0%	4.0%	15.0%	100.0%	100.0%	0.0%	100.0%	28.9%	71.1%	100.0%
2029	93.1%	6.9%	73.5%	3.6%	22.9%	100.0%	100.0%	0.0%	100.0%	28.9%	71.1%	100.0%
2030	93.1%	6.9%	65.2%	3.2%	31.6%	100.0%	100.0%	0.0%	100.0%	28.9%	71.1%	100.0%
2031	93.1%	6.9%	65.2%	3.2%	31.6%	100.0%	100.0%	0.0%	100.0%	28.9%	71.1%	100.0%
2032	93.1%	6.9%	65.4%	3.2%	31.4%	100.0%	100.0%	0.0%	100.0%	28.9%	71.1%	100.0%
2033	93.1%	6.9%	75.5%	3.7%	20.7%	100.0%	100.0%	0.0%	100.0%	28.9%	71.1%	100.0%
2034	93.1%	6.9%	85.3%	4.2%	10.5%	100.0%	100.0%	0.0%	100.0%	28.9%	71.1%	100.0%
2035	93.1%	6.9%	93.9%	4.6%	1.5%	100.0%	100.0%	0.0%	100.0%	28.9%	71.1%	100.0%
2036	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2037	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2038	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2039	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2040	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
Maximum Blend % (By Volume)	100.0%	10.0%	100.0%	5.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
Maximum Blend % (By Energy)	100.0%	6.9%	100.0%	4.7%	95.3%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
Baseline Blend %	93.1%	6.9%	97.7%	2.3%								

Notes:
(1) Clear Gasoline, Clear Diesel, and Fossil CNG calculated as remainder after biofuel blending

Baseline Blendstock Energy % by Class

Blended Fuel	Finished Gasoline	Finished Gasoline	Finished Diesel	Finished Diesel	Finished Diesel	Electricity	Hydrogen	CNG	CNG	E85	E85	LPG
Blendstock	Clear Gasoline	Ethanol	Clear Diesel	Biodiesel	Renewable Diesel	Electricity	Hydrogen	Fossil CNG	RNG	Clear Gasoline	Ethanol	LPG
2020												
2021												
2022												
2023												
2024												
2025	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2026	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2027	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2028	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2029	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2030	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2031	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2032	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2033	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2034	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2035	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2036	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2037	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2038	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2039	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%
2040	93.1%	6.9%	97.7%	2.3%	0.0%	100.0%	100.0%	100.0%	0.0%	28.9%	71.1%	100.0%

	Incremental BD Supply Cost (Million 2023$)	Incremental RD Supply Cost (Million 2023$)
2026	$12	$34
2027	$10	$42
2028	$8	$61
2029	$6	$90
2030	$4	$105
2031	$3	$88
2032	$2	$72
2033	$3	$38
2034	$4	$19
2035	$5	$3
2036	$0	$0
2037	$0	$0
2038	$0	$0
2039	$0	$0
2040	$0	$0

100% Pass through

Units: 2023$/EER-Adjusted GGE

Year	Finished Gasoline	Finished Diesel	Clear Gasoline	Ethanol	Clear Diesel	Biodiesel	Renewable Diesel	Electricity	Hydrogen	Fossil CNG	RNG	LPG
2025	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
2026	$0.02	$0.03	$0.05	-$0.32	$0.03	-$0.77	-$0.67	-$1.09	-$0.96	-$0.25	-$0.96	-$0.08
2027	$0.04	$0.05	$0.06	-$0.26	$0.05	-$0.65	-$0.57	-$0.91	-$0.81	-$0.20	-$0.81	-$0.05
2028	$0.06	$0.07	$0.09	-$0.22	$0.07	-$0.60	-$0.52	-$0.84	-$0.76	-$0.17	-$0.76	-$0.02
2029	$0.10	$0.11	$0.12	-$0.15	$0.11	-$0.48	-$0.41	-$0.68	-$0.62	-$0.10	-$0.62	$0.03
2030	$0.16	$0.17	$0.18	-$0.05	$0.17	-$0.35	-$0.29	-$0.54	-$0.47	-$0.01	-$0.47	$0.10
2031	$0.15	$0.15	$0.16	-$0.04	$0.15	-$0.29	-$0.23	-$0.48	-$0.38	$0.00	-$0.39	$0.09
2032	$0.13	$0.13	$0.14	-$0.03	$0.13	-$0.23	-$0.19	-$0.40	-$0.32	$0.00	-$0.31	$0.08
2033	$0.11	$0.11	$0.12	-$0.02	$0.11	-$0.18	-$0.15	-$0.32	-$0.26	$0.01	-$0.25	$0.07
2034	$0.11	$0.11	$0.12	-$0.01	$0.11	-$0.18	-$0.14	-$0.32	-$0.26	$0.01	-$0.24	$0.07
2035	$0.12	$0.12	$0.13	-$0.01	$0.12	-$0.17	-$0.14	-$0.32	-$0.27	$0.02	-$0.24	$0.08
2036	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
2037	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
2038	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
2039	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
2040	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Note: 1 GGE is added for each of the gasoline and diesel standard, for each fuel, to avoid division by zero. This addition only impacts the calculation that allocates the percentage of fuel under each standard; the actual price impacts use the correct GGE.

Real Cost of Capital Rate for Holders 4.39%

Year	Total Fueling Credits (MT)	Total Fueling Deficits (MT)	Net FSE Credits (MT)	Net Credits Generated (MT)	Bank Balance (MT)	Rule 1 Slack	Credit Price	Rule 3 Target	Rule 3 Slack	Prior Year Inventory Holding Cost	Prior Year Inventory Impairment	Prior Year Inventory Gain/Loss
2025	0	0	0	0	0							
2026	943,578	-634,105	0	309,473	309,473	51%	$111.93	618,945	0	$0	$0	$0
2027	1,255,514	-890,038	63,411	428,886	738,359	52%	$96.92	857,772	0	-$1,519,724	-$4,645,183	-$6,164,907
2028	1,704,869	-1,322,772	89,004	471,102	1,209,460	64%	$93.70	942,203	0	-$3,139,603	-$2,373,327	-$5,512,930
2029	2,364,363	-2,209,553	132,277	287,087	1,496,547	87%	$82.47	574,174	0	-$4,972,226	-$13,582,252	-$18,554,477
2030	2,313,348	-3,560,434	220,955	-1,026,131	470,416	129%	$71.99			-$5,415,110	-$15,690,267	-$21,105,377
2031	2,761,578	-3,588,037	356,043	-470,416	0	113%	$60.90			-$1,485,767	-$5,218,081	-$6,703,848
2032	3,243,530	-3,602,334	358,804	0	0	100%	$50.08			$0	$0	$0
2033	3,433,693	-3,793,927	360,233	0	0	100%	$40.49			$0	$0	$0
2034	3,610,830	-3,990,223	379,393	0	0	100%	$40.57			$0	$0	$0
2035	3,787,676	-4,186,698	399,022	0	0	100%	$40.80			$0	$0	$0
2036	4,005,319	-4,305,464	418,670	118,524	118,524	97%				$0	$0	$0
2037	4,432,512	-4,334,518	0	97,993	216,518	98%				$0	$0	$0
2038	4,807,588	-4,365,852	0	441,736	658,254	90%				$0	$0	$0
2039	5,141,715	-4,399,659	0	742,056	1,400,310	83%				$0	$0	$0
2040	5,448,425	-4,456,507	0	991,918	2,392,227	78%				$0	$0	$0

Banking Rules

1) Maximum net credit generation for bank is limited to 100% of current year deficit, based on historical observations from other states (specifically, Washington had highest net generation at just over 100% of deficits)

2) Subject to rule 1, prior to 2030, will seek to bank in a rising credit price environment (considering holding costs) until BBD blend rates reach subsequent year

3) Prior to 2030 in a falling credit price environment (considering holding costs), will limit net credit generation to 50% of what it would have been under rules 1 & 2 (credits will still be banked to account for uncertainty during target ramping period through 2030, but at a

4) Beginning in 2030, will consume bank balance until BBD blend rate falls below subsequent year (due to declining price and BBD blending environment)

Blended Fuel				Finished Gasoline	Finished Gasoline	Finished Diesel	Finished Diesel	Finished Diesel
Blendstock Fuel				Clear Gasoline	Ethanol	Clear Diesel	Biodiesel	Renewable Diesel
Standard	Gasoline	Diesel		Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Lookup			Total Fueling Credits (MT)	Clear Gasoline_Gasoline	Ethanol_Gasoline	Clear Diesel_Gasoline	Biodiesel_Gasoline	Renewable Diesel_Gasoline
2025								
2026	93.30	92.72	943,578	0	188,503	0	1,722	2,277
2027	91.87	91.30	1,255,514	0	176,489	0	1,629	3,239
2028	89.31	88.75	1,704,869	0	154,260	0	1,464	4,786
2029	84.56	84.03	2,364,363	0	119,126	0	1,211	6,551
2030	76.01	75.54	2,313,348	0	50,169	0	886	7,173
2031	75.06	74.59	2,761,578	0	40,457	0	819	6,598
2032	74.11	73.65	3,243,530	0	31,461	0	758	6,012
2033	73.16	72.70	3,433,693	0	23,269	0	805	3,639
2034	72.21	71.76	3,610,830	0	15,989	0	833	1,670
2035	71.26	70.82	3,787,676	0	9,612	0	836	219
2036	70.31	69.87	4,005,319	0	3,872	0	383	0
2037	69.36	68.93	4,432,512	0	0	0	356	0
2038	68.41	67.98	4,807,588	0	0	0	330	0
2039	67.46	67.04	5,141,715	0	0	0	306	0
2040	66.51	66.09	5,448,425	0	0	0	282	0

Blended Fuel				Finished Gasoline	Finished Gasoline	Finished Diesel	Finished Diesel	Finished Diesel
Blendstock Fuel				Clear Gasoline	Ethanol	Clear Diesel	Biodiesel	Renewable Diesel
Standard	Gasoline	Diesel		Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Lookup			Total Fueling Deficits (MT)	Clear Gasoline_Gasoline	Ethanol_Gasoline	Clear Diesel_Gasoline	Biodiesel_Gasoline	Renewable Diesel_Gasoline
2025								
2026	93.30	92.72	-634,105	-386,910	0	-1,203	0	0
2027	91.87	91.30	-890,038	-537,974	0	-1,997	0	0
2028	89.31	88.75	-1,322,772	-802,643	0	-3,288	0	0
2029	84.56	84.03	-2,209,553	-1,327,748	0	-5,347	0	0
2030	76.01	75.54	-3,560,434	-2,209,640	0	-8,505	0	0
2031	75.06	74.59	-3,588,037	-2,187,269	0	-8,447	0	0
2032	74.11	73.65	-3,602,334	-2,149,050	0	-8,382	0	0
2033	73.16	72.70	-3,793,927	-2,098,018	0	-9,532	0	0
2034	72.21	71.76	-3,990,223	-2,045,718	0	-10,558	0	0
2035	71.26	70.82	-4,186,698	-2,009,200	0	-11,311	0	0
2036	70.31	69.87	-4,305,464	-1,966,693	0	-11,708	0	0
2037	69.36	68.93	-4,334,518	-1,921,057	-1,253	-11,610	0	0
2038	68.41	67.98	-4,365,852	-1,875,422	-5,810	-11,479	0	0
2039	67.46	67.04	-4,399,659	-1,833,945	-9,877	-11,317	0	0
2040	66.51	66.09	-4,456,507	-1,816,974	-13,683	-11,116	0	0

Credit Generation by Blendstock Type and Standard (MT)

Electricity	Hydrogen	CNG	CNG	LPG	Finished Gasoline	Finished Gasoline	Finished Diesel	Finished Diesel	Finished Diesel	Electricity
Electricity	Hydrogen	Fossil CNG	RNG	LPG	Clear Gasoline	Ethanol	Clear Diesel	Biodiesel	Renewable Diesel	Electricity
Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Electricity_Gasoline	Hydrogen_Gasoline	Fossil CNG_Gasoline	RNG_Gasoline	LPG_Gasoline	Clear Gasoline_Diesel	Ethanol_Diesel	Clear Diesel_Diesel	Biodiesel_Diesel	Renewable Diesel_Diesel	Electricity_Diesel
127,601	0	0	0	0	0	19,883	0	216,972	286,427	41,297
299,163	0	0	0	0	0	17,994	0	198,867	394,926	104,012
545,920	0	0	0	0	0	15,264	0	173,049	564,826	186,926
806,802	0	0	0	0	0	11,021	0	158,184	854,204	278,649
805,075	0	0	0	0	0	4,329	0	112,528	908,371	311,731
1,147,446	0	0	0	0	0	3,548	0	109,070	875,915	455,425
1,529,359	0	0	0	0	0	2,802	0	105,979	838,121	597,289
1,886,809	0	0	0	0	0	2,090	0	118,427	533,882	723,341
2,209,744	0	0	0	0	0	1,414	0	129,435	258,620	841,784
2,479,614	0	0	0	0	0	773	0	137,599	36,021	961,529
2,773,323	0	0	0	0	0	169	0	65,660	0	1,096,747
3,063,878	0	0	0	0	0	0	0	63,529	0	1,229,324
3,309,602	0	0	0	0	0	0	0	61,414	0	1,350,333
3,520,090	0	0	0	0	0	0	0	59,316	0	1,465,385
3,692,952	0	0	0	0	0	0	0	57,234	0	1,590,407

Deficit Generation by Blendstock Type and Standard (MT)

Electricity	Hydrogen	CNG	CNG	LPG	Finished Gasoline	Finished Gasoline	Finished Diesel	Finished Diesel	Finished Diesel	Electricity
Electricity	Hydrogen	Fossil CNG	RNG	LPG	Clear Gasoline	Ethanol	Clear Diesel	Biodiesel	Renewable Diesel	Electricity
Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Electricity_Gasoline	Hydrogen_Gasoline	Fossil CNG_Gasoline	RNG_Gasoline	LPG_Gasoline	Clear Gasoline_Diesel	Ethanol_Diesel	Clear Diesel_Diesel	Biodiesel_Diesel	Renewable Diesel_Diesel	Electricity_Diesel
0	0	0	0	0	-48,609	0	-197,383	0	0	0
0	0	0	0	0	-62,740	0	-287,326	0	0	0
0	0	0	0	0	-87,778	0	-429,062	0	0	0
0	0	0	0	0	-132,861	0	-740,467	0	0	0
0	0	0	0	0	-210,702	0	-1,119,120	0	0	0
0	0	0	0	0	-214,429	0	-1,163,842	0	0	0
0	0	0	0	0	-217,664	0	-1,211,519	0	0	0
0	0	0	0	0	-220,404	0	-1,448,500	0	0	0
0	0	0	0	0	-222,649	0	-1,691,990	0	0	0
0	0	0	0	0	-224,394	0	-1,920,561	0	0	0
0	0	0	0	0	-228,134	0	-2,065,953	0	0	0
0	0	0	0	0	-231,545	-412	-2,131,304	0	0	0
0	0	0	0	0	-234,626	-970	-2,195,728	0	0	0
0	0	0	0	0	-237,378	-1,506	-2,259,222	0	0	0
0	0	0	0	0	-239,802	-2,018	-2,321,785	0	0	0

Hydrogen	CNG	CNG	LPG
Hydrogen	Fossil CNG	RNG	LPG
Diesel	Diesel	Diesel	Diesel
Hydrogen_Diesel	Fossil CNG_Diesel	RNG_Diesel	LPG_Diesel
0	0	58,896	0
0	0	59,195	0
0	0	58,375	0
0	0	128,616	0
0	0	113,085	0
10,523	0	111,777	0
21,301	0	110,449	0
32,331	0	109,099	0
43,611	0	107,729	0
55,136	0	106,337	0
65,165	0	0	0
75,424	0	0	0
85,909	0	0	0
96,619	0	0	0
107,550	0	0	0

Credit Generation and Repayment - Capacity and Project Credits			
Year	FSE Credits - LD (MT)	FSE Credits - MHD (MT)	Net Capacity and Advance Credits (MT)
2025			0
2026	0	0	0
2027	31,705	31,705	63,411
2028	44,502	44,502	89,004
2029	66,139	66,139	132,277
2030	110,478	110,478	220,955
2031	178,022	178,022	356,043
2032	179,402	179,402	358,804
2033	180,117	180,117	360,233
2034	189,696	189,696	379,393
2035	199,511	199,511	399,022
2036	209,335	209,335	418,670
2037	0	0	0
2038	0	0	0
2039	0	0	0
2040	0	0	0

FSE Credit Maximum %	5%	5%

Source: NM CTFS Draft Regulation

Hydrogen	CNG	CNG	LPG
Hydrogen	Fossil CNG	RNG	LPG
Diesel	Diesel	Diesel	Diesel
Hydrogen_Diesel	Fossil CNG_Diesel	RNG_Diesel	LPG_Diesel
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	-3,131
0	0	0	-12,468
0	0	0	-14,051
0	0	0	-15,719
0	0	0	-17,472
0	0	0	-19,309
0	0	0	-21,231
0	-9,557	0	-23,419
0	-11,627	0	-25,711
0	-13,709	0	-28,108
0	-15,805	0	-30,609
0	-17,915	0	-33,215

	Forecast CI (Realized) (gCO2e/MJ)									
Year	Clear Gasoline	Ethanol	Clear Diesel	Biodiesel	Renewable Diesel	Electricity	Hydrogen	Fossil CNG	RNG	LPG
2025	96.90	69.60	95.30	35.28	42.39	69.66	46.10	74.30	21.40	87.00
2026	96.90	69.60	95.30	35.28	42.39	0.00	46.10	74.30	21.40	87.00
2027	96.90	69.60	95.30	35.28	42.39	0.00	46.10	74.30	21.40	87.00
2028	96.90	69.60	95.30	35.28	42.39	0.00	46.10	74.30	21.40	87.00
2029	96.90	69.60	95.30	35.28	42.39	0.00	46.10	74.30	21.40	87.00
2030	96.90	69.60	95.30	35.28	42.39	48.88	46.10	74.30	21.40	87.00
2031	96.90	69.60	95.30	35.28	42.39	34.54	42.92	74.30	21.40	87.00
2032	96.90	69.60	95.30	35.28	42.39	24.38	39.74	74.30	21.40	87.00
2033	96.90	69.60	95.30	35.28	42.39	22.70	36.56	74.30	21.40	87.00
2034	96.90	69.60	95.30	35.28	42.39	22.38	33.38	74.30	21.40	87.00
2035	96.90	69.60	95.30	35.28	42.39	19.85	30.20	74.30	21.40	87.00
2036	96.90	69.60	95.30	35.28	42.39	18.51	27.02	74.30	21.40	87.00
2037	96.90	69.60	95.30	35.28	42.39	16.76	23.84	74.30	21.40	87.00
2038	96.90	69.60	95.30	35.28	42.39	16.89	20.66	74.30	21.40	87.00
2039	96.90	69.60	95.30	35.28	42.39	17.18	17.48	74.30	21.40	87.00
2040	96.90	69.60	95.30	35.28	42.39	14.44	14.30	74.30	21.40	87.00

Electricity (Pre-REC Retirement)
69.66
62.32
61.25
60.47
58.89
48.88
34.54
24.38
22.70
22.38
19.85
18.51
16.76
16.89
17.18
14.44

	Forecast CI (Pre-REC Retirement) (gCO2e/MJ)									
Year	Clear Gasoline	Ethanol	Clear Diesel	Biodiesel	Renewable Diesel	Electricity	Hydrogen	Fossil CNG	RNG	LPG
2025	96.90	69.60	95.30	35.28	42.39	69.66	46.10	74.30	21.40	87.00
2026	96.90	69.60	95.30	35.28	42.39	62.32	46.10	74.30	21.40	87.00
2027	96.90	69.60	95.30	35.28	42.39	61.25	46.10	74.30	21.40	87.00
2028	96.90	69.60	95.30	35.28	42.39	60.47	46.10	74.30	21.40	87.00
2029	96.90	69.60	95.30	35.28	42.39	58.89	46.10	74.30	21.40	87.00
2030	96.90	69.60	95.30	35.28	42.39	48.88	46.10	74.30	21.40	87.00
2031	96.90	69.60	95.30	35.28	42.39	34.54	42.92	74.30	21.40	87.00
2032	96.90	69.60	95.30	35.28	42.39	24.38	39.74	74.30	21.40	87.00
2033	96.90	69.60	95.30	35.28	42.39	22.70	36.56	74.30	21.40	87.00
2034	96.90	69.60	95.30	35.28	42.39	22.38	33.38	74.30	21.40	87.00
2035	96.90	69.60	95.30	35.28	42.39	19.85	30.20	74.30	21.40	87.00
2036	96.90	69.60	95.30	35.28	42.39	18.51	27.02	74.30	21.40	87.00
2038	96.90	69.60	95.30	35.28	42.39	16.89	20.66	74.30	21.40	87.00
2039	96.90	69.60	95.30	35.28	42.39	17.18	17.48	74.30	21.40	87.00
2040	96.90	69.60	95.30	35.28	42.39	14.44	14.30	74.30	21.40	87.00

	Vehicle Population Forecast by Powertrain and GVWR Category												
Year	LDV - ICE	LDV - ICE	LDV - ICE	LDV - ZEV	LDV - ZEV	LDV - PHEV	LDV - PHEV	LDV - PHEV	LDT - ICE	LDT - ICE	LDT - ICE	LDT - ZEV	LDT - ZEV
Vehicle Class	LDV	LDV	LDV	LDV	LDV	LDV	LDV	LDV	LDT	LDT	LDT	LDT	LDT
Powertrain	ICE	ICE	ICE	ZEV	ZEV	PHEV	PHEV	PHEV	ICE	ICE	ICE	ZEV	ZEV
Primary Fuel	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen
Secondary Fuel						Electricity	Electricity	Electricity					
2020	**647,317**	**4,425**	**0**	**1,156**	**0**	**503**	**0**	**0**	**977,959**	**5,484**	**0**	**196**	**0**
2021	653,523	4,174	0	1,071	0	802	0	0	988,476	5,720	0	1,141	0
2022	658,718	3,922	0	1,768	0	1,330	0	0	998,778	5,957	0	2,162	0
2023	663,119	3,671	0	3,019	0	2,098	0	0	1,008,227	6,193	0	3,889	0
2024	666,992	3,419	0	4,598	0	3,065	0	0	1,017,080	6,430	0	6,089	0
2025	670,866	3,168	0	6,177	0	4,031	0	0	1,025,933	6,666	0	8,289	0
2026	674,739	2,917	0	7,757	0	4,998	0	0	1,034,786	6,903	0	10,489	0
2027	667,073	2,665	0	20,876	0	5,965	0	0	1,029,257	7,139	0	27,071	0
2028	657,059	2,414	0	36,343	0	6,932	0	0	1,012,543	7,375	0	54,838	0
2029	646,970	2,163	0	51,884	0	7,899	0	0	990,628	7,612	0	87,806	0
2030	**634,525**	**1,911**	**0**	**69,782**	**0**	**8,866**	**0**	**0**	**970,730**	**7,848**	**0**	**118,757**	**0**
2031	603,367	1,696	0	100,925	0	9,832	0	0	933,891	7,621	0	157,123	0
2032	571,798	1,481	0	132,478	0	10,799	0	0	890,532	7,393	0	202,008	0
2033	540,324	1,266	0	163,938	0	11,766	0	0	842,559	7,166	0	251,509	0
2034	513,874	1,051	0	190,371	0	12,733	0	0	794,818	6,939	0	300,776	0
2035	**491,813**	**836**	**0**	**212,418**	**0**	**13,700**	**0**	**0**	**758,365**	**6,711**	**0**	**338,755**	**0**
2036	459,889	736	0	247,131	0	14,667	0	0	727,883	6,569	0	374,708	0
2037	431,648	636	0	278,163	0	15,633	0	0	695,554	6,426	0	412,506	0
2038	405,634	536	0	306,966	0	16,600	0	0	664,409	6,284	0	449,121	0
2039	384,773	436	0	330,617	0	17,567	0	0	634,605	6,141	0	484,395	0
2040	**379,066**	**335**	**0**	**339,114**	**0**	**18,534**	**0**	**0**	**610,566**	**5,999**	**0**	**513,904**	**0**

LDT - PHEV	LDT - PHEV	LDT - PHEV	Class 2b-3 - ICE	Class 2b-3 - ICE	Class 2b-3 - ICE	Class 2b-3 - ZEV	Class 2b-3 - ZEV	Class 4-5 - ICE	Class 4-5 - ICE	Class 4-5 - ICE	Class 4-5 - ZEV	Class 4-5 - ZEV
LDT	LDT	LDT	Class 2b-3	Class 2b-3	Class 2b-3	Class 2b-3	Class 2b-3	Class 4-5	Class 4-5	Class 4-5	Class 4-5	Class 4-5
PHEV	PHEV	PHEV	ICE	ICE	ICE	ZEV	ZEV	ICE	ICE	ICE	ZEV	ZEV
Finished Gasoline	Finished Diesel	CNG	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen
Electricity	Electricity	Electricity										
301	**0**	**0**	**55,642**	**49,353**	**0**	**0**	**0**	**10,484**	**9,742**	**0**	**0**	**0**
481	0	0	55,062	49,796	0	0	0	10,649	10,009	0	0	0
800	0	0	54,477	50,233	0	11	0	10,812	10,275	0	4	0
1,266	0	0	53,873	50,652	0	58	0	10,968	10,533	0	24	0
1,855	0	0	53,205	51,006	0	235	0	11,097	10,765	0	95	0
2,444	0	0	52,455	51,278	0	575	0	11,246	11,015	0	129	0
3,033	0	0	51,635	51,482	0	1,054	0	11,387	11,260	0	175	0
3,622	0	0	50,725	51,594	0	1,714	0	11,420	11,395	0	440	0
4,212	0	0	49,704	51,596	0	2,595	0	11,387	11,464	0	838	0
4,801	0	0	48,574	51,488	0	3,697	0	11,287	11,467	0	1,367	0
5,390	**0**	**0**	**47,333**	**51,269**	**0**	**5,018**	**0**	**11,121**	**11,403**	**0**	**2,029**	**0**
5,979	0	0	45,813	50,573	0	8,342	0	10,947	11,196	0	2,920	0
6,568	0	0	44,293	49,876	0	11,666	0	10,772	10,989	0	3,811	0
7,157	0	0	42,772	49,179	0	14,990	0	10,598	10,782	0	4,703	0
7,747	0	0	41,252	48,483	0	18,314	0	10,424	10,575	0	5,594	0
8,336	**0**	**0**	**39,732**	**47,786**	**0**	**21,638**	**0**	**10,250**	**10,368**	**0**	**6,485**	**0**
8,925	0	0	38,990	47,498	0	24,511	0	9,983	10,229	0	7,645	0
9,514	0	0	38,249	47,210	0	27,384	0	9,717	10,090	0	8,805	0
10,103	0	0	37,507	46,922	0	30,256	0	9,451	9,951	0	9,965	0
10,692	0	0	36,765	46,635	0	33,129	0	9,185	9,813	0	11,125	0
11,282	**0**	**0**	**36,024**	**46,347**	**0**	**36,001**	**0**	**8,919**	**9,674**	**0**	**12,285**	**0**

Class 6-7 - ICE	Class 6-7 - ICE	Class 6-7 - ICE	Class 6-7 - ZEV	Class 6-7 - ZEV	Class 8 - ICE	Class 8 - ICE	Class 8 - ICE	Class 8 - ZEV	Class 8 - ZEV	Urban Busses	Urban Busses	Urban Busses
Class 6-7	Class 6-7	Class 6-7	Class 6-7	Class 6-7	Class 8	Class 8	Class 8	Class 8	Class 8	Urban Busses	Urban Busses	Urban Busses
ICE	ICE	ICE	ZEV	ZEV	ICE	ICE	ICE	ZEV	ZEV	ICE	ICE	ICE
Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG
5,351	**19,452**	**0**	**0**	**0**	**19**	**38,076**	**368**	**0**	**0**	**0**	**218**	**28**
5,211	19,587	0	0	0	18	38,633	391	0	0	0	226	30
5,070	19,719	0	2	0	16	39,189	415	2	0	0	234	32
4,930	19,852	0	3	0	15	39,744	438	3	0	0	242	35
4,789	19,985	0	5	0	14	40,300	461	5	0	0	250	37
4,649	20,097	0	28	0	12	40,835	484	27	0	0	257	39
4,508	20,200	0	59	0	11	41,362	507	58	0	0	265	41
4,368	20,157	0	236	0	9	41,747	530	231	0	0	269	43
4,227	20,027	0	501	0	8	42,045	554	490	0	0	272	45
4,086	19,807	0	855	0	6	42,256	577	836	0	0	272	47
3,946	**19,500**	**0**	**1,297**	**0**	**5**	**42,382**	**600**	**1,268**	**0**	**0**	**271**	**49**
3,885	18,999	0	1,737	25	4	42,163	598	1,734	136	0	268	48
3,824	18,498	0	2,177	50	4	41,943	597	2,200	272	0	265	46
3,764	17,997	0	2,617	76	3	41,724	595	2,667	409	0	262	45
3,703	17,496	0	3,057	101	3	41,505	593	3,133	545	0	259	43
3,642	**16,995**	**0**	**3,497**	**126**	**2**	**41,286**	**592**	**3,599**	**681**	**0**	**256**	**42**
3,588	16,657	0	4,051	146	2	41,088	583	4,201	795	0	251	41
3,534	16,318	0	4,604	166	2	40,889	574	4,803	909	0	247	40
3,480	15,980	0	5,158	186	2	40,690	565	5,405	1,023	0	242	38
3,426	15,641	0	5,711	206	2	40,492	556	6,006	1,137	0	238	37
3,371	**15,303**	**0**	**6,265**	**226**	**3**	**40,293**	**547**	**6,608**	**1,251**	**0**	**233**	**36**

Urban Busses	Gliders	Gliders	Gliders	LDV - FFV	LDT - FFV	Motorcycle
Urban Busses	Gliders	Gliders	Gliders	LDV	LDT	Motorcycle
ZEV	ICE	ICE	ICE	ICE	ICE	ICE
Electricity	Finished Gasoline	Finished Diesel	CNG	Finished Gasoline	Finished Gasoline	Finished Gasoline
				E85	E85	
0	**0**	**462**	**0**	**354**	**2,114**	**129,534**
0	0	479	0	369	2,229	131,025
0	0	496	0	384	2,345	132,516
0	0	513	0	398	2,461	134,007
0	0	530	0	413	2,576	135,499
1	0	547	0	428	2,692	136,990
1	0	564	0	442	2,808	138,481
5	0	581	0	457	2,923	139,972
10	0	598	0	472	3,039	141,463
17	0	615	0	486	3,155	142,954
26	**0**	**632**	**0**	**501**	**3,270**	**144,446**
36	0	605	0	467	3,046	144,325
45	0	578	0	433	2,822	144,205
54	0	551	0	399	2,598	144,085
63	0	523	0	365	2,374	143,965
73	**0**	**496**	**0**	**330**	**2,150**	**143,844**
87	0	464	0	306	2,004	144,571
101	0	431	0	282	1,858	145,298
115	0	399	0	257	1,712	146,024
129	0	366	0	233	1,566	146,751
143	**0**	**334**	**0**	**209**	**1,419**	**147,478**

	Vehicle Population Forecast by Powertrain and GVWR Category												
Year	LDV - ICE	LDV - ICE	LDV - ICE	LDV - ZEV	LDV - ZEV	LDV - PHEV	LDV - PHEV	LDV - PHEV	LDT - ICE	LDT - ICE	LDT - ICE	LDT - ZEV	LDT - ZEV
Vehicle Class	LDV	LDV	LDV	LDV	LDV	LDV	LDV	LDV	LDT	LDT	LDT	LDT	LDT
Powertrain	ICE	ICE	ICE	ZEV	ZEV	PHEV	PHEV	PHEV	ICE	ICE	ICE	ZEV	ZEV
Primary Fuel	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen
Secondary Fuel						Electricity	Electricity	Electricity					
2020	**6,743,427,271**	**46,096,500**	**0**	**10,561,786**	**0**	**6,041,536**	**0**	**0**	**10,620,407,068**	**59,553,415**	**0**	**1,864,594**	**0**
2021	7,130,983,875	45,539,989	0	10,245,126	0	10,086,620	0	0	11,121,904,153	64,362,361	0	11,255,036	0
2022	8,009,882,782	47,692,842	0	18,854,336	0	18,635,160	0	0	12,396,958,581	73,935,908	0	23,533,984	0
2023	8,335,396,620	46,141,911	0	33,271,459	0	30,391,215	0	0	12,815,607,666	78,721,846	0	43,346,892	0
2024	8,646,412,560	44,327,063	0	52,266,272	0	45,787,408	0	0	13,217,117,392	83,554,138	0	69,386,218	0
2025	8,949,336,540	42,261,887	0	72,260,562	0	61,982,978	0	0	13,608,532,224	88,422,512	0	96,414,667	0
2026	9,244,274,216	39,960,195	0	93,188,353	0	78,924,970	0	0	13,989,972,016	93,319,921	0	124,351,457	0
2027	9,388,406,792	37,511,845	0	257,632,777	0	96,759,704	0	0	14,187,206,228	98,403,065	0	327,205,450	0
2028	9,487,363,540	34,855,432	0	460,153,908	0	115,359,737	0	0	14,229,469,312	103,648,185	0	675,770,668	0
2029	9,569,059,963	31,985,876	0	672,917,944	0	134,648,925	0	0	14,184,439,004	108,991,450	0	1,102,475,215	0
2030	**9,603,282,386**	**28,925,489**	**0**	**926,098,323**	**0**	**154,645,660**	**0**	**0**	**14,142,463,789**	**114,341,100**	**0**	**1,517,143,759**	**0**
2031	9,180,568,284	25,806,863	0	1,346,568,332	0	172,428,016	0	0	13,661,526,023	111,482,839	0	2,015,508,763	0
2032	8,747,550,601	22,656,039	0	1,777,171,632	0	190,412,993	0	0	13,090,397,514	108,680,158	0	2,603,842,157	0
2033	8,310,995,168	19,470,191	0	2,211,157,228	0	208,588,582	0	0	12,451,904,946	105,904,318	0	3,259,347,490	0
2034	7,940,229,477	16,234,860	0	2,579,408,382	0	226,758,488	0	0	11,809,443,761	103,093,924	0	3,918,745,685	0
2035	**7,628,156,014**	**12,959,647**	**0**	**2,889,033,922**	**0**	**244,901,793**	**0**	**0**	**11,313,787,636**	**100,121,495**	**0**	**4,431,572,418**	**0**
2036	7,174,141,995	11,474,223	0	3,380,544,846	0	263,697,057	0	0	10,898,396,176	98,350,555	0	4,919,673,224	0
2037	6,767,821,292	9,964,475	0	3,824,369,894	0	282,509,206	0	0	10,454,070,146	96,583,589	0	5,436,597,125	0
2038	6,389,600,568	8,435,533	0	4,240,056,392	0	301,379,116	0	0	10,022,457,843	94,786,599	0	5,940,784,300	0
2039	6,083,541,466	6,885,660	0	4,583,732,707	0	320,118,520	0	0	9,606,151,759	92,958,775	0	6,429,651,042	0
2040	**5,999,388,506**	**5,309,788**	**0**	**4,706,307,409**	**0**	**338,079,392**	**0**	**0**	**9,268,097,253**	**91,055,157**	**0**	**6,840,401,750**	**0**

LDT - PHEV	LDT - PHEV	LDT - PHEV	Class 2b-3 - ICE	Class 2b-3 - ICE	Class 2b-3 - ICE	Class 2b-3 - ZEV	Class 2b-3 - ZEV	Class 4-5 - ICE	Class 4-5 - ICE	Class 4-5 - ICE	Class 4-5 - ZEV	Class 4-5 - ZEV
LDT PHEV	LDT PHEV	LDT PHEV	Class 2b-3 ICE	Class 2b-3 ICE	Class 2b-3 ICE	Class 2b-3 ZEV	Class 2b-3 ZEV	Class 4-5 ICE	Class 4-5 ICE	Class 4-5 ICE	Class 4-5 ZEV	Class 4-5 ZEV
Finished Gasoline Electricity	Finished Diesel Electricity	CNG Electricity	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen
3,765,191	**0**	**0**	**799,862,867**	**709,462,702**	**0**	**0**	**0**	**220,842,312**	**205,199,282**	**0**	**0**	**0**
6,237,066	0	0	797,369,444	721,108,655	0	0	0	216,295,764	203,293,749	0	0	0
11,441,956	0	0	847,840,070	781,793,979	0	171,580	0	225,956,475	214,719,972	0	93,528	0
18,543,420	0	0	837,959,047	787,855,261	0	907,618	0	219,358,677	210,654,570	0	472,977	0
27,782,228	0	0	827,008,186	792,831,518	0	3,645,478	0	212,430,761	206,061,604	0	1,817,995	0
37,365,378	0	0	814,716,510	796,447,212	0	8,931,675	0	206,050,583	201,831,860	0	2,359,938	0
47,264,563	0	0	801,293,643	798,907,382	0	16,351,546	0	199,722,526	197,481,670	0	3,078,094	0
57,548,309	0	0	786,404,559	799,872,394	0	26,579,752	0	191,731,173	191,306,677	0	7,392,232	0
68,215,294	0	0	769,761,944	799,050,301	0	40,195,552	0	182,992,826	184,233,434	0	13,459,503	0
79,226,756	0	0	751,375,600	796,446,246	0	57,184,002	0	173,627,470	176,391,441	0	21,030,419	0
90,504,404	**0**	**0**	**731,256,357**	**792,066,375**	**0**	**77,528,127**	**0**	**163,744,887**	**167,899,325**	**0**	**29,876,570**	**0**
100,808,888	0	0	705,899,379	779,239,350	0	128,541,197	0	162,304,282	166,002,612	0	43,297,859	0
111,279,197	0	0	680,704,345	766,511,796	0	179,292,853	0	160,783,670	164,018,275	0	56,886,776	0
121,913,838	0	0	655,666,226	753,880,623	0	229,791,212	0	159,187,744	161,951,453	0	70,633,494	0
132,657,848	0	0	630,780,197	741,342,870	0	280,044,062	0	157,520,835	159,806,891	0	84,528,934	0
143,329,359	**0**	**0**	**606,041,632**	**728,895,692**	**0**	**330,058,871**	**0**	**155,786,949**	**157,588,976**	**0**	**98,564,704**	**0**
154,016,184	0	0	591,745,697	720,869,591	0	371,999,250	0	153,171,601	156,943,618	0	117,293,111	0
164,809,556	0	0	577,658,891	713,005,575	0	413,568,413	0	150,406,528	156,182,183	0	136,287,322	0
175,655,008	0	0	563,771,133	705,295,830	0	454,784,259	0	147,503,278	155,313,624	0	155,526,832	0
186,544,583	0	0	550,072,976	697,733,035	0	495,663,552	0	144,472,244	154,345,997	0	174,993,195	0
197,373,495	**0**	**0**	**536,555,566**	**690,310,327**	**0**	**536,222,013**	**0**	**141,322,799**	**153,286,570**	**0**	**194,669,767**	**0**

Class 6-7 - ICE	Class 6-7 - ICE	Class 6-7 - ICE	Class 6-7 - ZEV	Class 6-7 - ZEV	Class 8 - ICE	Class 8 - ICE	Class 8 - ICE	Class 8 - ZEV	Class 8 - ZEV	Urban Busses	Urban Busses	Urban Busses
Class 6-7	Class 6-7	Class 6-7	Class 6-7	Class 6-7	Class 8	Class 8	Class 8	Class 8	Class 8	Urban Busses	Urban Busses	Urban Busses
ICE	ICE	ICE	ZEV	ZEV	ICE	ICE	ICE	ZEV	ZEV	ICE	ICE	ICE
Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG
131,550,522	**478,185,039**	**0**	**0**	**0**	**1,494,385**	**2,926,432,924**	**28,294,222**	**0**	**0**	**0**	**14,863,914**	**1,931,951**
123,279,323	463,379,881	0	5,869	0	1,360,987	2,925,971,842	29,637,592	18,420	0	0	16,426,987	2,210,888
122,975,104	478,272,975	0	42,320	0	1,313,804	3,121,145,402	33,012,418	136,039	0	0	19,182,614	2,664,551
113,801,459	458,275,609	0	80,688	0	1,170,278	3,096,202,543	34,096,732	266,429	0	0	20,668,731	2,954,304
105,028,307	438,267,502	0	115,072	0	1,032,555	3,071,324,627	35,123,194	391,189	0	0	22,122,512	3,245,578
96,649,377	417,821,772	0	578,619	0	900,391	3,044,989,051	36,094,228	2,029,360	0	0	23,505,846	3,537,570
88,658,397	397,255,499	0	1,160,526	0	773,554	3,018,162,857	37,012,126	4,210,544	0	0	24,839,672	3,829,582
81,049,087	374,059,966	0	4,375,789	0	651,827	2,981,311,547	37,879,049	16,466,066	0	0	25,855,938	4,121,005
73,815,158	349,717,238	0	8,748,629	0	535,003	2,938,985,274	38,697,045	34,242,771	0	0	26,651,912	4,411,307
66,950,320	324,511,843	0	14,000,812	0	422,886	2,891,542,378	39,468,046	57,179,483	0	0	27,220,612	4,700,016
60,448,273	**298,720,322**	**0**	**19,862,094**	**0**	**315,292**	**2,839,322,462**	**40,193,887**	**84,933,909**	**0**	**0**	**27,556,822**	**4,986,717**
59,955,878	293,191,535	0	26,800,821	389,555	280,563	2,838,157,706	40,273,255	116,727,793	9,170,191	0	27,369,757	4,864,589
59,453,144	287,565,996	0	33,840,893	784,857	245,472	2,836,643,734	40,348,579	148,809,624	18,426,351	0	27,176,270	4,740,481
58,939,950	281,842,560	0	40,983,507	1,185,974	210,025	2,834,788,617	40,419,950	181,172,745	27,766,495	0	26,976,611	4,614,470
58,416,171	276,020,066	0	48,229,881	1,592,973	174,232	2,832,600,182	40,487,461	213,810,705	37,188,695	0	26,771,016	4,486,628
57,881,681	**270,097,333**	**0**	**55,581,252**	**2,005,926**	**138,100**	**2,830,086,015**	**40,551,200**	**246,717,247**	**46,691,084**	**0**	**26,559,712**	**4,357,026**
57,579,323	267,306,893	0	65,006,642	2,346,088	145,812	2,827,707,778	40,097,922	289,119,433	54,715,671	0	26,095,392	4,231,279
57,252,077	264,373,981	0	74,593,563	2,692,080	153,569	2,824,997,429	39,636,621	331,824,481	62,797,575	0	25,630,664	4,105,445
56,900,485	261,301,715	0	84,338,481	3,043,774	161,370	2,821,964,828	39,167,535	374,823,401	70,935,093	0	25,165,553	3,979,531
56,525,078	258,093,120	0	94,237,966	3,401,046	169,212	2,818,619,449	38,690,893	418,107,551	79,126,591	0	24,700,081	3,853,541
56,126,368	**254,751,136**	**0**	**104,288,684**	**3,763,777**	**177,095**	**2,814,970,399**	**38,206,915**	**461,668,628**	**87,370,498**	**0**	**24,234,272**	**3,727,480**

Urban Busses	Gliders	Gliders	Gliders	LDV - FFV	LDT - FFV	Motorcycle
Urban Busses	Gliders	Gliders	Gliders	LDV	LDT	Motorcycle
ZEV	ICE	ICE	ICE	ICE	ICE	ICE
Electricity	Finished Gasoline	Finished Diesel	CNG	Finished Gasoline	Finished Gasoline	Finished Gasoline
				E85	E85	
0	**0**	**35,486,963**	**0**	**3,690,401**	**22,955,884**	**254,941,398**
633	0	36,259,650	0	4,025,757	25,083,271	271,574,961
3,858	0	39,486,129	0	4,664,531	29,103,861	307,485,242
7,235	0	39,949,769	0	5,005,908	31,270,430	322,682,678
10,615	0	40,380,396	0	5,352,231	33,466,295	337,601,981
52,915	0	40,779,388	0	5,702,947	35,687,561	352,243,152
113,890	0	41,148,045	0	6,057,521	37,930,511	366,606,191
462,203	0	41,487,594	0	6,415,437	40,191,594	380,691,097
1,001,118	0	41,799,197	0	6,776,200	42,467,419	394,497,871
1,738,089	0	42,083,953	0	7,139,328	44,754,739	408,026,512
2,678,747	**0**	**42,342,902**	**0**	**7,504,359**	**47,050,452**	**421,277,021**
3,634,636	0	40,716,508	0	6,994,434	43,820,634	422,261,592
4,598,928	0	39,069,821	0	6,484,375	40,591,766	423,246,164
5,571,296	0	37,403,310	0	5,974,183	37,363,842	424,230,735
6,551,429	0	35,717,431	0	5,463,857	34,136,860	425,215,307
7,539,033	**0**	**34,012,625**	**0**	**4,953,399**	**30,910,814**	**426,199,878**
8,997,204	0	31,916,924	0	4,588,019	28,803,491	428,352,420
10,455,870	0	29,801,135	0	4,222,640	26,697,123	430,504,961
11,915,000	0	27,665,854	0	3,857,261	24,591,696	432,657,502
13,374,566	0	25,511,653	0	3,491,884	22,487,195	434,810,044
14,834,541	**0**	**23,339,084**	**0**	**3,126,507**	**20,383,607**	**436,962,585**

	Fuel Consumption Forecast by Powertrain and GVWR Category (Units - Primary Fuel)										
Year	LDV - ICE	LDV - ICE	LDV - ICE	LDV - ZEV	LDV - ZEV	LDV - PHEV	LDV - PHEV	LDV - PHEV	LDT - ICE	LDT - ICE	LDT - ICE
Vehicle Class	LDV	LDV	LDV	LDV	LDV	LDV	LDV	LDV	LDT	LDT	LDT
Powertrain	ICE	ICE	ICE	ZEV	ZEV	PHEV	PHEV	PHEV	ICE	ICE	ICE
Primary Fuel	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Finished Gasoline	Finished Diesel	CNG
Secondary Fuel						Electricity	Electricity	Electricity			
Units	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE
Standard	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Primary Fuel VMT %	100%	100%	100%	100%	100%	Lookup	100%	100%	100%	100%	100%
2020	256,371,985	1,804,681	0	99,229	0	91,875	0	0	549,270,303	3,125,079	0
2021	264,604,386	1,777,246	0	96,783	0	149,711	0	0	563,656,802	3,273,295	0
2022	290,256,062	1,855,386	0	179,096	0	270,115	0	0	615,908,997	3,647,711	0
2023	295,139,439	1,789,399	0	317,800	0	430,436	0	0	624,416,988	3,771,037	0
2024	299,302,452	1,713,624	0	502,024	0	633,987	0	0	631,783,445	3,889,560	0
2025	303,009,287	1,628,677	0	697,972	0	839,455	0	0	638,402,490	4,003,211	0
2026	306,292,749	1,535,172	0	905,203	0	1,046,016	0	0	644,320,559	4,112,068	0
2027	304,546,628	1,436,632	0	2,516,788	0	1,161,337	0	0	641,694,799	4,223,232	0
2028	301,436,874	1,330,760	0	4,520,891	0	1,301,168	0	0	632,275,472	4,335,534	0
2029	297,914,898	1,217,429	0	6,649,249	0	1,186,348	0	0	619,370,359	4,446,284	0
2030	293,083,003	1,097,555	0	9,203,892	0	1,241,265	0	0	607,035,322	4,551,942	0
2031	272,353,637	974,898	0	13,373,138	0	1,253,249	0	0	577,377,462	4,372,670	0
2032	252,453,817	852,109	0	17,637,012	0	1,230,949	0	0	544,863,635	4,200,760	0
2033	233,507,783	729,083	0	21,928,362	0	1,312,765	0	0	510,557,575	4,034,799	0
2034	217,339,395	605,284	0	25,562,176	0	1,390,327	0	0	477,099,459	3,872,231	0
2035	203,549,841	481,078	0	28,610,255	0	1,463,832	0	0	450,455,461	3,708,192	0
2036	186,741,725	425,314	0	33,453,948	0	1,441,438	0	0	427,722,283	3,581,208	0
2037	171,949,762	368,812	0	37,819,204	0	1,507,317	0	0	404,509,441	3,458,576	0
2038	158,546,426	311,766	0	41,900,205	0	1,570,418	0	0	382,426,079	3,338,886	0
2039	147,504,927	254,114	0	45,264,325	0	1,629,972	0	0	361,523,378	3,221,967	0
2040	142,216,797	195,671	0	46,441,851	0	1,682,991	0	0	344,090,435	3,106,155	0

LDT - ZEV	LDT - ZEV	LDT - PHEV	LDT - PHEV	LDT - PHEV	Class 2b-3 - ICE	Class 2b-3 - ICE	Class 2b-3 - ICE	Class 2b-3 - ZEV	Class 2b-3 - ZEV	Class 4-5 - ICE	Class 4-5 - ICE
LDT	LDT	LDT	LDT	LDT	Class 2b-3	Class 2b-3	Class 2b-3	Class 2b-3	Class 2b-3	Class 4-5	Class 4-5
ZEV	ZEV	PHEV	PHEV	PHEV	ICE	ICE	ICE	ZEV	ZEV	ICE	ICE
Electricity	Hydrogen	Finished Gasoline Electricity	Finished Diesel Electricity	CNG Electricity	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel
GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	DGE	DGE
Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Diesel	Diesel
100%	100%	Lookup	100%	100%	100%	100%	100%	100%	100%	100%	100%
24,546	0	99,312	0	0	71,470,046	62,386,973	0	0	0	22,972,157	18,413,912
148,844	0	161,208	0	0	70,802,804	61,514,573	0	0	0	22,469,533	17,769,644
312,658	0	289,916	0	0	74,817,649	64,754,691	0	4,608	0	23,442,186	18,293,803
578,537	0	460,782	0	0	73,490,101	63,415,197	0	23,419	0	22,727,736	17,504,797
930,368	0	677,281	0	0	72,085,561	62,064,292	0	90,500	0	21,981,005	16,710,989
1,298,801	0	893,970	0	0	70,581,958	60,681,896	0	213,644	0	21,292,837	15,983,260
1,682,976	0	1,110,174	0	0	68,999,140	59,285,682	0	377,360	0	20,611,852	15,279,635
4,449,225	0	1,132,279	0	0	67,309,861	57,852,138	0	592,552	0	19,761,219	14,469,581
9,232,294	0	1,273,059	0	0	65,491,584	56,363,439	0	866,631	0	18,835,921	13,628,649
15,133,356	0	1,183,140	0	0	63,547,440	54,823,933	0	1,193,662	0	17,848,584	12,768,205
20,924,691	0	1,250,877	0	0	61,480,567	53,237,625	0	1,568,399	0	16,810,721	11,897,884
27,808,461	0	1,248,323	0	0	59,534,402	52,510,395	0	2,534,411	0	16,627,592	11,633,257
35,939,078	0	1,264,479	0	0	57,589,719	51,786,129	0	3,447,582	0	16,437,057	11,368,351
45,003,159	0	1,364,660	0	0	55,646,105	51,064,641	0	4,311,895	0	16,239,641	11,103,527
54,127,696	0	1,463,104	0	0	53,703,159	50,345,751	0	5,130,948	0	16,035,828	10,839,106
61,233,699	0	1,557,907	0	0	51,760,493	49,629,285	0	5,908,002	0	15,826,066	10,575,368
68,003,168	0	1,571,589	0	0	50,700,189	49,061,887	0	6,508,784	0	15,527,823	10,445,997
75,176,196	0	1,658,055	0	0	49,651,097	48,505,999	0	7,076,752	0	15,215,679	10,311,059
82,178,335	0	1,742,638	0	0	48,612,455	47,961,075	0	7,614,327	0	14,890,886	10,171,276
88,973,644	0	1,825,336	0	0	47,583,546	47,426,604	0	8,123,708	0	14,554,570	10,027,287
94,692,605	0	1,905,216	0	0	46,563,697	46,902,105	0	8,606,894	0	14,207,745	9,879,660

Class 4-5 - ICE	Class 4-5 - ZEV	Class 4-5 - ZEV	Class 6-7 - ICE	Class 6-7 - ICE	Class 6-7 - ICE	Class 6-7 - ZEV	Class 6-7 - ZEV	Class 8 - ICE	Class 8 - ICE	Class 8 - ICE	Class 8 - ZEV
Class 4-5	Class 4-5	Class 4-5	Class 6-7	Class 6-7	Class 6-7	Class 6-7	Class 6-7	Class 8	Class 8	Class 8	Class 8
ICE	ZEV	ZEV	ICE	ICE	ICE	ZEV	ZEV	ICE	ICE	ICE	ZEV
CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity
DGE	DGE	DGE	DGE	DGE	DGE	DGE	DGE	DGE	DGE	DGE	DGE
Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
0	0	0	16,420,813	65,556,758	0	0	0	222,658	536,696,713	4,328,098	0
0	0	0	15,314,091	62,765,451	0	205	0	203,461	528,875,924	4,520,483	974
0	2,104	0	15,202,926	64,015,293	0	1,492	0	197,067	556,136,276	5,020,715	7,135
0	10,451	0	14,001,574	60,620,570	0	2,869	0	176,130	543,961,148	5,170,718	13,860
0	39,466	0	12,860,692	57,303,011	0	4,128	0	155,928	532,133,771	5,311,113	20,188
0	50,349	0	11,778,658	54,004,794	0	20,945	0	136,431	520,379,717	5,442,348	103,901
0	64,560	0	10,753,879	50,765,781	0	42,390	0	117,611	508,859,068	5,564,846	213,881
0	152,465	0	9,784,791	47,266,981	0	161,294	0	99,443	495,976,359	5,679,006	829,895
0	273,059	0	8,869,859	43,702,217	0	325,459	0	81,900	482,532,157	5,785,204	1,712,492
0	419,782	0	8,007,575	40,108,822	0	525,704	0	64,959	468,606,309	5,883,796	2,837,607
0	586,905	0	7,196,458	36,521,536	0	752,804	0	48,599	454,271,588	5,975,118	4,182,838
0	852,834	0	7,118,023	35,542,079	0	1,015,638	24,855	42,587	451,088,928	5,932,062	5,705,776
0	1,123,500	0	7,038,798	34,567,438	0	1,282,233	49,655	36,701	447,892,855	5,889,197	7,220,149
0	1,398,747	0	6,958,775	33,597,358	0	1,552,631	74,408	30,937	444,684,898	5,846,532	8,725,824
0	1,678,433	0	6,877,946	32,631,587	0	1,826,878	99,118	25,290	441,466,505	5,804,075	10,222,684
0	1,962,426	0	6,796,304	31,669,882	0	2,105,019	123,791	19,758	438,239,055	5,761,832	11,710,622
0	2,345,062	0	6,742,291	31,120,514	0	2,465,531	143,756	20,566	435,891,630	5,640,886	13,624,493
0	2,736,244	0	6,685,666	30,562,411	0	2,833,217	163,796	21,357	433,514,365	5,521,199	15,525,178
0	3,135,667	0	6,626,514	29,996,112	0	3,207,976	183,900	22,133	431,109,167	5,402,768	17,412,541
0	3,543,062	0	6,564,918	29,422,134	0	3,589,706	204,059	22,893	428,677,852	5,285,587	19,286,465
0	3,958,191	0	6,500,956	28,840,967	0	3,978,311	224,266	23,639	426,222,146	5,169,651	21,146,851

Class 8 - ZEV	Urban Busses	Urban Busses	Urban Busses	Urban Busses	Gliders	Gliders	Gliders	LDV - FFV	LDT - FFV	Motorcycle
Class 8	Urban Busses	Urban Busses	Urban Busses	Urban Busses	Gliders	Gliders	Gliders	LDV	LDT	Motorcycle
ZEV	ICE	ICE	ICE	ZEV	ICE	ICE	ICE	ICE	ICE	ICE
Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity	Finished Gasoline	Finished Diesel	CNG	Finished Gasoline E85	Finished Gasoline E85	Finished Gasoline
DGE	DGE	DGE	DGE	DGE	DGE	DGE	DGE	GGE	GGE	GGE
Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Gasoline	Gasoline	Gasoline
100%	100%	100%	100%	100%	100%	100%	100%	Lookup	Lookup	100%
0	0	2,478,849	295,526	0	0	6,705,629	0	242,115	1,946,808	5,794,123
0	0	2,723,710	337,216	33	0	6,846,309	0	260,084	2,108,155	6,172,158
0	0	3,162,360	405,240	202	0	7,449,719	0	296,818	2,424,338	6,988,301
0	0	3,387,913	448,016	376	0	7,531,342	0	313,821	2,581,873	7,333,697
0	0	3,605,637	490,776	548	0	7,606,619	0	330,632	2,739,056	7,672,772
0	0	3,809,486	533,401	2,709	0	7,675,825	0	347,227	2,895,578	8,005,526
0	0	4,003,071	575,785	5,785	0	7,739,217	0	363,582	3,051,160	8,331,959
0	0	4,143,604	617,841	23,295	0	7,797,042	0	379,678	3,205,540	8,652,070
0	0	4,247,470	659,490	50,066	0	7,849,529	0	395,495	3,358,482	8,965,861
0	0	4,314,170	700,666	86,255	0	7,896,897	0	411,018	3,509,767	9,273,330
0	0	4,343,493	741,312	131,923	0	7,939,353	0	426,233	3,659,194	9,574,478
767,097	0	4,262,611	716,531	177,665	0	7,638,540	0	386,681	3,360,160	9,596,854
1,531,282	0	4,182,645	691,911	223,137	0	7,333,592	0	349,175	3,069,477	9,619,231
2,292,446	0	4,103,601	667,459	268,330	0	7,024,591	0	313,561	2,786,803	9,641,608
3,050,492	0	4,025,483	643,180	313,236	0	6,711,613	0	279,698	2,511,816	9,663,984
3,805,325	0	3,948,293	619,080	357,846	0	6,394,738	0	247,460	2,244,207	9,686,361
4,439,174	0	3,840,460	595,247	423,985	0	5,992,513	0	223,815	2,063,776	9,735,282
5,071,947	0	3,734,704	571,870	489,202	0	5,587,620	0	201,257	1,888,085	9,784,204
5,703,523	0	3,630,967	548,936	553,515	0	5,180,183	0	179,713	1,716,952	9,833,125
6,333,787	0	3,529,193	526,435	616,942	0	4,770,319	0	159,115	1,550,203	9,882,046
6,962,631	0	3,429,330	504,353	679,500	0	4,358,140	0	139,403	1,387,673	9,930,968

	Fuel Consumption Forecast by Powertrain and GVWR Category (GGE - Primary Fuel)									
Year	LDV - ICE	LDV - ICE	LDV - ICE	LDV - ZEV	LDV - ZEV	LDV - PHEV	LDV - PHEV	LDV - PHEV	LDT - ICE	LDT - ICE
Vehicle Class	LDV	LDV	LDV	LDV	LDV	LDV	LDV	LDV	LDT	LDT
Powertrain	ICE	ICE	ICE	ZEV	ZEV	PHEV	PHEV	PHEV	ICE	ICE
Primary Fuel	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Finished Gasoline	Finished Diesel
Secondary Fuel						Electricity	Electricity	Electricity		
Units	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE
Standard	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Primary Fuel VMT %	100%	100%	100%	100%	100%	Lookup	100%	100%	100%	100%
2020	256,371,985	1,804,681	0	99,229	0	91,875	0	0	549,270,303	3,125,079
2021	264,604,386	1,777,246	0	96,783	0	149,711	0	0	563,656,802	3,273,295
2022	290,256,062	1,855,386	0	179,096	0	270,115	0	0	615,908,997	3,647,711
2023	295,139,439	1,789,399	0	317,800	0	430,436	0	0	624,416,988	3,771,037
2024	299,302,452	1,713,624	0	502,024	0	633,987	0	0	631,783,445	3,889,560
2025	303,009,287	1,628,677	0	697,972	0	839,455	0	0	638,402,490	4,003,211
2026	306,292,749	1,535,172	0	905,203	0	1,046,016	0	0	644,320,559	4,112,068
2027	304,546,628	1,436,632	0	2,516,788	0	1,161,337	0	0	641,694,799	4,223,232
2028	301,436,874	1,330,760	0	4,520,891	0	1,301,168	0	0	632,275,472	4,335,534
2029	297,914,898	1,217,429	0	6,649,249	0	1,186,348	0	0	619,370,359	4,446,284
2030	293,083,003	1,097,555	0	9,203,892	0	1,241,265	0	0	607,035,322	4,551,942
2031	272,353,637	974,898	0	13,373,138	0	1,253,249	0	0	577,377,462	4,372,670
2032	252,453,817	852,109	0	17,637,012	0	1,230,949	0	0	544,863,635	4,200,760
2033	233,507,783	729,083	0	21,928,362	0	1,312,765	0	0	510,557,575	4,034,799
2034	217,339,395	605,284	0	25,562,176	0	1,390,327	0	0	477,099,459	3,872,231
2035	203,549,841	481,078	0	28,610,255	0	1,463,832	0	0	450,455,461	3,708,192
2036	186,741,725	425,314	0	33,453,948	0	1,441,438	0	0	427,722,283	3,581,208
2037	171,949,762	368,812	0	37,819,204	0	1,507,317	0	0	404,509,441	3,458,576
2038	158,546,426	311,766	0	41,900,205	0	1,570,418	0	0	382,426,079	3,338,886
2039	147,504,927	254,114	0	45,264,325	0	1,629,972	0	0	361,523,378	3,221,967
2040	142,216,797	195,671	0	46,441,851	0	1,682,991	0	0	344,090,435	3,106,155

LDT - ICE	LDT - ZEV	LDT - ZEV	LDT - PHEV	LDT - PHEV	LDT - PHEV	Class 2b-3 - ICE	Class 2b-3 - ICE	Class 2b-3 - ICE	Class 2b-3 - ZEV	Class 2b-3 - ZEV
LDT ICE	LDT ZEV	LDT ZEV	LDT PHEV	LDT PHEV	LDT PHEV	Class 2b-3 ICE	Class 2b-3 ICE	Class 2b-3 ICE	Class 2b-3 ZEV	Class 2b-3 ZEV
CNG	Electricity	Hydrogen	Finished Gasoline Electricity	Finished Diesel Electricity	CNG Electricity	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen
GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE
Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Diesel	Diesel	Diesel	Diesel	Diesel
100%	100%	100%	Lookup	100%	100%	100%	100%	100%	100%	100%
0	24,546	0	99,312	0	0	71,470,046	62,386,973	0	0	0
0	148,844	0	161,208	0	0	70,802,804	61,514,573	0	0	0
0	312,658	0	289,916	0	0	74,817,649	64,754,691	0	4,608	0
0	578,537	0	460,782	0	0	73,490,101	63,415,197	0	23,419	0
0	930,368	0	677,281	0	0	72,085,561	62,064,292	0	90,500	0
0	1,298,801	0	893,970	0	0	70,581,958	60,681,896	0	213,644	0
0	1,682,976	0	1,110,174	0	0	68,999,140	59,285,682	0	377,360	0
0	4,449,225	0	1,132,279	0	0	67,309,861	57,852,138	0	592,552	0
0	9,232,294	0	1,273,059	0	0	65,491,584	56,363,439	0	866,631	0
0	15,133,356	0	1,183,140	0	0	63,547,440	54,823,933	0	1,193,662	0
0	20,924,691	0	1,250,877	0	0	61,480,567	53,237,625	0	1,568,399	0
0	27,808,461	0	1,248,323	0	0	59,534,402	52,510,395	0	2,534,411	0
0	35,939,078	0	1,264,479	0	0	57,589,719	51,786,129	0	3,447,582	0
0	45,003,159	0	1,364,660	0	0	55,646,105	51,064,641	0	4,311,895	0
0	54,127,696	0	1,463,104	0	0	53,703,159	50,345,751	0	5,130,948	0
0	61,233,699	0	1,557,907	0	0	51,760,493	49,629,285	0	5,908,002	0
0	68,003,168	0	1,571,589	0	0	50,700,189	49,061,887	0	6,508,784	0
0	75,176,196	0	1,658,055	0	0	49,651,097	48,505,999	0	7,076,752	0
0	82,178,335	0	1,742,638	0	0	48,612,455	47,961,075	0	7,614,327	0
0	88,973,644	0	1,825,336	0	0	47,583,546	47,426,604	0	8,123,708	0
0	94,692,605	0	1,905,216	0	0	46,563,697	46,902,105	0	8,606,894	0

Class 4-5 - ICE	Class 4-5 - ICE	Class 4-5 - ICE	Class 4-5 - ZEV	Class 4-5 - ZEV	Class 6-7 - ICE	Class 6-7 - ICE	Class 6-7 - ICE	Class 6-7 - ZEV	Class 6-7 - ZEV	Class 8 - ICE
Class 4-5 ICE	Class 4-5 ICE	Class 4-5 ICE	Class 4-5 ZEV	Class 4-5 ZEV	Class 6-7 ICE	Class 6-7 ICE	Class 6-7 ICE	Class 6-7 ZEV	Class 6-7 ZEV	Class 8 ICE
Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline
GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE
Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
25,817,474	20,694,647	0	0	0	18,454,684	73,676,575	0	0	0	250,236
25,252,594	19,970,580	0	0	0	17,210,884	70,539,539	0	230	0	228,661
26,345,720	20,559,661	0	2,365	0	17,085,951	71,944,186	0	1,676	0	221,476
25,542,778	19,672,930	0	11,745	0	15,735,799	68,128,994	0	3,225	0	197,945
24,703,558	18,780,801	0	44,355	0	14,453,609	64,400,525	0	4,640	0	175,241
23,930,154	17,962,936	0	56,586	0	13,237,555	60,693,793	0	23,539	0	153,329
23,164,823	17,172,161	0	72,556	0	12,085,848	57,053,598	0	47,640	0	132,179
22,208,831	16,261,774	0	171,349	0	10,996,729	53,121,438	0	181,272	0	111,759
21,168,926	15,316,685	0	306,879	0	9,968,474	49,115,145	0	365,771	0	92,044
20,059,298	14,349,666	0	471,776	0	8,999,388	45,076,675	0	590,817	0	73,005
18,892,886	13,371,548	0	659,599	0	8,087,807	41,045,070	0	846,045	0	54,618
18,687,075	13,074,144	0	958,465	0	7,999,657	39,944,298	0	1,141,434	27,933	47,862
18,472,940	12,776,427	0	1,262,656	0	7,910,619	38,848,939	0	1,441,049	55,806	41,247
18,251,072	12,478,803	0	1,571,995	0	7,820,684	37,758,705	0	1,744,939	83,624	34,769
18,022,015	12,181,631	0	1,886,323	0	7,729,844	36,673,314	0	2,053,154	111,395	28,423
17,786,272	11,885,226	0	2,205,491	0	7,638,090	35,592,493	0	2,365,745	139,123	22,205
17,451,089	11,739,831	0	2,635,520	0	7,577,387	34,975,081	0	2,770,910	161,562	23,113
17,100,283	11,588,180	0	3,075,154	0	7,513,748	34,347,851	0	3,184,138	184,084	24,003
16,735,261	11,431,084	0	3,524,049	0	7,447,270	33,711,411	0	3,605,313	206,678	24,874
16,357,289	11,269,260	0	3,981,903	0	7,378,044	33,066,340	0	4,034,324	229,334	25,729
15,967,508	11,103,348	0	4,448,450	0	7,306,160	32,413,190	0	4,471,062	252,044	26,567

Class 8 - ICE	Class 8 - ICE	Class 8 - ZEV	Class 8 - ZEV	Urban Busses	Urban Busses	Urban Busses	Urban Busses	Gliders	Gliders	Gliders
Class 8	Class 8	Class 8	Class 8	Urban Busses	Urban Busses	Urban Busses	Urban Busses	Gliders	Gliders	Gliders
ICE	ICE	ZEV	ZEV	ICE	ICE	ICE	ZEV	ICE	ICE	ICE
Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity	Finished Gasoline	Finished Diesel	CNG
GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE
Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
603,171,621	4,864,173	0	0	0	2,785,877	332,130	0	0	7,536,184	0
594,382,154	5,080,387	1,095	0	0	3,061,067	378,984	38	0	7,694,289	0
625,018,956	5,642,577	8,018	0	0	3,554,048	455,433	227	0	8,372,437	0
611,335,824	5,811,160	15,577	0	0	3,807,538	503,507	423	0	8,464,169	0
598,043,516	5,968,944	22,689	0	0	4,052,229	551,564	616	0	8,548,770	0
584,833,612	6,116,434	116,770	0	0	4,281,327	599,467	3,045	0	8,626,547	0
571,886,024	6,254,104	240,372	0	0	4,498,888	647,102	6,502	0	8,697,792	0
557,407,670	6,382,404	932,685	0	0	4,656,828	694,366	26,180	0	8,762,778	0
542,298,278	6,501,755	1,924,600	0	0	4,773,559	741,174	56,267	0	8,821,766	0
526,647,584	6,612,559	3,189,071	0	0	4,848,520	787,450	96,938	0	8,875,002	0
510,537,373	6,715,193	4,700,921	0	0	4,881,475	833,131	148,263	0	8,922,716	0
506,960,511	6,666,803	6,412,490	862,109	0	4,790,575	805,280	199,670	0	8,584,645	0
503,368,575	6,618,629	8,114,432	1,720,945	0	4,700,704	777,611	250,775	0	8,241,926	0
499,763,281	6,570,680	9,806,599	2,576,387	0	4,611,870	750,130	301,566	0	7,894,652	0
496,146,261	6,522,964	11,488,859	3,428,323	0	4,524,077	722,844	352,033	0	7,542,910	0
492,519,061	6,475,488	13,161,092	4,276,651	0	4,437,326	695,759	402,168	0	7,186,786	0
489,880,885	6,339,562	15,312,014	4,989,007	0	4,316,137	668,974	476,500	0	6,734,741	0
487,209,173	6,205,051	17,448,117	5,700,155	0	4,197,282	642,701	549,794	0	6,279,699	0
484,506,070	6,071,951	19,569,248	6,409,958	0	4,080,696	616,927	622,073	0	5,821,797	0
481,773,614	5,940,257	21,675,274	7,118,286	0	3,966,317	591,639	693,356	0	5,361,167	0
479,013,745	5,809,960	23,766,087	7,825,018	0	3,854,084	566,822	763,662	0	4,897,936	0

LDV - FFV	LDT - FFV	Motorcycle
LDV	LDT	Motorcycle
ICE	ICE	ICE
Finished Gasoline E85	Finished Gasoline E85	Finished Gasoline
GGE	GGE	GGE
Gasoline	Gasoline	Gasoline
Lookup	Lookup	100%
242,115	1,946,808	5,794,123
260,084	2,108,155	6,172,158
296,818	2,424,338	6,988,301
313,821	2,581,873	7,333,697
330,632	2,739,056	7,672,772
347,227	2,895,578	8,005,526
363,582	3,051,160	8,331,959
379,678	3,205,540	8,652,070
395,495	3,358,482	8,965,861
411,018	3,509,767	9,273,330
426,233	3,659,194	9,574,478
386,681	3,360,160	9,596,854
349,175	3,069,477	9,619,231
313,561	2,786,803	9,641,608
279,698	2,511,816	9,663,984
247,460	2,244,207	9,686,361
223,815	2,063,776	9,735,282
201,257	1,888,085	9,784,204
179,713	1,716,952	9,833,125
159,115	1,550,203	9,882,046
139,403	1,387,673	9,930,968

	Fuel Consumption Forecast by Powertrain and GVWR Category (Units - Secondary Fuel)										
Year	LDV - ICE	LDV - ICE	LDV - ICE	LDV - ZEV	LDV - ZEV	LDV - PHEV	LDV - PHEV	LDV - PHEV	LDT - ICE	LDT - ICE	LDT - ICE
Vehicle Class	LDV	LDV	LDV	LDV	LDV	LDV	LDV	LDV	LDT	LDT	LDT
Powertrain	ICE	ICE	ICE	ZEV	ZEV	PHEV	PHEV	PHEV	ICE	ICE	ICE
Primary Fuel	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Finished Gasoline	Finished Diesel	CNG
Secondary Fuel						Electricity	Electricity	Electricity			
Units	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE
Standard	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Secondary Fuel VMT %	0%	0%	0%	0%	0%	Lookup	0%	0%	0%	0%	0%
2020	0	0	0	0	0	34,057	0	0	0	0	0
2021	0	0	0	0	0	57,171	0	0	0	0	0
2022	0	0	0	0	0	106,209	0	0	0	0	0
2023	0	0	0	0	0	174,173	0	0	0	0	0
2024	0	0	0	0	0	263,876	0	0	0	0	0
2025	0	0	0	0	0	359,220	0	0	0	0	0
2026	0	0	0	0	0	459,991	0	0	0	0	0
2027	0	0	0	0	0	595,498	0	0	0	0	0
2028	0	0	0	0	0	731,029	0	0	0	0	0
2029	0	0	0	0	0	953,965	0	0	0	0	0
2030	0	0	0	0	0	1,132,712	0	0	0	0	0
2031	0	0	0	0	0	1,292,884	0	0	0	0	0
2032	0	0	0	0	0	1,466,405	0	0	0	0	0
2033	0	0	0	0	0	1,605,236	0	0	0	0	0
2034	0	0	0	0	0	1,743,825	0	0	0	0	0
2035	0	0	0	0	0	1,882,014	0	0	0	0	0
2036	0	0	0	0	0	2,061,546	0	0	0	0	0
2037	0	0	0	0	0	2,207,050	0	0	0	0	0
2038	0	0	0	0	0	2,352,799	0	0	0	0	0
2039	0	0	0	0	0	2,497,323	0	0	0	0	0
2040	0	0	0	0	0	2,635,573	0	0	0	0	0

LDT - ZEV	LDT - ZEV	LDT - PHEV	LDT - PHEV	LDT - PHEV	Class 2b-3 - ICE	Class 2b-3 - ICE	Class 2b-3 - ICE	Class 2b-3 - ZEV	Class 2b-3 - ZEV	Class 4-5 - ICE	Class 4-5 - ICE
LDT	LDT	LDT	LDT	LDT	Class 2b-3	Class 2b-3	Class 2b-3	Class 2b-3	Class 2b-3	Class 4-5	Class 4-5
ZEV	ZEV	PHEV	PHEV	PHEV	ICE	ICE	ICE	ZEV	ZEV	ICE	ICE
Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel
		Electricity	Electricity	Electricity							
GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	DGE	DGE
Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Diesel	Diesel
0%	0%	Lookup	0%	0%	0%	0%	0%	0%	0%	0%	0%
0	0	24,288	0	0	0	0	0	0	0	0	0
0	0	40,417	0	0	0	0	0	0	0	0	0
0	0	74,485	0	0	0	0	0	0	0	0	0
0	0	121,272	0	0	0	0	0	0	0	0	0
0	0	182,534	0	0	0	0	0	0	0	0	0
0	0	246,641	0	0	0	0	0	0	0	0	0
0	0	313,443	0	0	0	0	0	0	0	0	0
0	0	442,125	0	0	0	0	0	0	0	0	0
0	0	540,530	0	0	0	0	0	0	0	0	0
0	0	715,590	0	0	0	0	0	0	0	0	0
0	0	846,314	0	0	0	0	0	0	0	0	0
0	0	983,355	0	0	0	0	0	0	0	0	0
0	0	1,116,608	0	0	0	0	0	0	0	0	0
0	0	1,223,770	0	0	0	0	0	0	0	0	0
0	0	1,332,109	0	0	0	0	0	0	0	0	0
0	0	1,439,800	0	0	0	0	0	0	0	0	0
0	0	1,575,400	0	0	0	0	0	0	0	0	0
0	0	1,686,426	0	0	0	0	0	0	0	0	0
0	0	1,798,067	0	0	0	0	0	0	0	0	0
0	0	1,910,242	0	0	0	0	0	0	0	0	0
0	0	2,021,878	0	0	0	0	0	0	0	0	0

Class 4-5 - ICE	Class 4-5 - ZEV	Class 4-5 - ZEV	Class 6-7 - ICE	Class 6-7 - ICE	Class 6-7 - ICE	Class 6-7 - ZEV	Class 6-7 - ZEV	Class 8 - ICE	Class 8 - ICE	Class 8 - ICE	Class 8 - ZEV
Class 4-5	Class 4-5	Class 4-5	Class 6-7	Class 6-7	Class 6-7	Class 6-7	Class 6-7	Class 8	Class 8	Class 8	Class 8
ICE	ZEV	ZEV	ICE	ICE	ICE	ZEV	ZEV	ICE	ICE	ICE	ZEV
CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity
DGE	DGE	DGE	DGE	DGE	DGE	DGE	DGE	DGE	DGE	DGE	DGE
Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0

Class 8 - ZEV	Urban Busses	Urban Busses	Urban Busses	Urban Busses	Gliders	Gliders	Gliders	LDV - FFV	LDT - FFV	Motorcycle
Class 8	Urban Busses	Urban Busses	Urban Busses	Urban Busses	Gliders	Gliders	Gliders	LDV	LDT	Motorcycle
ZEV	ICE	ICE	ICE	ZEV	ICE	ICE	ICE	ICE	ICE	ICE
Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity	Finished Gasoline	Finished Diesel	CNG	Finished Gasoline E85	Finished Gasoline E85	Finished Gasoline
DGE	DGE	DGE	DGE	DGE	DGE	DGE	DGE	GGE	GGE	GGE
Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Gasoline	Gasoline	Gasoline
0%	0%	0%	0%	0%	0%	0%	0%	Lookup	Lookup	0%
0	0	0	0	0	0	0	0	6,042	48,580	0
0	0	0	0	0	0	0	0	6,490	52,606	0
0	0	0	0	0	0	0	0	7,407	60,496	0
0	0	0	0	0	0	0	0	7,831	64,427	0
0	0	0	0	0	0	0	0	8,250	68,349	0
0	0	0	0	0	0	0	0	8,665	72,255	0
0	0	0	0	0	0	0	0	9,073	76,137	0
0	0	0	0	0	0	0	0	9,474	79,990	0
0	0	0	0	0	0	0	0	9,869	83,806	0
0	0	0	0	0	0	0	0	10,256	87,581	0
0	0	0	0	0	0	0	0	10,636	91,310	0
0	0	0	0	0	0	0	0	9,649	83,848	0
0	0	0	0	0	0	0	0	8,713	76,594	0
0	0	0	0	0	0	0	0	7,824	69,541	0
0	0	0	0	0	0	0	0	6,979	62,679	0
0	0	0	0	0	0	0	0	6,175	56,001	0
0	0	0	0	0	0	0	0	5,585	51,499	0
0	0	0	0	0	0	0	0	5,022	47,114	0
0	0	0	0	0	0	0	0	4,484	42,844	0
0	0	0	0	0	0	0	0	3,970	38,683	0
0	0	0	0	0	0	0	0	3,479	34,627	0

	Fuel Consumption Forecast by Powertrain and GVWR Category (GGE - Secondary Fuel)									
Year	LDV - ICE	LDV - ICE	LDV - ICE	LDV - ZEV	LDV - ZEV	LDV - PHEV	LDV - PHEV	LDV - PHEV	LDT - ICE	LDT - ICE
Vehicle Class	LDV	LDV	LDV	LDV	LDV	LDV	LDV	LDV	LDT	LDT
Powertrain	ICE	ICE	ICE	ZEV	ZEV	PHEV	PHEV	PHEV	ICE	ICE
Primary Fuel	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Finished Gasoline	Finished Diesel
Secondary Fuel						Electricity	Electricity	Electricity		
Units	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE
Standard	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Secondary Fuel VMT %	0%	0%	0%	0%	0%	Lookup	0%	0%	0%	0%
2020	0	0	0	0	0	34,057	0	0	0	0
2021	0	0	0	0	0	57,171	0	0	0	0
2022	0	0	0	0	0	106,209	0	0	0	0
2023	0	0	0	0	0	174,173	0	0	0	0
2024	0	0	0	0	0	263,876	0	0	0	0
2025	0	0	0	0	0	359,220	0	0	0	0
2026	0	0	0	0	0	459,991	0	0	0	0
2027	0	0	0	0	0	595,498	0	0	0	0
2028	0	0	0	0	0	731,029	0	0	0	0
2029	0	0	0	0	0	953,965	0	0	0	0
2030	0	0	0	0	0	1,132,712	0	0	0	0
2031	0	0	0	0	0	1,292,884	0	0	0	0
2032	0	0	0	0	0	1,466,405	0	0	0	0
2033	0	0	0	0	0	1,605,236	0	0	0	0
2034	0	0	0	0	0	1,743,825	0	0	0	0
2035	0	0	0	0	0	1,882,014	0	0	0	0
2036	0	0	0	0	0	2,061,546	0	0	0	0
2037	0	0	0	0	0	2,207,050	0	0	0	0
2038	0	0	0	0	0	2,352,799	0	0	0	0
2039	0	0	0	0	0	2,497,323	0	0	0	0
2040	0	0	0	0	0	2,635,573	0	0	0	0

LDT - ICE	LDT - ZEV	LDT - ZEV	LDT - PHEV	LDT - PHEV	LDT - PHEV	Class 2b-3 - ICE	Class 2b-3 - ICE	Class 2b-3 - ICE	Class 2b-3 - ZEV	Class 2b-3 - ZEV
LDT	LDT	LDT	LDT	LDT	LDT	Class 2b-3	Class 2b-3	Class 2b-3	Class 2b-3	Class 2b-3
ICE	ZEV	ZEV	PHEV	PHEV	PHEV	ICE	ICE	ICE	ZEV	ZEV
CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen
			Electricity	Electricity	Electricity					
GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE
Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Diesel	Diesel	Diesel	Diesel	Diesel
0%	0%	0%	Lookup	0%	0%	0%	0%	0%	0%	0%
0	0	0	24,288	0	0	0	0	0	0	0
0	0	0	40,417	0	0	0	0	0	0	0
0	0	0	74,485	0	0	0	0	0	0	0
0	0	0	121,272	0	0	0	0	0	0	0
0	0	0	182,534	0	0	0	0	0	0	0
0	0	0	246,641	0	0	0	0	0	0	0
0	0	0	313,443	0	0	0	0	0	0	0
0	0	0	442,125	0	0	0	0	0	0	0
0	0	0	540,530	0	0	0	0	0	0	0
0	0	0	715,590	0	0	0	0	0	0	0
0	0	0	846,314	0	0	0	0	0	0	0
0	0	0	983,355	0	0	0	0	0	0	0
0	0	0	1,116,608	0	0	0	0	0	0	0
0	0	0	1,223,770	0	0	0	0	0	0	0
0	0	0	1,332,109	0	0	0	0	0	0	0
0	0	0	1,439,800	0	0	0	0	0	0	0
0	0	0	1,575,400	0	0	0	0	0	0	0
0	0	0	1,686,426	0	0	0	0	0	0	0
0	0	0	1,798,067	0	0	0	0	0	0	0
0	0	0	1,910,242	0	0	0	0	0	0	0
0	0	0	2,021,878	0	0	0	0	0	0	0

Class 4-5 - ICE	Class 4-5 - ICE	Class 4-5 - ICE	Class 4-5 - ZEV	Class 4-5 - ZEV	Class 6-7 - ICE	Class 6-7 - ICE	Class 6-7 - ICE	Class 6-7 - ZEV	Class 6-7 - ZEV	Class 8 - ICE
Class 4-5	Class 4-5	Class 4-5	Class 4-5	Class 4-5	Class 6-7	Class 6-7	Class 6-7	Class 6-7	Class 6-7	Class 8
ICE	ICE	ICE	ZEV	ZEV	ICE	ICE	ICE	ZEV	ZEV	ICE
Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline
GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE
Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0

Class 8 - ICE	Class 8 - ICE	Class 8 - ZEV	Class 8 - ZEV	Urban Busses	Urban Busses	Urban Busses	Urban Busses	Gliders	Gliders	Gliders
Class 8	Class 8	Class 8	Class 8	Urban Busses	Urban Busses	Urban Busses	Urban Busses	Gliders	Gliders	Gliders
ICE	ICE	ZEV	ZEV	ICE	ICE	ICE	ZEV	ICE	ICE	ICE
Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity	Finished Gasoline	Finished Diesel	CNG
GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE	GGE
Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0

LDV - FFV	LDT - FFV	Motorcycle
LDV	LDT	Motorcycle
ICE	ICE	ICE
Finished Gasoline	Finished Gasoline	Finished Gasoline
E85	E85	
GGE	GGE	GGE
Gasoline	Gasoline	Gasoline
Lookup	Lookup	0%
6,042	48,580	0
6,490	52,606	0
7,407	60,496	0
7,831	64,427	0
8,250	68,349	0
8,665	72,255	0
9,073	76,137	0
9,474	79,990	0
9,869	83,806	0
10,256	87,581	0
10,636	91,310	0
9,649	83,848	0
8,713	76,594	0
7,824	69,541	0
6,979	62,679	0
6,175	56,001	0
5,585	51,499	0
5,022	47,114	0
4,484	42,844	0
3,970	38,683	0
3,479	34,627	0

	Fuel Consumption by Blended Fuel Type and Standard (GGE)								
Blended Fuel	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	E85	LPG	Finished Gasoline	Finished Diesel
Standard	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Diesel	Diesel
Lookup	Finished Gasoline_Gasoline	Finished Diesel_Gasoline	CNG_Gasoline	Electricity_Gasoline	Hydrogen_Gasoline	E85_Gasoline	LPG_Gasoline	Finished Gasoline_Diesel	Finished Diesel_Diesel
2020	813,816,521	4,929,761	0	182,120	0	54,621	0	115,992,440	770,251,877
2021	837,112,504	5,050,541	0	343,215	0	59,096	0	113,494,944	757,162,201
2022	916,434,547	5,503,096	0	672,448	0	67,903	0	118,470,794	794,203,979
2023	930,677,037	5,560,436	0	1,191,782	0	72,258	0	114,966,624	774,824,652
2024	943,139,625	5,603,185	0	1,878,803	0	76,600	0	111,417,969	755,890,133
2025	954,393,533	5,631,887	0	2,602,634	0	80,920	0	107,902,996	737,080,111
2026	964,516,198	5,647,240	0	3,361,613	0	85,210	0	104,381,989	718,594,145
2027	960,772,331	5,659,865	0	8,003,636	0	89,464	0	100,627,181	698,062,627
2028	949,006,411	5,666,293	0	15,024,744	0	93,675	0	96,721,028	676,688,873
2029	965,570,840	5,663,713	0	23,452,160	0	97,838	0	92,679,130	747,803,539
2030	949,211,487	5,649,497	0	32,107,610	0	101,946	0	88,515,878	725,602,735
2031	898,730,836	5,347,569	0	43,457,839	0	93,497	0	86,268,995	720,192,817
2032	846,218,587	5,052,869	0	56,159,102	0	85,308	0	84,014,524	714,772,271
2033	793,065,933	4,763,882	0	69,760,527	0	77,365	0	81,752,630	709,342,844
2034	743,542,316	4,477,515	0	82,765,807	0	69,658	0	79,483,442	703,906,157
2035	703,212,956	4,189,270	0	93,165,769	0	62,176	0	77,207,061	698,463,712
2036	663,743,359	4,006,522	0	105,094,063	0	57,084	0	75,751,778	694,818,992
2037	625,977,137	3,827,388	0	116,888,876	0	52,137	0	74,289,131	691,135,508
2038	590,729,931	3,650,652	0	128,229,406	0	47,329	0	72,819,860	687,416,349
2039	559,025,123	3,476,081	0	138,645,534	0	42,654	0	71,344,609	683,664,410
2040	536,539,192	3,301,827	0	145,791,907	0	38,106	0	69,863,931	679,882,411

CNG	Electricity	Hydrogen	E85	LPG
Diesel	Diesel	Diesel	Diesel	Diesel
CNG_Diesel	Electricity_Diesel	Hydrogen_Diesel	E85_Diesel	LPG_Diesel
5,196,303	0	0	0	0
5,459,371	1,363	0	0	0
6,098,010	16,895	0	0	0
6,314,666	54,389	0	0	0
6,520,508	162,799	0	0	0
6,715,901	413,583	0	0	0
6,901,206	744,430	0	0	0
7,076,770	1,904,039	0	0	0
7,242,929	3,520,149	0	0	0
17,160,937	5,542,264	0	0	8,820,292
17,457,065	7,923,228	0	0	9,088,741
17,561,568	11,246,470	890,042	0	9,463,520
17,666,466	14,516,494	1,776,751	0	9,838,299
17,771,778	17,736,994	2,660,011	0	10,213,079
17,877,518	20,911,317	3,539,718	0	10,587,858
17,983,700	24,042,499	4,415,774	0	10,962,638
18,032,087	27,703,727	5,150,569	0	11,425,623
18,082,402	31,333,955	5,884,239	0	11,888,607
18,134,627	34,935,010	6,616,635	0	12,351,592
18,188,742	38,508,566	7,347,620	0	12,814,577
18,244,728	42,056,155	8,077,062	0	13,277,562

	Fuel Consumption by Blendstock Type and Standard (GGE)				
Blended Fuel	Finished Gasoline	Finished Gasoline	Finished Diesel	Finished Diesel	Finished Diesel
Blendstock Fuel	Clear Gasoline	Ethanol	Clear Diesel	Biodiesel	Renewable Diesel
Standard	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Lookup	Clear Gasoline_Gasoline	Ethanol_Gasoline	Clear Diesel_Gasoline	Biodiesel_Gasoline	Renewable Diesel_Gasoline
2020	0	0	0	0	0
2021	0	0	0	0	0
2022	0	0	0	0	0
2023	0	0	0	0	0
2024	0	0	0	0	0
2025	888,680,874	65,712,659	5,503,314	128,573	0
2026	898,106,565	66,409,633	5,025,406	248,072	373,762
2027	894,620,474	66,151,857	4,872,269	240,513	547,083
2028	883,664,670	65,341,740	4,587,342	226,448	852,503
2029	899,088,592	66,482,248	4,160,028	205,354	1,298,331
2030	883,855,626	65,355,860	3,684,400	181,875	1,783,222
2031	836,850,709	61,880,127	3,487,493	172,155	1,687,920
2032	787,954,075	58,264,512	3,305,588	163,176	1,584,105
2033	738,461,130	54,604,803	3,597,779	177,599	988,504
2034	692,347,352	51,194,964	3,820,789	188,608	468,118
2035	654,794,781	48,418,175	3,931,668	194,081	63,520
2036	618,042,776	45,700,583	3,915,055	91,467	0
2037	582,876,864	43,100,273	3,740,011	87,377	0
2038	550,056,526	40,673,405	3,567,309	83,343	0
2039	520,534,683	38,490,440	3,396,724	79,357	0
2040	499,596,971	36,942,221	3,226,448	75,379	0

Electricity	Hydrogen	CNG	CNG	E85	E85	LPG	Finished Gasoline	Finished Gasoline	Finished Diesel
Electricity	Hydrogen	Fossil CNG	RNG	Clear Gasoline	Ethanol	LPG	Clear Gasoline	Ethanol	Clear Diesel
Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Diesel	Diesel	Diesel
Electricity_Gasoline	Hydrogen_Gasoline	Fossil CNG_Gasoline	RNG_Gasoline	Clear Gasoline_Gasoline	Ethanol_Gasoline	LPG_Gasoline	Clear Gasoline_Diesel	Ethanol_Diesel	Clear Diesel_Diesel
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
2,602,634	0	0	0	23,354	57,566	0	100,473,574	7,429,422	720,252,929
3,361,613	0	0	0	24,592	60,618	0	97,194,998	7,186,991	639,467,669
8,003,636	0	0	0	25,820	63,644	0	93,698,718	6,928,462	600,924,055
15,024,744	0	0	0	27,035	66,640	0	90,061,515	6,659,513	547,836,685
23,452,160	0	0	0	28,236	69,601	0	86,297,913	6,381,217	549,265,766
32,107,610	0	0	0	29,422	72,524	0	82,421,313	6,094,565	473,212,174
43,457,839	0	0	0	26,984	66,513	0	80,329,134	5,939,861	469,684,019
56,159,102	0	0	0	24,620	60,687	0	78,229,890	5,784,635	467,604,164
69,760,527	0	0	0	22,328	55,037	0	76,123,733	5,628,897	535,709,872
82,765,807	0	0	0	20,104	49,555	0	74,010,785	5,472,657	600,662,816
93,165,769	0	0	0	17,944	44,232	0	71,891,139	5,315,922	655,514,565
105,094,063	0	0	0	16,475	40,609	0	70,536,057	5,215,721	678,956,610
116,888,876	0	0	0	15,047	37,090	0	69,174,117	5,115,014	675,357,219
128,229,406	0	0	0	13,659	33,669	0	67,806,010	5,013,851	671,722,966
138,645,534	0	0	0	12,310	30,344	0	66,432,334	4,912,275	668,056,683
145,791,907	0	0	0	10,998	27,108	0	65,053,605	4,810,327	664,361,024

Finished Diesel	Finished Diesel	Electricity	Hydrogen	CNG	CNG	E85	E85	LPG		
Biodiesel	Renewable Diesel	Electricity	Hydrogen	Fossil CNG	RNG	Clear Gasoline	Ethanol	LPG		
Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel		
Biodiesel_Diesel	Renewable Diesel_Diesel	Electricity_Diesel	Hydrogen_Diesel	Fossil CNG_Diesel	RNG_Diesel	Clear Gasoline_Diesel	Ethanol_Diesel	LPG_Diesel	Year	Carbon Emissions (MT)
0	0	0	0	0	0	0	0	0	2020	
0	0	0	0	0	0	0	0	0	2021	
0	0	0	0	0	0	0	0	0	2022	
0	0	0	0	0	0	0	0	0	2023	
0	0	0	0	0	0	0	0	0	2024	
16,827,182	0	413,583	0	6,715,901	0	0	0	0	2025	20,511,706
31,566,446	47,560,031	744,430	0	0	6,901,206	0	0	0	2026	19,898,808
29,663,793	67,474,779	1,904,039	0	0	7,076,770	0	0	0	2027	19,466,590
27,043,208	101,808,981	3,520,149	0	0	7,242,929	0	0	0	2028	18,844,815
27,113,752	171,424,021	5,542,264	0	0	17,160,937	0	0	8,820,292	2029	19,471,466
23,359,471	229,031,090	7,923,228	0	0	17,457,065	0	0	9,088,741	2030	18,881,868
23,185,308	227,323,490	11,246,470	890,042	0	17,561,568	0	0	9,463,520	2031	18,230,570
23,082,639	224,085,467	14,516,494	1,776,751	0	17,666,466	0	0	9,838,299	2032	17,552,731
26,444,584	147,188,388	17,736,994	2,660,011	0	17,771,778	0	0	10,213,079	2033	17,362,606
29,650,897	73,592,443	20,911,317	3,539,718	0	17,877,518	0	0	10,587,858	2034	17,201,166
32,358,579	10,590,568	24,042,499	4,415,774	0	17,983,700	0	0	10,962,638	2035	17,039,998
15,862,381	0	27,703,727	5,150,569	18,032,087	0	0	0	11,425,623	2036	16,853,163
15,778,289	0	31,333,955	5,884,239	18,082,402	0	0	0	11,888,607	2037	16,372,187
15,693,382	0	34,935,010	6,616,635	18,134,627	0	0	0	12,351,592	2038	15,948,211
15,607,727	0	38,508,566	7,347,620	18,188,742	0	0	0	12,814,577	2039	15,565,441
15,521,386	0	42,056,155	8,077,062	18,244,728	0	0	0	13,277,562	2040	15,212,621

	Fuel Consumption by Blendstock (GGE)										
	Clear Gasoline	Ethanol	Clear Diesel	Biodiesel	Renewable Diesel	Electricity	Hydrogen	Fossil CNG	RNG	LPG	Electricity MWh
Year	Clear Gasoline	Ethanol	Clear Diesel	Biodiesel	Renewable Diesel	Electricity	Hydrogen	Fossil CNG	RNG	LPG	
2020	0	0	0	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0	0	0	0
2023	0	0	0	0	0	0	0	0	0	0	0
2024	0	0	0	0	0	0	0	0	0	0	0
2025	1,018,830,588	75,392,294	826,223,168	19,302,952	0	3,016,217	0	15,885,574	0	7,746,500	100,255
2026	1,025,182,990	75,864,977	745,426,482	34,172,613	47,933,792	4,106,043	0	9,317,487	6,901,206	8,014,948	136,479
2027	1,018,405,895	75,366,787	707,196,212	32,273,299	68,021,862	9,907,675	0	9,465,300	7,076,770	8,283,396	329,318
2028	1,004,018,152	74,305,805	654,290,397	29,649,547	102,661,484	18,544,893	0	9,613,114	7,242,929	8,551,844	616,407
2029	985,414,742	72,933,066	553,425,793	27,319,106	172,722,352	28,994,423	0	0	17,160,937	8,820,292	963,735
2030	966,306,361	71,522,950	476,896,575	23,541,346	230,814,311	40,030,838	0	0	17,457,065	9,088,741	1,330,571
2031	917,206,826	67,886,501	473,171,512	23,357,464	229,011,410	54,704,309	890,042	0	17,561,568	9,463,520	1,818,297
2032	866,208,585	64,109,834	470,909,752	23,245,815	225,669,573	70,675,596	1,776,751	0	17,666,466	9,838,299	2,349,161
2033	814,607,191	60,288,737	539,307,651	26,622,184	148,176,892	87,497,521	2,660,011	0	17,771,778	10,213,079	2,908,299
2034	766,378,241	56,717,175	604,483,605	29,839,505	74,060,561	103,677,124	3,539,718	0	17,877,518	10,587,858	3,446,087
2035	726,703,864	53,778,328	659,446,233	32,552,660	10,654,089	117,208,267	4,415,774	0	17,983,700	10,962,638	3,895,843
2036	688,595,307	50,956,913	682,871,665	15,953,848	0	132,797,790	5,150,569	18,032,087	0	11,425,623	4,414,018
2037	652,066,027	48,252,377	679,097,230	15,865,666	0	148,222,830	5,884,239	18,082,402	0	11,888,607	4,926,725
2038	617,876,195	45,720,925	675,290,276	15,776,725	0	163,164,416	6,616,635	18,134,627	0	12,351,592	5,423,363
2039	586,979,327	43,433,059	671,453,407	15,687,085	0	177,154,099	7,347,620	18,188,742	0	12,814,577	5,888,361
2040	564,661,574	41,779,656	667,587,472	15,596,765	0	187,848,062	8,077,062	18,244,728	0	13,277,562	6,243,814

	Fuel Economy Forecast by Powertrain and GVWR Category (Miles per Units - Primary Fuel)								
Year	LDV - ICE	LDV - ICE	LDV - ICE	LDV - ZEV	LDV - ZEV	LDV - PHEV	LDV - PHEV	LDV - PHEV	LDT - ICE
Vehicle Class	LDV	LDV	LDV	LDV	LDV	LDV	LDV	LDV	LDT
Powertrain	ICE	ICE	ICE	ZEV	ZEV	PHEV	PHEV	PHEV	ICE
Primary Fuel	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Finished Gasoline
Secondary Fuel						Electricity	Electricity	Electricity	
Units	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE
2020	26.30	25.54		106.44	65.76	26.30			19.34
2021	26.95	25.62		105.86	67.37	26.95			19.73
2022	27.60	25.71		105.27	68.99	27.60			20.13
2023	28.24	25.79		104.69	70.61	28.24			20.52
2024	28.89	25.87		104.11	72.22	28.89			20.92
2025	29.53	25.95		103.53	73.84	29.53			21.32
2026	30.18	26.03		102.95	75.45	30.18			21.71
2027	30.83	26.11		102.37	77.07	30.83			22.11
2028	31.47	26.19		101.78	78.68	31.47			22.51
2029	32.12	26.27		101.20	80.30	32.12			22.90
2030	32.77	26.35		100.62	81.92	32.77			23.30
2031	33.71	26.47		100.69	84.27	33.71			23.66
2032	34.65	26.59		100.76	86.63	34.65			24.03
2033	35.59	26.71		100.84	88.98	35.59			24.39
2034	36.53	26.82		100.91	91.33	36.53			24.75
2035	37.48	26.94		100.98	93.69	37.48			25.12
2036	38.42	26.98		101.05	96.04	38.42			25.48
2037	39.36	27.02		101.12	98.40	39.36			25.84
2038	40.30	27.06		101.19	100.75	40.30			26.21
2039	41.24	27.10		101.27	103.11	41.24			26.57
2040	42.18	27.14		101.34	105.46	42.18			26.94

LDT - ICE	LDT - ICE	LDT - ZEV	LDT - ZEV	LDT - PHEV	LDT - PHEV	LDT - PHEV	Class 2b-3 - ICE	Class 2b-3 - ICE	Class 2b-3 - ICE
LDT	LDT	LDT	LDT	LDT	LDT	LDT	Class 2b-3	Class 2b-3	Class 2b-3
ICE	ICE	ZEV	ZEV	PHEV	PHEV	PHEV	ICE	ICE	ICE
Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline Electricity	Finished Diesel Electricity	CNG Electricity	Finished Gasoline	Finished Diesel	CNG
Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE
19.06		75.96	48.34	19.34			11.19	11.37	
19.66		75.62	49.33	19.73			11.26	11.72	
20.27		75.27	50.32	20.13			11.33	12.07	
20.88		74.93	51.31	20.52			11.40	12.42	
21.48		74.58	52.30	20.92			11.47	12.77	
22.09		74.23	53.29	21.32			11.54	13.12	
22.69		73.89	54.28	21.71			11.61	13.48	
23.30		73.54	55.27	22.11			11.68	13.83	
23.91		73.20	56.26	22.51			11.75	14.18	
24.51		72.85	57.25	22.90			11.82	14.53	
25.12		72.50	58.24	23.30			11.89	14.88	
25.50		72.48	59.15	23.66			11.86	14.84	
25.87		72.45	60.06	24.03			11.82	14.80	
26.25		72.42	60.97	24.39			11.78	14.76	
26.62		72.40	61.88	24.75			11.75	14.73	
27.00		72.37	62.79	25.12			11.71	14.69	
27.46		72.34	63.70	25.48			11.67	14.69	
27.93		72.32	64.61	25.84			11.63	14.70	
28.39		72.29	65.52	26.21			11.60	14.71	
28.85		72.26	66.43	26.57			11.56	14.71	
29.31		72.24	67.34	26.94			11.52	14.72	

Class 2b-3 - ZEV	Class 2b-3 - ZEV	Class 4-5 - ICE	Class 4-5 - ICE	Class 4-5 - ICE	Class 4-5 - ZEV	Class 4-5 - ZEV	Class 6-7 - ICE	Class 6-7 - ICE	Class 6-7 - ICE
Class 2b-3	Class 2b-3	Class 4-5	Class 4-5	Class 4-5	Class 4-5	Class 4-5	Class 6-7	Class 6-7	Class 6-7
ZEV	ZEV	ICE	ICE	ICE	ZEV	ZEV	ICE	ICE	ICE
Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG
Miles per GGE	Miles per GGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE
34.18	27.98	9.61	11.14		42.84	21.17	8.01	7.29	
35.71	28.15	9.63	11.44		43.64	21.74	8.05	7.38	
37.23	28.33	9.64	11.74		44.45	22.30	8.09	7.47	
38.76	28.51	9.65	12.03		45.26	22.86	8.13	7.56	
40.28	28.68	9.66	12.33		46.06	23.43	8.17	7.65	
41.81	28.86	9.68	12.63		46.87	23.99	8.21	7.74	
43.33	29.03	9.69	12.92		47.68	24.56	8.24	7.83	
44.86	29.21	9.70	13.22		48.48	25.12	8.28	7.91	
46.38	29.38	9.72	13.52		49.29	25.68	8.32	8.00	
47.91	29.56	9.73	13.81		50.10	26.25	8.36	8.09	
49.43	29.74	9.74	14.11		50.91	26.81	8.40	8.18	
50.72	29.64	9.76	14.27		50.77	27.11	8.42	8.25	
52.01	29.55	9.78	14.43		50.63	27.41	8.45	8.32	
53.29	29.46	9.80	14.59		50.50	27.71	8.47	8.39	
54.58	29.36	9.82	14.74		50.36	28.01	8.49	8.46	
55.87	29.27	9.84	14.90		50.23	28.31	8.52	8.53	
57.15	29.18	9.86	15.02		50.02	28.55	8.54	8.59	
58.44	29.09	9.88	15.15		49.81	28.78	8.56	8.65	
59.73	28.99	9.91	15.27		49.60	29.01	8.59	8.71	
61.01	28.90	9.93	15.39		49.39	29.25	8.61	8.77	
62.30	28.81	9.95	15.52		49.18	29.48	8.63	8.83	

Class 6-7 - ZEV	Class 6-7 - ZEV	Class 8 - ICE	Class 8 - ICE	Class 8 - ICE	Class 8 - ZEV	Class 8 - ZEV	Urban Busses	Urban Busses	Urban Busses
Class 6-7	Class 6-7	Class 8	Class 8	Class 8	Class 8	Class 8	Urban Busses	Urban Busses	Urban Busses
ZEV	ZEV	ICE	ICE	ICE	ZEV	ZEV	ICE	ICE	ICE
Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG
Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE
28.87	13.86	6.71	5.45	6.54	18.76	10.36		6.00	6.54
28.62	14.03	6.69	5.53	6.56	18.91	10.51		6.03	6.56
28.37	14.20	6.67	5.61	6.58	19.07	10.66		6.07	6.58
28.12	14.36	6.64	5.69	6.59	19.22	10.81		6.10	6.59
27.87	14.53	6.62	5.77	6.61	19.38	10.97		6.14	6.61
27.63	14.70	6.60	5.85	6.63	19.53	11.12		6.17	6.63
27.38	14.87	6.58	5.93	6.65	19.69	11.27		6.21	6.65
27.13	15.04	6.55	6.01	6.67	19.84	11.42		6.24	6.67
26.88	15.20	6.53	6.09	6.69	20.00	11.57		6.27	6.69
26.63	15.37	6.51	6.17	6.71	20.15	11.72		6.31	6.71
26.38	15.54	6.49	6.25	6.73	20.31	11.88		6.34	6.73
26.39	15.67	6.59	6.29	6.79	20.46	11.95		6.42	6.79
26.39	15.81	6.69	6.33	6.85	20.61	12.03		6.50	6.85
26.40	15.94	6.79	6.37	6.91	20.76	12.11		6.57	6.91
26.40	16.07	6.89	6.42	6.98	20.92	12.19		6.65	6.98
26.40	16.20	6.99	6.46	7.04	21.07	12.27		6.73	7.04
26.37	16.32	7.09	6.49	7.11	21.22	12.33		6.79	7.11
26.33	16.44	7.19	6.52	7.18	21.37	12.38		6.86	7.18
26.29	16.55	7.29	6.55	7.25	21.53	12.44		6.93	7.25
26.25	16.67	7.39	6.58	7.32	21.68	12.49		7.00	7.32
26.21	16.78	7.49	6.60	7.39	21.83	12.55		7.07	7.39

Urban Busses	Gliders	Gliders	Gliders	LDV	LDT	Motorcycle
Urban Busses	Gliders	Gliders	Gliders	LDV	LDT	Motorcycle
ZEV	ICE	ICE	ICE	ICE	ICE	ICE
Electricity	Finished Gasoline	Finished Diesel	CNG	Finished Gasoline	Finished Gasoline	Finished Gasoline
Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per GGE	Miles per GGE	Miles per GGE
18.76		5.29		14.87	11.50	44.00
18.91		5.30		15.10	11.61	44.00
19.07		5.30		15.33	11.71	44.00
19.22		5.30		15.56	11.82	44.00
19.38		5.31		15.79	11.92	44.00
19.53		5.31		16.02	12.02	44.00
19.69		5.32		16.26	12.13	44.00
19.84		5.32		16.49	12.23	44.00
20.00		5.33		16.72	12.34	44.00
20.15		5.33		16.95	12.44	44.00
20.31		5.33		17.18	12.55	44.00
20.46		5.33		17.65	12.72	44.00
20.61		5.33		18.12	12.90	44.00
20.76		5.32		18.59	13.08	44.00
20.92		5.32		19.06	13.26	44.00
21.07		5.32		19.53	13.44	44.00
21.22		5.33		20.00	13.62	44.00
21.37		5.33		20.47	13.80	44.00
21.53		5.34		20.94	13.97	44.00
21.68		5.35		21.41	14.15	44.00
21.83		5.36		21.88	14.33	44.00

	Fuel Economy Forecast by Powertrain and GVWR Category (Miles per Units - Secondary Fuel)								
Year	LDV - ICE	LDV - ICE	LDV - ICE	LDV - ZEV	LDV - ZEV	LDV - PHEV	LDV - PHEV	LDV - PHEV	LDT - ICE
Vehicle Class	LDV	LDV	LDV	LDV	LDV	LDV	LDV	LDV	LDT
Powertrain	ICE	ICE	ICE	ZEV	ZEV	PHEV	PHEV	PHEV	ICE
Primary Fuel	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Finished Gasoline
Secondary Fuel						Electricity	Electricity	Electricity	
Units	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE
2020						106.44			
2021						105.86			
2022						105.27			
2023						104.69			
2024						104.11			
2025						103.53			
2026						102.95			
2027						102.37			
2028						101.78			
2029						101.20			
2030						100.62			
2031						100.69			
2032						100.76			
2033						100.84			
2034						100.91			
2035						100.98			
2036						101.05			
2037						101.12			
2038						101.19			
2039						101.27			
2040						101.34			

Source - Motorcycle MF https://afdc.energy.gov/data/10310

LDT - ICE	LDT - ICE	LDT - ZEV	LDT - ZEV	LDT - PHEV	LDT - PHEV	LDT - PHEV	Class 2b-3 - ICE	Class 2b-3 - ICE	Class 2b-3 - ICE
LDT	LDT	LDT	LDT	LDT	LDT	LDT	Class 2b-3	Class 2b-3	Class 2b-3
ICE	ICE	ZEV	ZEV	PHEV	PHEV	PHEV	ICE	ICE	ICE
Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Finished Gasoline	Finished Diesel	CNG
				Electricity	Electricity	Electricity			
Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE	Miles per GGE
				75.96					
				75.62					
				75.27					
				74.93					
				74.58					
				74.23					
				73.89					
				73.54					
				73.20					
				72.85					
				72.50					
				72.48					
				72.45					
				72.42					
				72.40					
				72.37					
				72.34					
				72.32					
				72.29					
				72.26					
				72.24					

Class 2b-3 - ZEV	Class 2b-3 - ZEV	Class 4-5 - ICE	Class 4-5 - ICE	Class 4-5 - ICE	Class 4-5 - ZEV	Class 4-5 - ZEV	Class 6-7 - ICE	Class 6-7 - ICE	Class 6-7 - ICE
Class 2b-3	Class 2b-3	Class 4-5	Class 4-5	Class 4-5	Class 4-5	Class 4-5	Class 6-7	Class 6-7	Class 6-7
ZEV	ZEV	ICE	ICE	ICE	ZEV	ZEV	ICE	ICE	ICE
Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG
Miles per GGE	Miles per GGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE

Class 6-7 - ZEV	Class 6-7 - ZEV	Class 8 - ICE	Class 8 - ICE	Class 8 - ICE	Class 8 - ZEV	Class 8 - ZEV	Urban Busses	Urban Busses	Urban Busses
Class 6-7	Class 6-7	Class 8	Class 8	Class 8	Class 8	Class 8	Urban Busses	Urban Busses	Urban Busses
ZEV	ZEV	ICE	ICE	ICE	ZEV	ZEV	ICE	ICE	ICE
Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG	Electricity	Hydrogen	Finished Gasoline	Finished Diesel	CNG
Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE	Miles per DGE

Urban Busses	Gliders	Gliders	Gliders	LDV	LDT	Motorcycle
Urban Busses	Gliders	Gliders	Gliders	LDV	LDT	Motorcycle
ZEV	ICE	ICE	ICE	ICE	ICE	ICE
Electricity	Finished Gasoline	Finished Diesel	CNG	E85	E85	Finished Gasoline
	Miles per DGE	Miles per DGE	Miles per DGE	Miles per GGE	Miles per GGE	Miles per GGE
				14.87	11.50	
				15.10	11.61	
				15.33	11.71	
				15.56	11.82	
				15.79	11.92	
				16.02	12.02	
				16.26	12.13	
				16.49	12.23	
				16.72	12.34	
				16.95	12.44	
				17.18	12.55	
				17.65	12.72	
				18.12	12.90	
				18.59	13.08	
				19.06	13.26	
				19.53	13.44	
				20.00	13.62	
				20.47	13.80	
				20.94	13.97	
				21.41	14.15	
				21.88	14.33	

Average Miles Per Gallon of Gasoline or Gasoline Gallons Equivalent (MPGGE)

	MC	LDV			LDT			LHD2b3		LHD45		MHD67		HHD8			BUS	
	Gasoline	Gasoline	E85	Electricity	Gasoline	E85	Electricity	Gasoline	Electricity	Gasoline	Electricity	Gasoline	Electricity	Gasoline	Fossil CNG	Electricity	Fossil CNG	Electricity
2020	44.00	25.93	14.66	104.92	19.06	11.34	74.88	11.03	33.70	8.43	38.20	7.03	25.74	5.89	6.35	14.56	5.86	16.73
2021	44.00	26.57	14.89	104.35	19.45	11.44	74.54	11.10	35.20	8.44	38.73	7.06	25.42	5.87	6.35	14.39	5.87	16.79
2022	44.00	27.20	15.11	103.78	19.84	11.55	74.20	11.17	36.70	8.45	39.26	7.10	25.10	5.85	6.35	14.23	5.89	16.85
2023	44.00	27.84	15.34	103.20	20.23	11.65	73.86	11.24	38.21	8.47	39.78	7.13	24.78	5.83	6.35	14.06	5.91	16.91
2024	44.00	28.48	15.57	102.63	20.62	11.75	73.52	11.31	39.71	8.48	40.31	7.16	24.46	5.81	6.35	13.89	5.92	16.97
2025	44.00	29.11	15.80	102.06	21.01	11.85	73.18	11.38	41.21	8.49	40.83	7.20	24.14	5.79	6.35	13.73	5.94	17.03
2026	44.00	29.75	16.02	101.48	21.40	11.96	72.84	11.45	42.72	8.50	41.36	7.23	23.81	5.77	6.35	13.56	5.96	17.09
2027	44.00	30.39	16.25	100.91	21.79	12.06	72.50	11.52	44.22	8.51	41.89	7.27	23.49	5.75	6.35	13.39	5.97	17.15
2028	44.00	31.03	16.48	100.34	22.19	12.16	72.16	11.59	45.72	8.52	42.41	7.30	23.17	5.73	6.35	13.23	5.99	17.22
2029	44.00	31.66	16.71	99.76	22.58	12.26	71.81	11.66	47.22	8.53	42.94	7.33	22.85	5.71	6.35	13.06	6.01	17.28
2030	44.00	32.30	16.93	99.19	22.97	12.37	71.47	11.72	48.73	8.54	43.46	7.37	22.53	5.69	6.35	12.89	6.02	17.34
2031	44.00	33.23	17.40	99.26	23.32	12.54	71.45	11.69	50.00	8.56	43.50	7.39	22.61	5.78	6.30	12.82	6.08	17.55
2032	44.00	34.16	17.86	99.33	23.68	12.72	71.42	11.65	51.27	8.58	43.54	7.41	22.70	5.87	6.26	12.75	6.14	17.76
2033	44.00	35.09	18.32	99.40	24.04	12.89	71.39	11.62	52.53	8.60	43.58	7.43	22.78	5.95	6.22	12.68	6.20	17.98
2034	44.00	36.01	18.79	99.47	24.40	13.07	71.37	11.58	53.80	8.62	43.62	7.45	22.87	6.04	6.18	12.62	6.26	18.19
2035	44.00	36.94	19.25	99.54	24.76	13.25	71.34	11.54	55.07	8.63	43.66	7.47	22.95	6.13	6.13	12.55	6.32	18.40
2036	44.00	37.87	19.72	99.61	25.12	13.42	71.32	11.51	56.34	8.65	43.70	7.49	23.04	6.22	6.09	12.48	6.38	18.62
2037	44.00	38.80	20.18	99.68	25.48	13.60	71.29	11.47	57.61	8.67	43.74	7.51	23.12	6.31	6.05	12.41	6.44	18.83
2038	44.00	39.73	20.64	99.75	25.83	13.78	71.26	11.43	58.88	8.69	43.78	7.53	23.21	6.40	6.00	12.34	6.50	19.04
2039	44.00	40.66	21.11	99.83	26.19	13.95	71.24	11.40	60.15	8.71	43.82	7.55	23.29	6.48	5.96	12.27	6.56	19.26
2040	44.00	41.58	21.57	99.90	26.55	14.13	71.21	11.36	61.42	8.72	43.86	7.57	23.38	6.57	5.92	12.20	6.62	19.47

Source (MC https://www.fhwa.dot.gov/policyinformation/statistics/2021/vm1.cfm

Average Miles Per Gallon of Diesel or Diesel Gallons Equivalent (MPDGE)

	LDV		LDT		LHD2b3		LHD45		MHD67		HHD8			BUS			GLIDER
	Diesel	Electricity	Diesel	Electricity	Diesel	Electricity	Diesel	Electricity	Diesel	Electricity	Diesel	Fossil CNG	Electricity	Diesel	Fossil CNG	Electricity	Diesel
2020	29.31	120.13	21.87	85.73	13.05	38.58	11.38	43.74	7.45	29.47	5.57	6.71	16.67	6.12	6.67	19.15	5.40
2021	29.40	119.98	22.56	85.71	13.45	40.55	11.68	44.56	7.54	29.22	5.65	6.76	16.54	6.16	6.69	19.31	5.41
2022	29.50	119.82	23.26	85.68	13.85	42.52	11.98	45.39	7.63	28.97	5.73	6.82	16.42	6.19	6.71	19.47	5.41
2023	29.59	119.67	23.95	85.65	14.26	44.49	12.29	46.21	7.72	28.71	5.81	6.87	16.29	6.23	6.73	19.63	5.42
2024	29.68	119.52	24.65	85.63	14.66	46.45	12.59	47.03	7.81	28.46	5.89	6.92	16.17	6.26	6.75	19.78	5.42
2025	29.78	119.37	25.35	85.60	15.06	48.42	12.89	47.86	7.90	28.21	5.97	6.97	16.04	6.30	6.77	19.94	5.42
2026	29.87	119.22	26.04	85.58	15.46	50.39	13.20	48.68	7.99	27.95	6.06	7.03	15.92	6.34	6.79	20.10	5.43
2027	29.96	119.07	26.74	85.55	15.87	52.36	13.50	49.50	8.08	27.70	6.14	7.08	15.79	6.37	6.81	20.26	5.43
2028	30.06	118.92	27.43	85.52	16.27	54.33	13.80	50.33	8.17	27.45	6.22	7.13	15.67	6.41	6.83	20.42	5.44
2029	30.15	118.77	28.13	85.50	16.67	56.30	14.11	51.15	8.26	27.19	6.30	7.18	15.54	6.44	6.85	20.57	5.44
2030	30.24	118.61	28.82	85.47	17.07	58.27	14.41	51.98	8.35	26.94	6.38	7.24	15.42	6.48	6.87	20.73	5.45
2031	30.38	118.23	29.26	85.08	17.03	60.71	14.57	51.84	8.42	26.94	6.42	7.26	15.22	6.56	6.93	20.89	5.44
2032	30.51	117.85	29.69	84.69	16.98	63.15	14.73	51.70	8.49	26.95	6.47	7.29	15.02	6.63	7.00	21.04	5.44
2033	30.64	117.47	30.12	84.30	16.94	65.59	14.89	51.56	8.57	26.95	6.51	7.31	14.83	6.71	7.06	21.20	5.44
2034	30.78	117.09	30.55	83.91	16.90	68.03	15.05	51.42	8.64	26.96	6.55	7.34	14.63	6.79	7.12	21.36	5.43
2035	30.91	116.71	30.98	83.52	16.85	70.47	15.21	51.28	8.71	26.96	6.59	7.36	14.43	6.87	7.19	21.51	5.43
2036	30.96	116.24	31.51	83.12	16.86	70.44	15.34	51.07	8.77	26.92	6.62	7.39	14.34	6.94	7.26	21.67	5.44
2037	31.00	115.77	32.04	82.73	16.87	70.41	15.47	50.86	8.83	26.88	6.65	7.41	14.25	7.01	7.33	21.82	5.45
2038	31.05	115.30	32.58	82.33	16.87	70.38	15.59	50.64	8.89	26.84	6.68	7.44	14.15	7.08	7.40	21.98	5.45
2039	31.09	114.84	33.11	81.93	16.88	70.34	15.72	50.43	8.96	26.80	6.71	7.47	14.06	7.15	7.47	22.13	5.46
2040	31.14	114.37	33.64	81.53	16.89	70.31	15.84	50.22	9.02	26.77	6.74	7.49	13.97	7.22	7.55	22.29	5.47

Year	Gasoline	Fossil CNG	LPG	Nonroad Diesel	Marine Diesel
2026	32,064,570	9,317,487	8,014,948	90,860,112	1,047,742
2027	32,283,706	9,465,300	8,283,396	91,267,580	1,065,043
2028	32,502,843	9,613,114	8,551,844	91,675,047	1,082,344
2029	32,721,979	9,760,928	8,820,292	92,082,514	1,099,645
2030	32,941,115	9,908,742	9,088,741	92,489,982	1,116,946
2031	33,154,470	10,089,484	9,463,520	93,195,526	1,132,723
2032	33,367,824	10,270,226	9,838,299	93,901,071	1,148,500
2033	33,581,178	10,450,968	10,213,079	94,606,615	1,164,277
2034	33,794,532	10,631,710	10,587,858	95,312,159	1,180,054
2035	34,007,886	10,812,452	10,962,638	96,017,704	1,195,832
2036	34,243,451	11,023,551	11,425,623	96,898,103	1,212,326
2037	34,479,016	11,234,650	11,888,607	97,778,502	1,228,820
2038	34,714,580	11,445,748	12,351,592	98,658,901	1,245,314
2039	34,950,145	11,656,847	12,814,577	99,539,300	1,261,808
2040	35,185,709	11,867,946	13,277,562	100,419,699	1,278,302

Year	Finished Gasoline (GGE)	Fossil CNG (GGE)	LPG (GGE)	Finished Diesel (DGE)
2026	32,064,570	9,317,487	8,014,948	90,860,112
2027	32,283,706	9,465,300	8,283,396	91,267,580
2028	32,502,843	9,613,114	8,551,844	91,675,047
2029	32,721,979	9,760,928	8,820,292	92,082,514
2030	32,941,115	9,908,742	9,088,741	92,489,982
2031	33,154,470	10,089,484	9,463,520	93,195,526
2032	33,367,824	10,270,226	9,838,299	93,901,071
2033	33,581,178	10,450,968	10,213,079	94,606,615
2034	33,794,532	10,631,710	10,587,858	95,312,159
2035	34,007,886	10,812,452	10,962,638	96,017,704
2036	34,243,451	11,023,551	11,425,623	96,898,103
2037	34,479,016	11,234,650	11,888,607	97,778,502
2038	34,714,580	11,445,748	12,351,592	98,658,901
2039	34,950,145	11,656,847	12,814,577	99,539,300
2040	35,185,709	11,867,946	13,277,562	100,419,699

Source: MOVES runs, interpolated between run years

	Units	MOVES	NM CTFS Model	MPG Multiplier
Gasoline	MJ/gal	117.957	119.66	101%
Diesel	MJ/gal	137.309	134.48	98%
E85	MJ/gal	85.729	93.33	109%
GGE/DGE	MJ/gal	1.164059784	1.12	97%

Projected Baseline Calculation

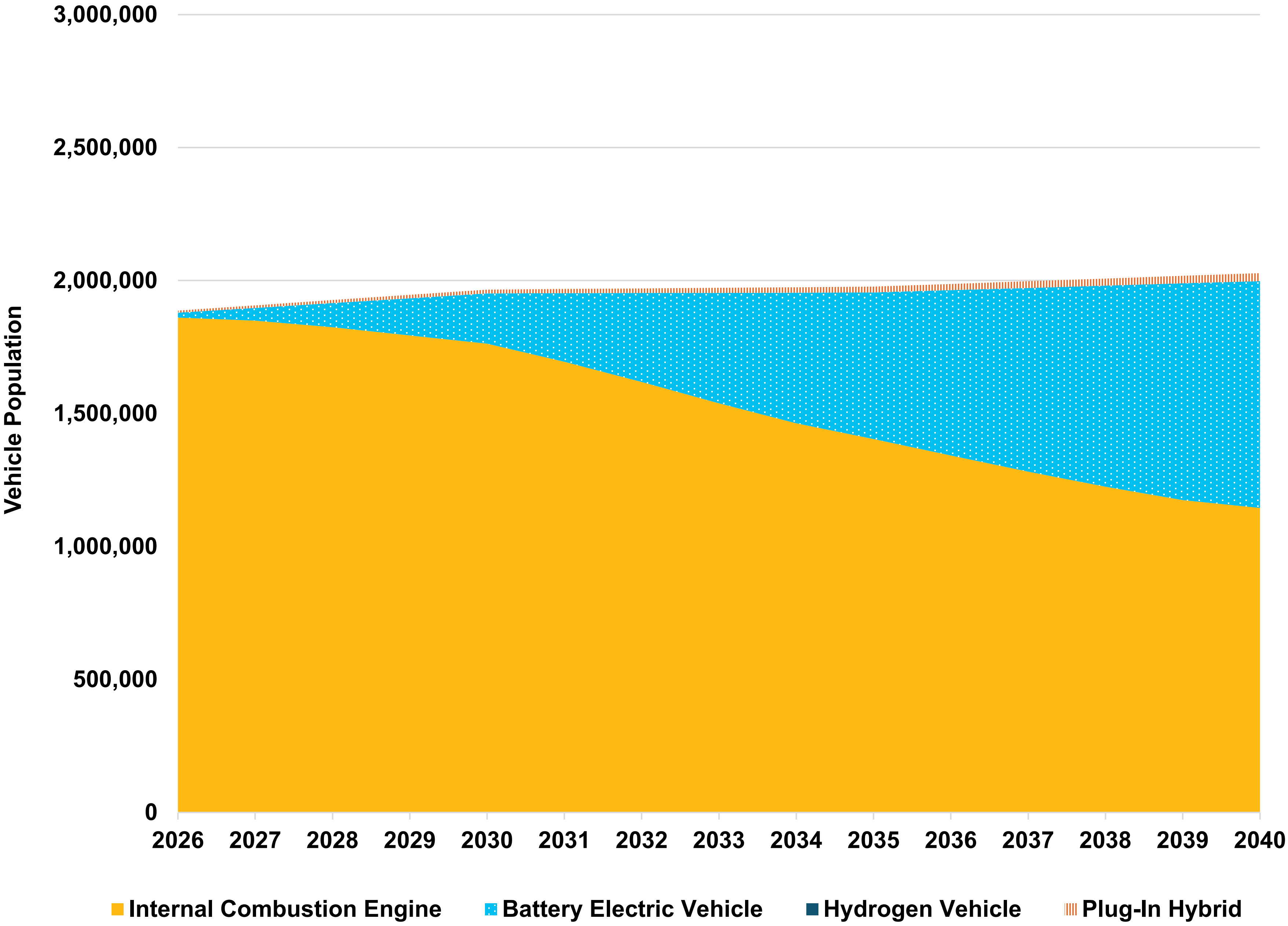
Standard	Reduction %	gCO2e/MJ Gasoline	gCO2e/MJ Diesel
2018 Baseline		95.01	94.42
2026	2%	93.30	92.72
2027	3%	91.87	91.30
2028	6%	89.31	88.75
2029	11%	84.56	84.03
2030	20%	76.01	75.54
2031	21%	75.06	74.59
2032	22%	74.11	73.65
2033	23%	73.16	72.70
2034	24%	72.21	71.76
2035	25%	71.26	70.82
2036	26%	70.31	69.87
2037	27%	69.36	68.93
2038	28%	68.41	67.98
2039	29%	67.46	67.04
2040	30%	66.51	66.09

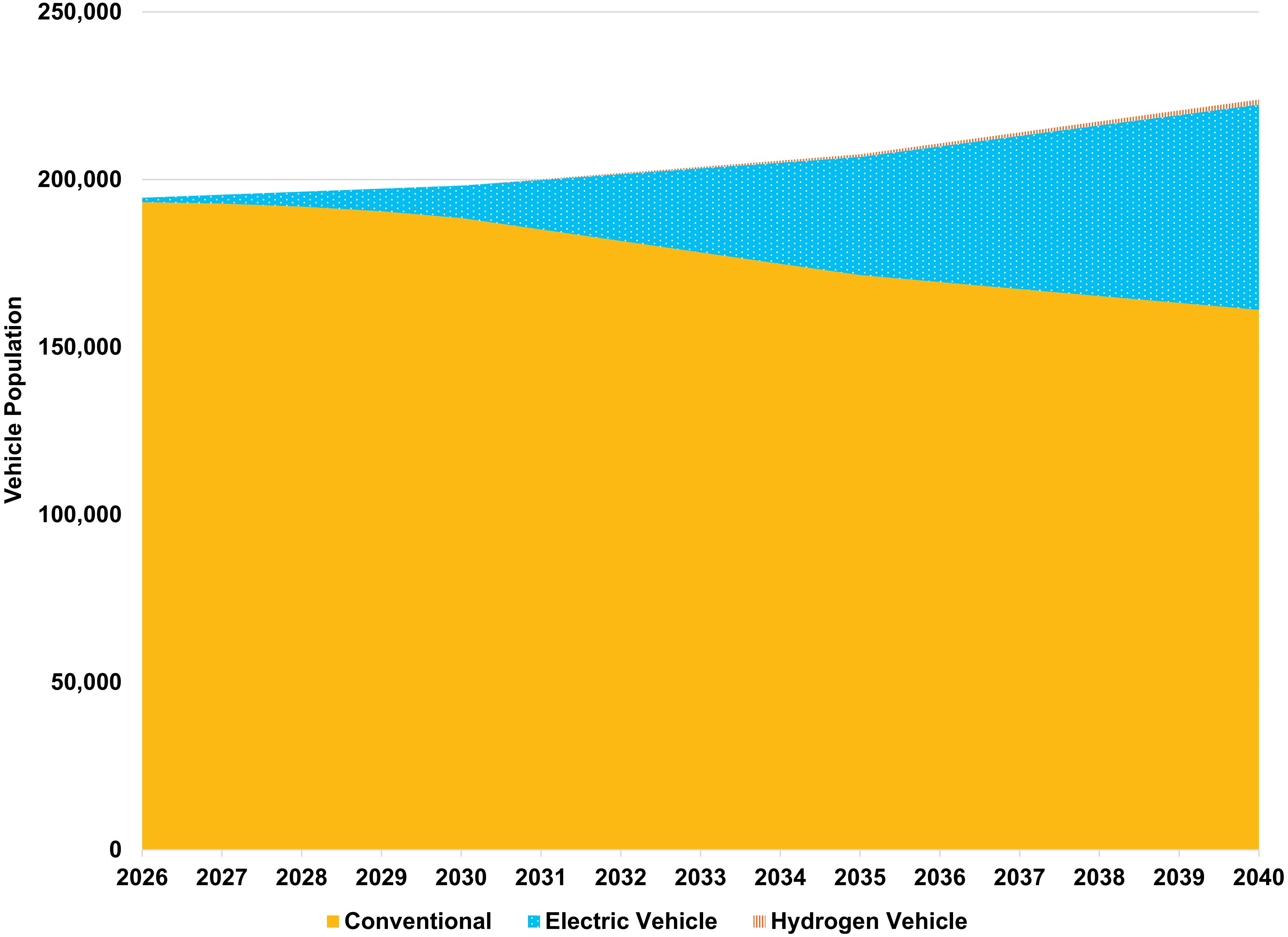
Year	SCC (2020$/MT, at 2% discount rate)	SCC (2023$/MT, at 2% discount rate)	SCC (2024$/MT, at 2% discount rate)
2020	$190.00	$219.13	$224.61
2021	$194.00	$223.75	$229.34
2022	$198.00	$228.36	$234.07
2023	$202.00	$232.97	$238.80
2024	$206.00	$237.59	$243.53
2025	$210.00	$242.20	$248.25
2026	$214.00	$246.82	$252.98
2027	$218.00	$251.43	$257.71
2028	$222.00	$256.04	$262.44
2029	$226.00	$260.66	$267.17
2030	$230.00	$265.27	$271.90
2031	$234.00	$269.88	$276.63
2032	$238.00	$274.50	$281.35
2033	$242.00	$279.11	$286.08
2034	$246.00	$283.72	$290.81
2035	$250.00	$288.34	$295.54
2036	$254.00	$292.95	$300.27
2037	$258.00	$297.56	$305.00
2038	$262.00	$302.18	$309.73
2039	$266.00	$306.79	$314.46
2040	$270.00	$311.40	$319.18

Year	Social Cost of Carbon (2024$/MT)
2026	$252.98
2027	$257.71
2028	$262.44
2029	$267.17
2030	$271.90
2031	$276.63
2032	$281.35
2033	$286.08
2034	$290.81
2035	$295.54
2036	$300.27
2037	$305.00
2038	$309.73
2039	$314.46
2040	$319.18

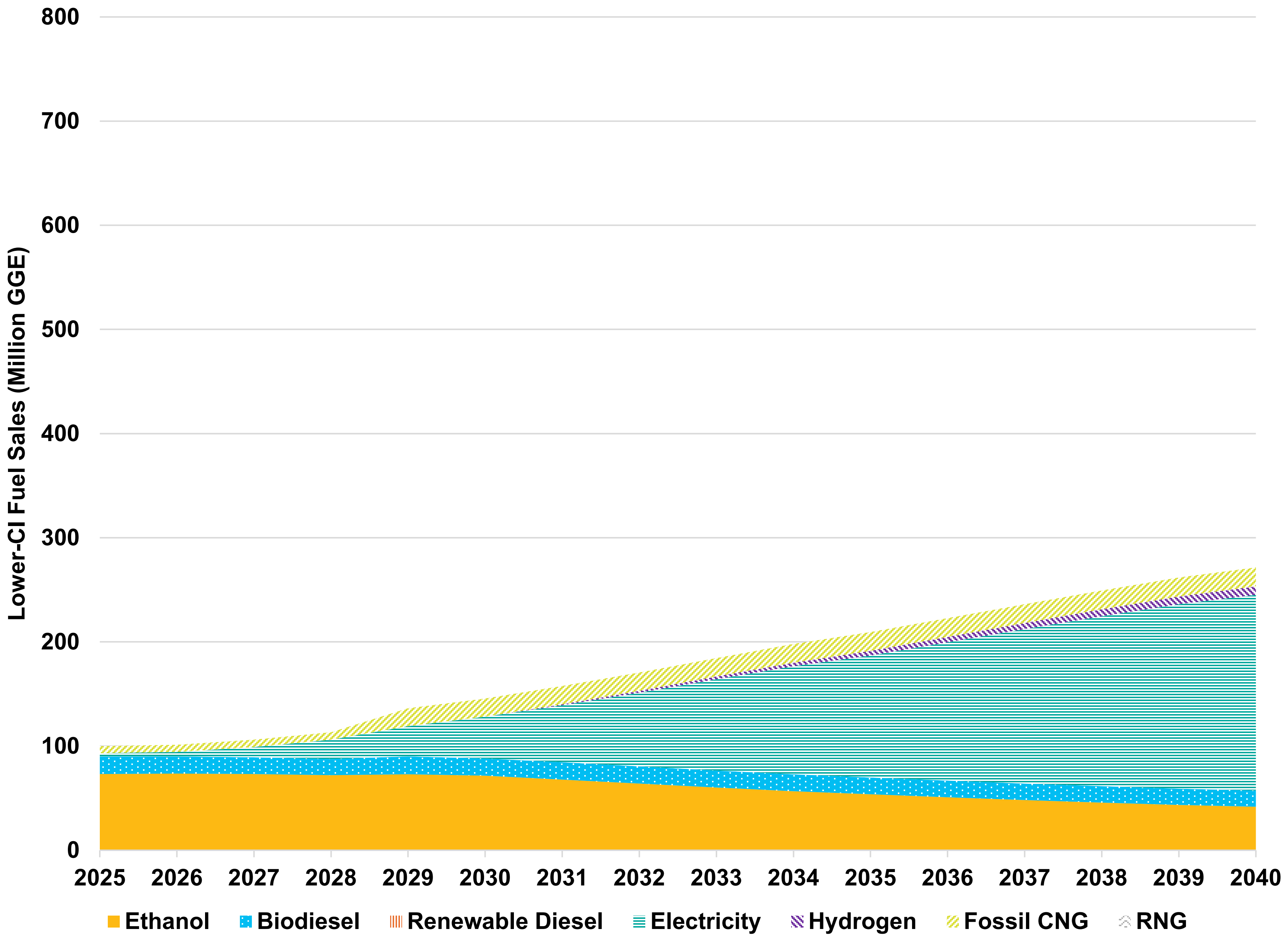
Source: Supplementary Material for the Regulatory Impact Analysis for the Final Rulemaking, “Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review” EPA Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances

Source URL: https://www.regulations.gov/document/EPA-HQ-OW-2022-0801-2625

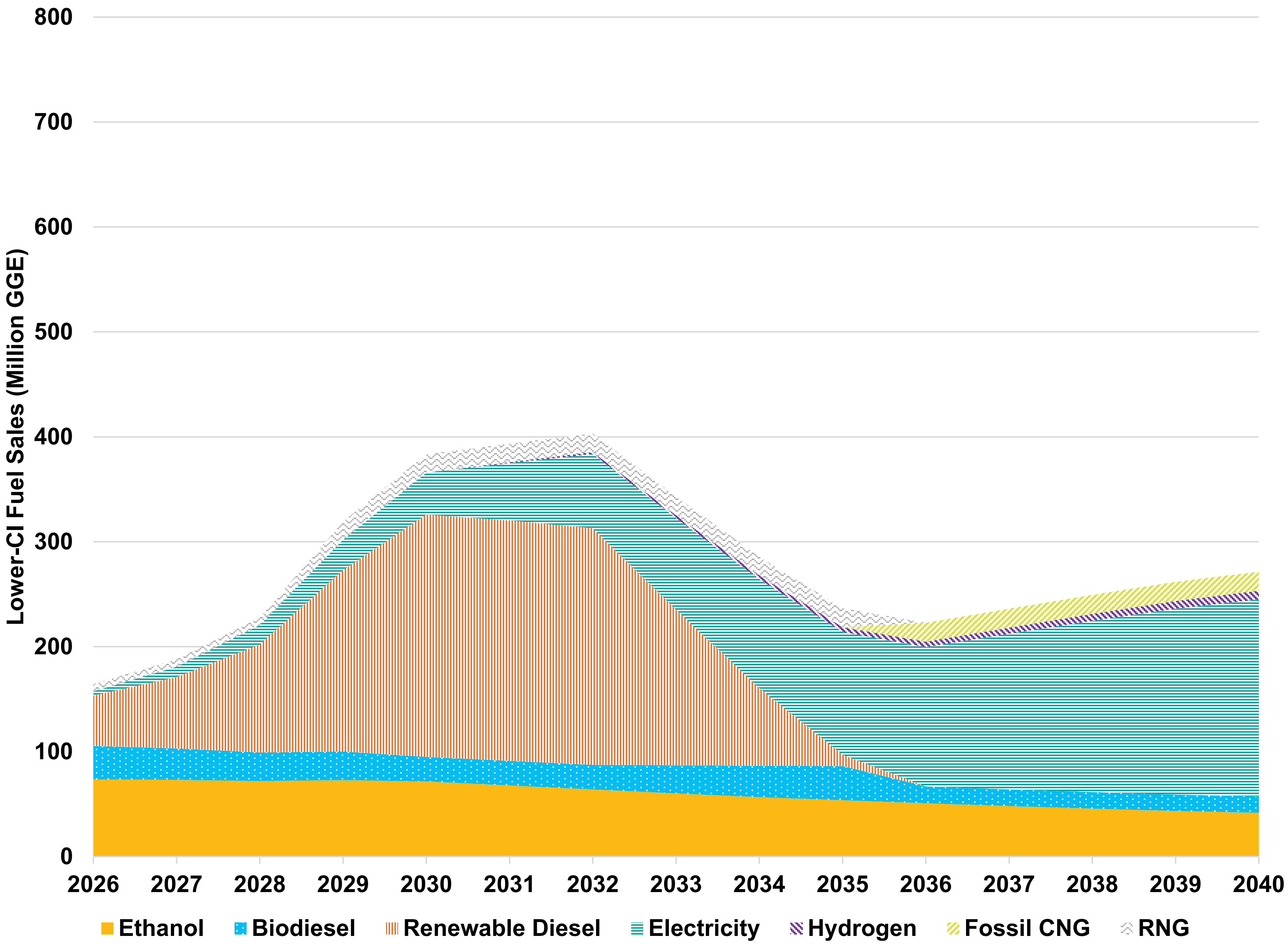

3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
Vehicle Population
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
Internal Combustion Engine
Battery Electric Vehicle
Hydrogen Vehicle
Plug-In Hybrid


250,000
200,000
150,000
100,000
50,000
0
Vehicle Population
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
Conventional
Electric Vehicle
Hydrogen Vehicle

	Light Duty Vehicle Population				Medium and Heavy Duty Vehicle Population		
Year	Internal Combustion Engine	Battery Electric Vehicle	Hydrogen Vehicle	Plug-In Hybrid	Conventional	Electric Vehicle	Hydrogen Vehicle
2026	1,861,075	18,246	0	8,032	193,221	1,347	0
2027	1,849,487	47,947	0	9,588	192,837	2,626	0
2028	1,824,365	91,181	0	11,144	191,925	4,434	0
2029	1,793,968	139,690	0	12,700	190,482	6,771	0
2030	1,763,231	188,539	0	14,256	188,511	9,638	0
2031	1,694,413	258,048	0	15,812	185,098	14,769	161
2032	1,618,665	334,486	0	17,368	181,685	19,900	323
2033	1,538,396	415,446	0	18,924	178,272	25,031	484
2034	1,463,385	491,148	0	20,480	174,859	30,161	646
2035	1,404,050	551,173	0	22,036	171,446	35,292	807
2036	1,341,957	621,839	0	23,592	169,373	40,494	941
2037	1,281,701	690,669	0	25,148	167,301	45,696	1,075
2038	1,224,856	756,087	0	26,704	165,228	50,898	1,209
2039	1,174,505	815,012	0	28,260	163,155	56,100	1,343
2040	1,145,072	853,018	0	29,816	161,083	61,302	1,477



Lower-CI Fuel Sales (Million GGE)
800
700
600
500
400
300
200
100
0
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
Ethanol
Biodiesel
Renewable Diesel
Electricity
Hydrogen
Fossil CNG
RNG



Lower-CI Fuel Sales (Million GGE)
800
700
600
500
400
300
200
100
0
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
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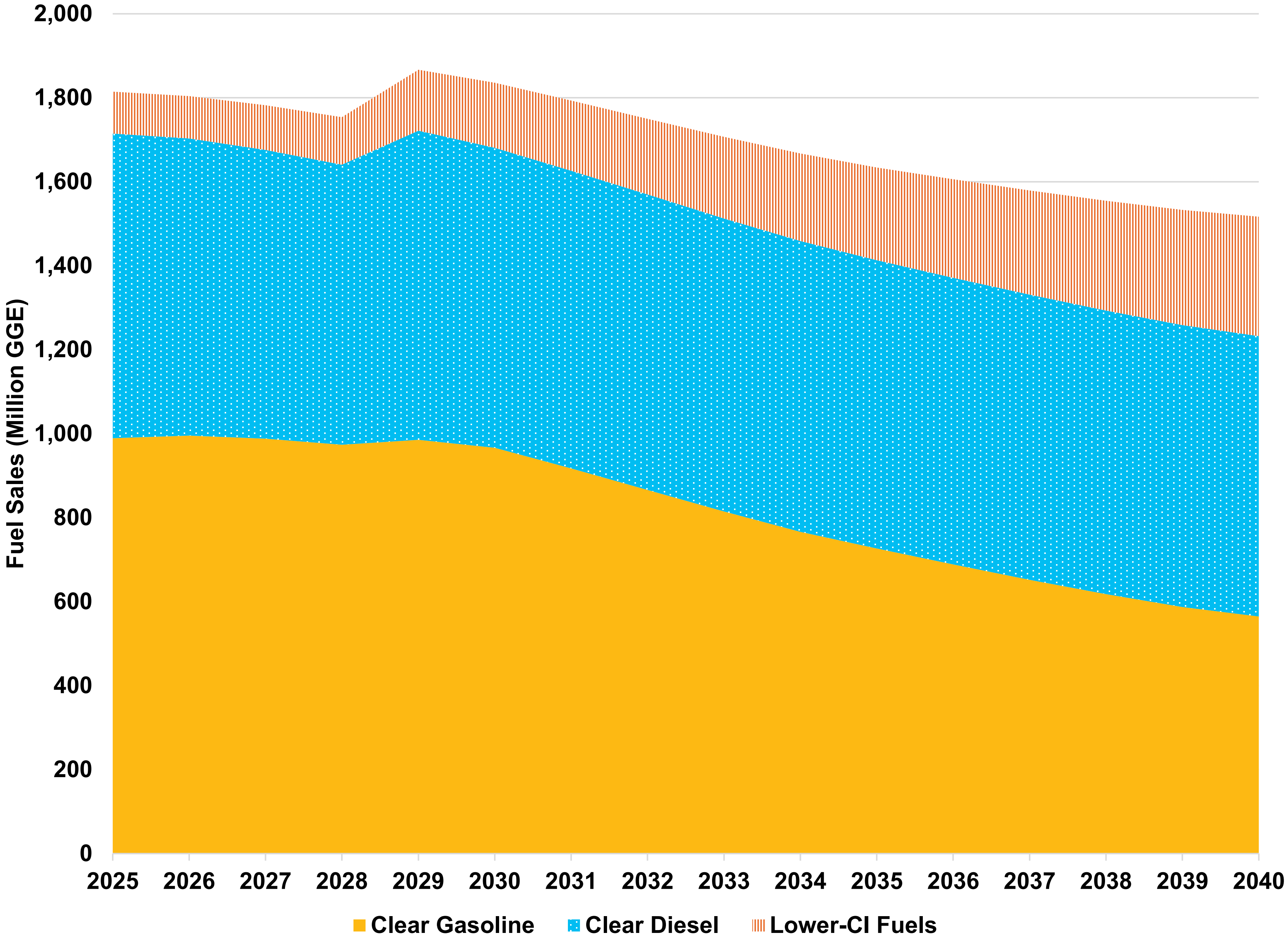
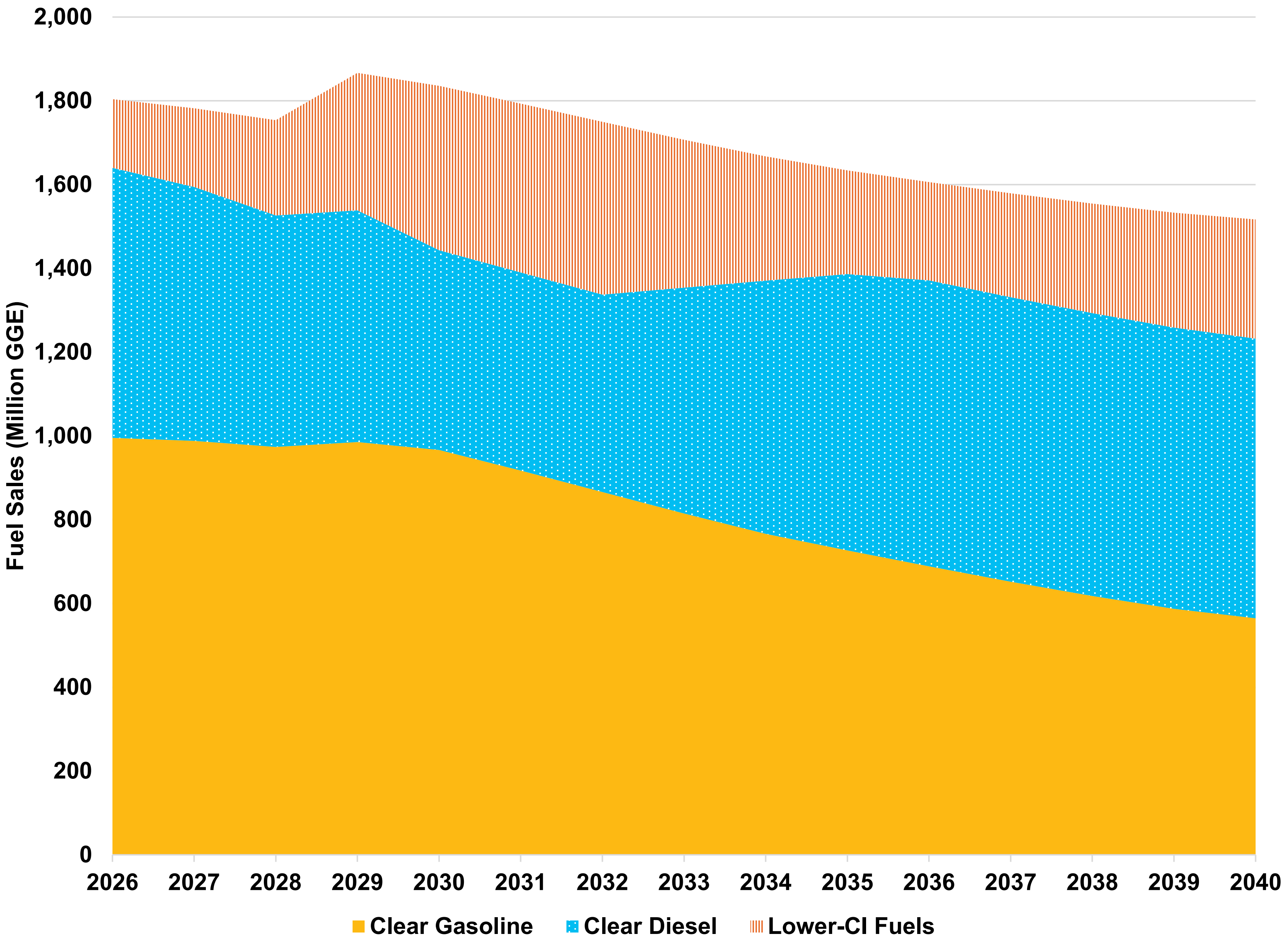
2038
2039
2040
Ethanol
Biodiesel
Renewable Diesel
Electricity
Hydrogen
Fossil CNG
RNG


Fuel Sales (Million GGE)
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
Clear Gasoline
Clear Diesel
Lower-CI Fuels



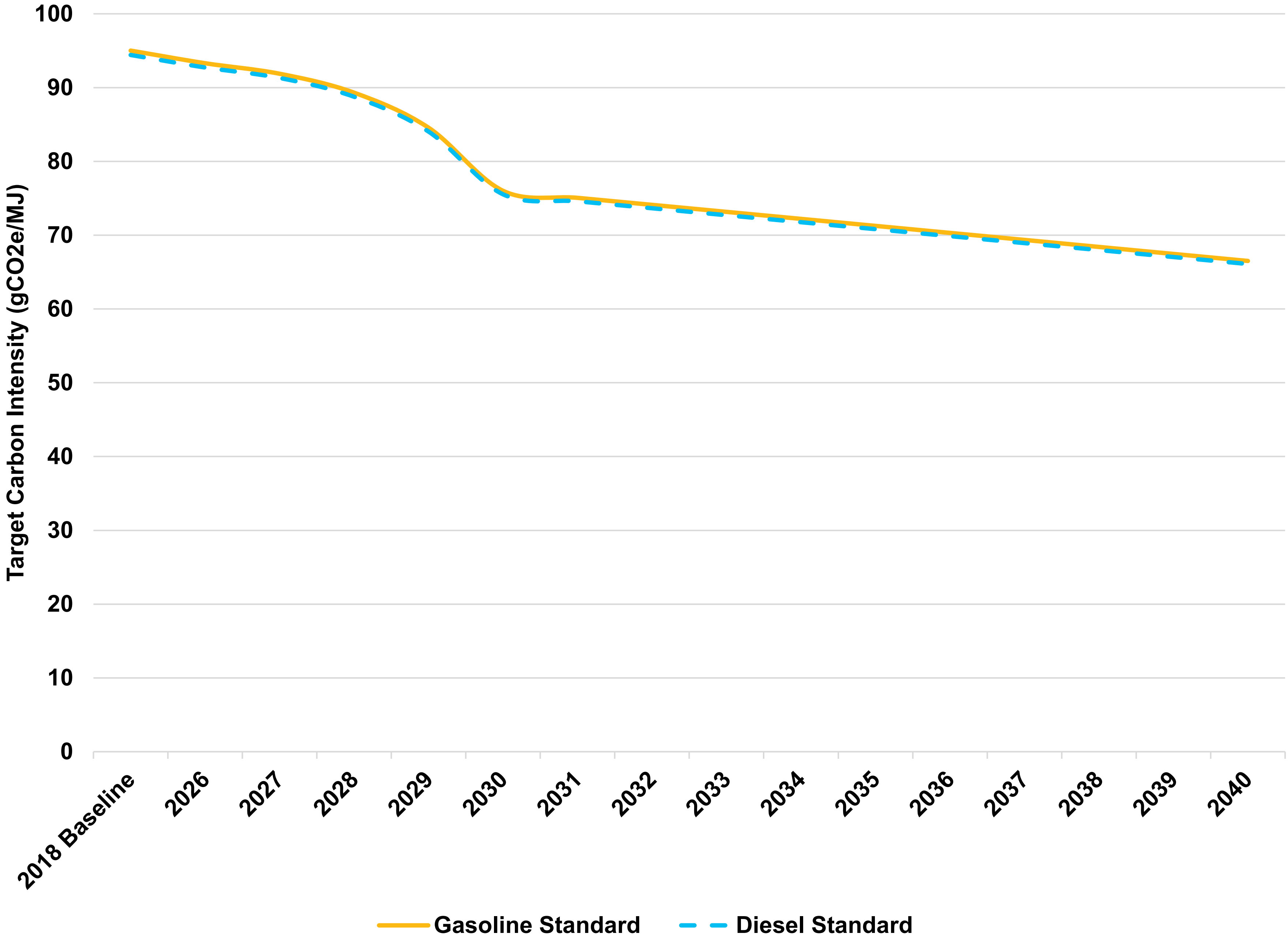
Fuel Sales (Million GGE)
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
Clear Gasoline
Clear Diesel
Lower-CI Fuels

Baseline (Million GGE)

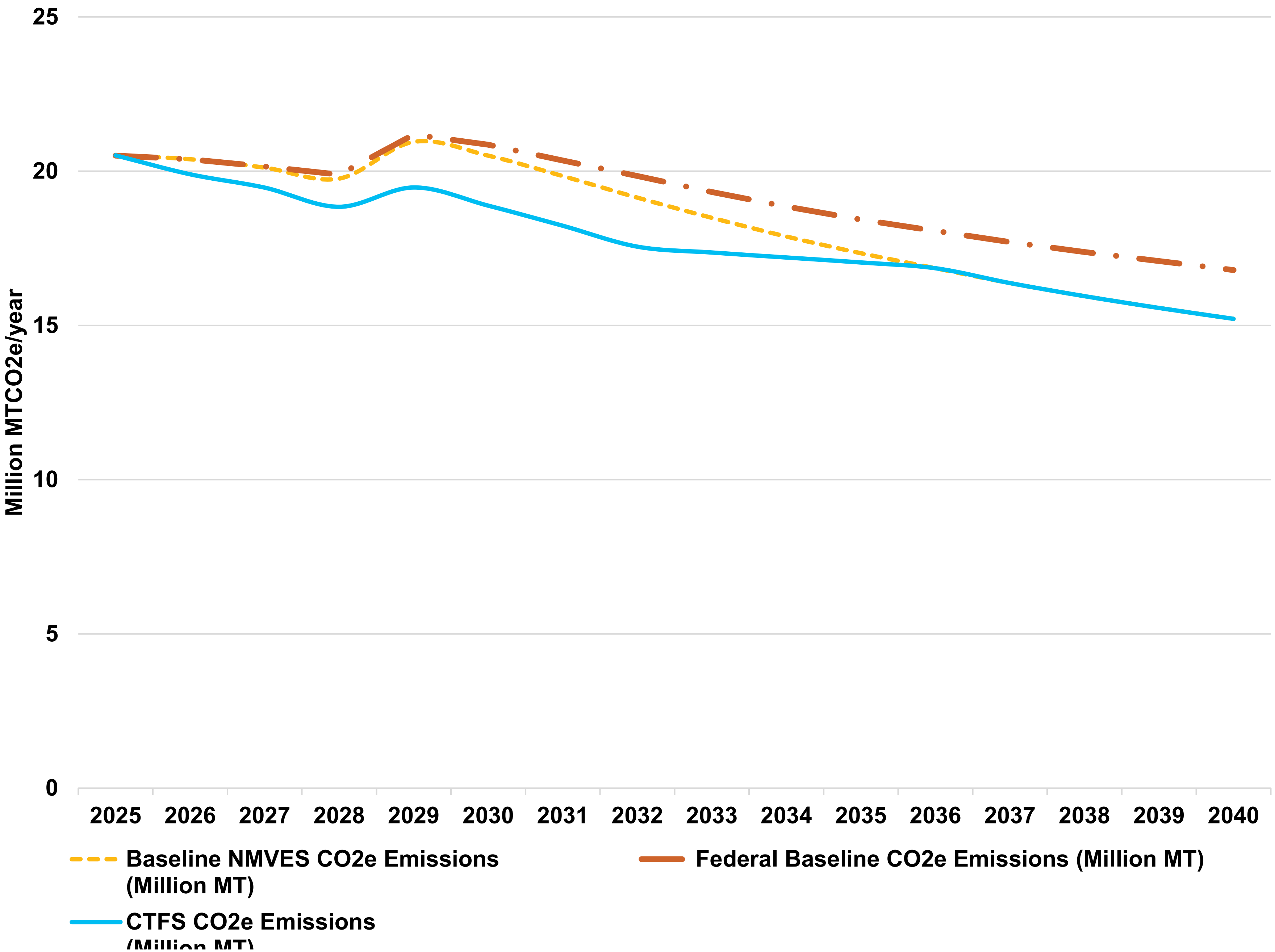
Year	Clear Gasoline	Clear Diesel	Ethanol	Biodiesel	Renewable Diesel	Electricity	Hydrogen	Fossil CNG	RNG	LPG	Clear Gasoline	Clear Diesel	Lower-CI Fuels
2025	989	726	73	17	0	3	0	7	0	0	989	726	100
2026	995	708	74	17	0	4	0	7	0	0	995	708	101
2027	988	688	73	16	0	10	0	7	0	0	988	688	106
2028	974	667	72	16	0	19	0	7	0	0	974	667	113
2029	985	736	73	17	0	29	0	17	0	9	985	736	145
2030	966	715	72	17	0	40	0	17	0	9	966	715	155
2031	917	709	68	17	0	55	1	18	0	9	917	709	167
2032	866	703	64	16	0	71	2	18	0	10	866	703	181
2033	815	698	60	16	0	87	3	18	0	10	815	698	195
2034	766	692	57	16	0	104	4	18	0	11	766	692	209
2035	727	687	54	16	0	117	4	18	0	11	727	687	220
2036	689	683	51	16	0	133	5	18	0	11	689	683	234
2037	652	679	48	16	0	148	6	18	0	12	652	679	248
2038	618	675	46	16	0	163	7	18	0	12	618	675	262
2039	587	671	43	16	0	177	7	18	0	13	587	671	275
2040	565	668	42	16	0	188	8	18	0	13	565	668	285

CTFS (Million GGE)

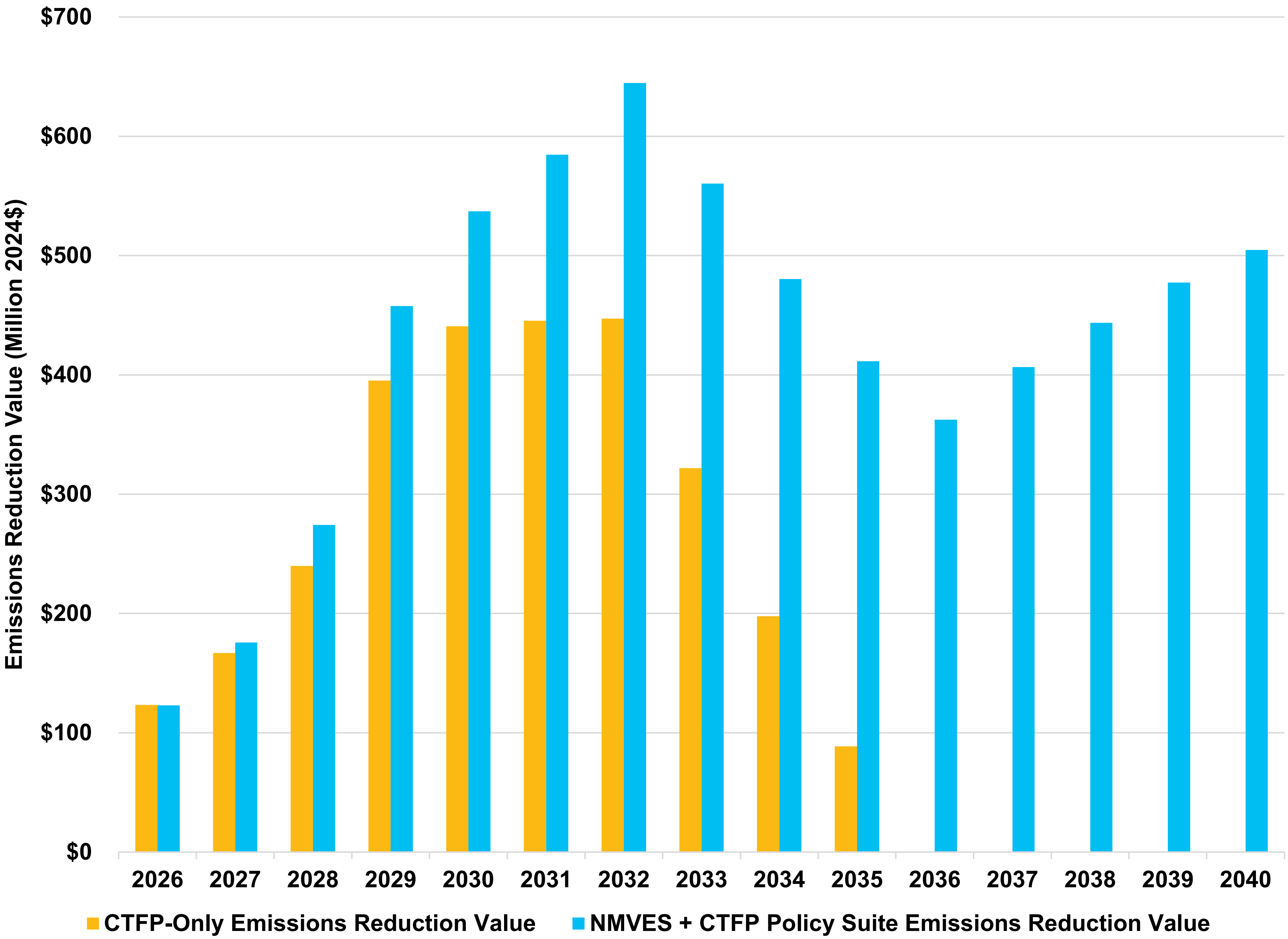
Clear Gasoline	Clear Diesel	Ethanol	Biodiesel	Renewable Diesel	Electricity	Hydrogen	Fossil CNG	RNG	LPG	Clear Gasoline	Clear Diesel	Lower-CI Fuels
989	726	73	17	0	3	0	7	0	0	989	726	100
995	644	74	32	48	4	0	0	7	0	995	644	164
988	606	73	30	68	10	0	0	7	0	988	606	188
974	552	72	27	103	19	0	0	7	0	974	552	228
985	553	73	27	173	29	0	0	17	9	985	553	328
966	477	72	24	231	40	0	0	17	9	966	477	392
917	473	68	23	229	55	1	0	18	9	917	473	403
866	471	64	23	226	71	2	0	18	10	866	471	413
815	539	60	27	148	87	3	0	18	10	815	539	353
766	604	57	30	74	104	4	0	18	11	766	604	296
727	659	54	33	11	117	4	0	18	11	727	659	248
689	683	51	16	0	133	5	18	0	11	689	683	234
652	679	48	16	0	148	6	18	0	12	652	679	248
618	675	46	16	0	163	7	18	0	12	618	675	262
587	671	43	16	0	177	7	18	0	13	587	671	275
565	668	42	16	0	188	8	18	0	13	565	668	285

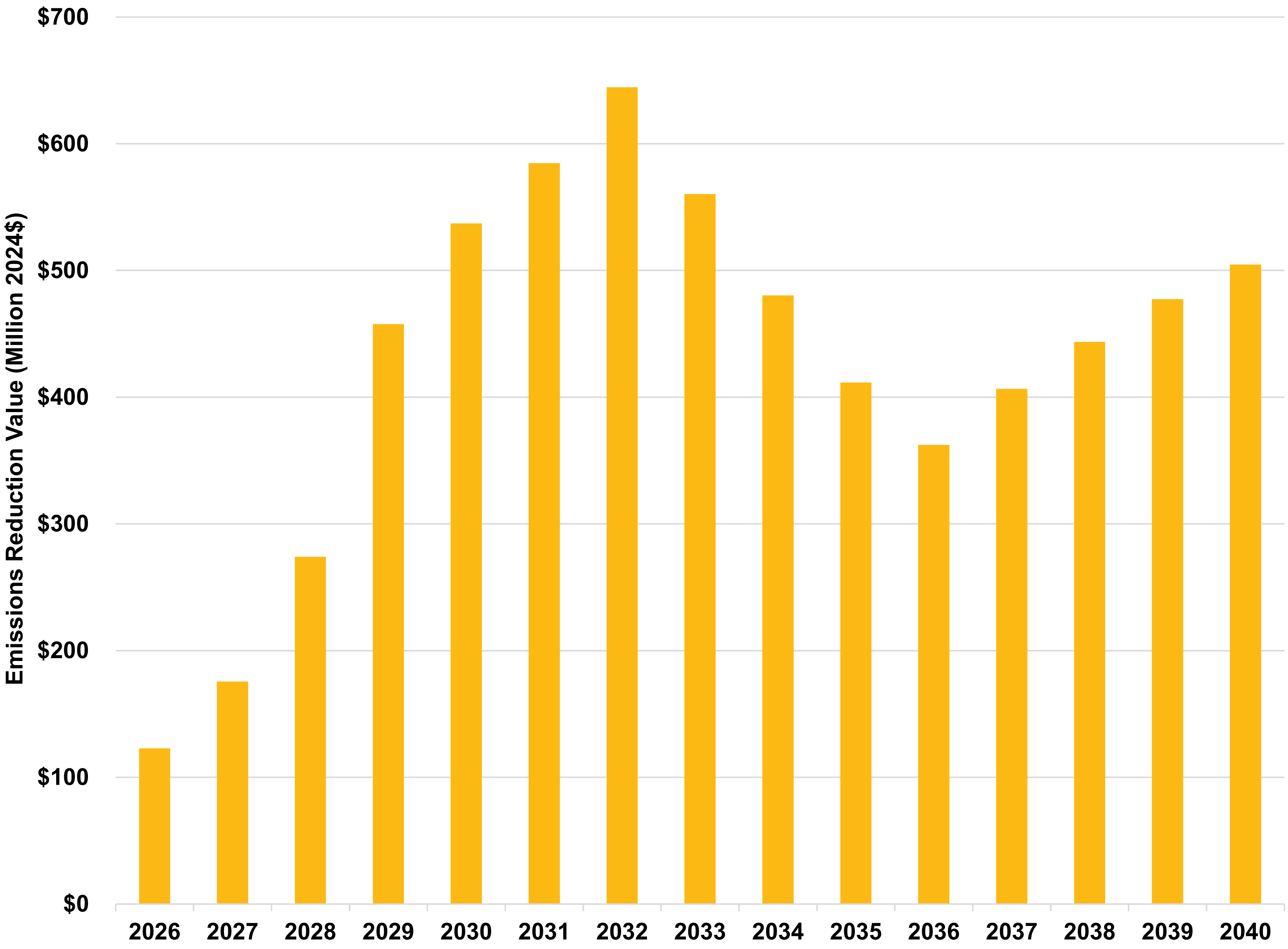


100
90
80
70
60
50
40
30
20
10
0
Target Carbon Intensity (gCO2e/MJ)
2018 Baseline
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
Gasoline Standard
Diesel Standard



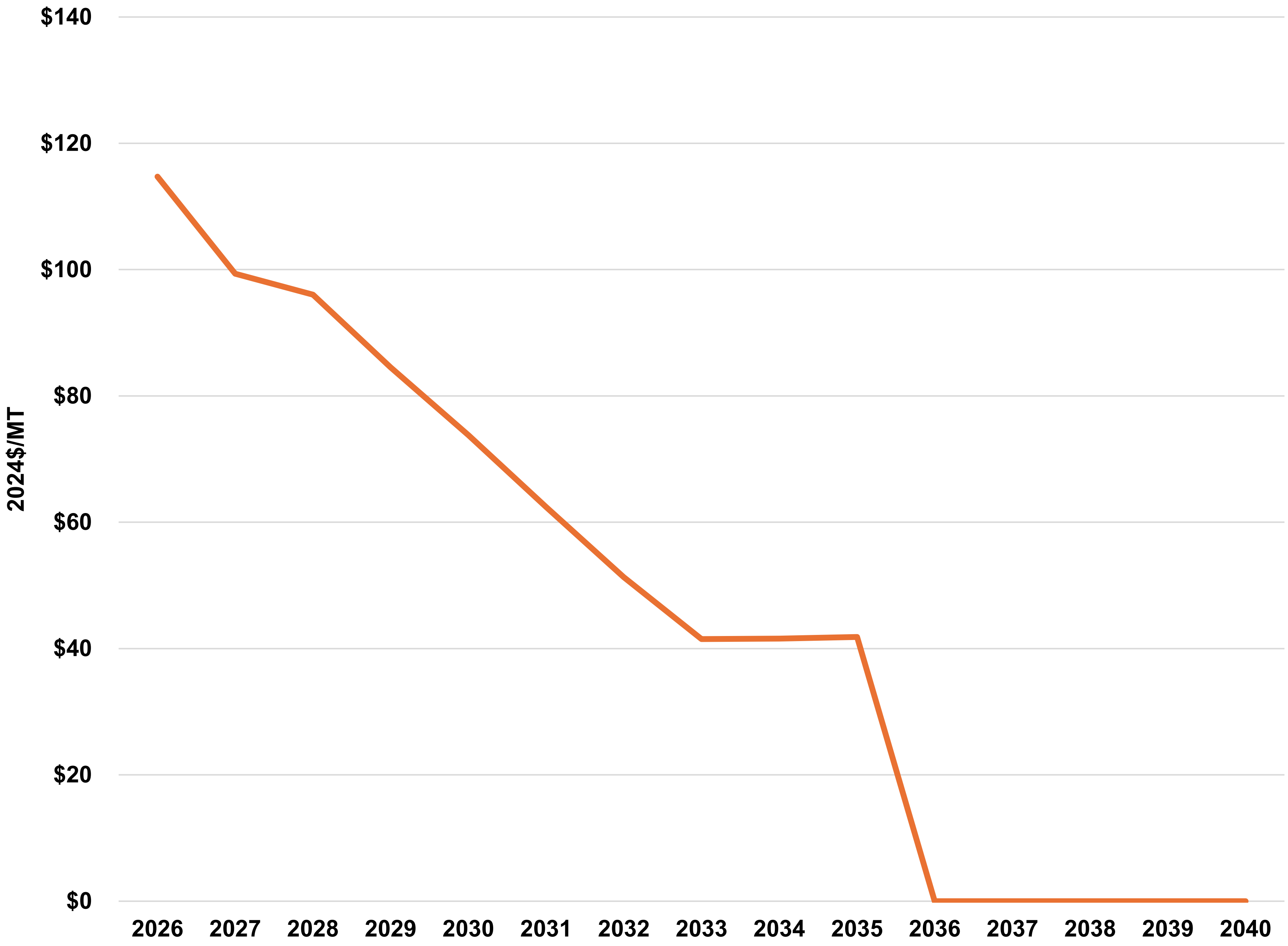
25
20
15
10
5
0
Million MTCO2e/year
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
Baseline NMVES CO2e Emissions (Million MT)
Federal Baseline CO2e Emissions (Million MT)
CTFS CO2e Emissions (Million MT)

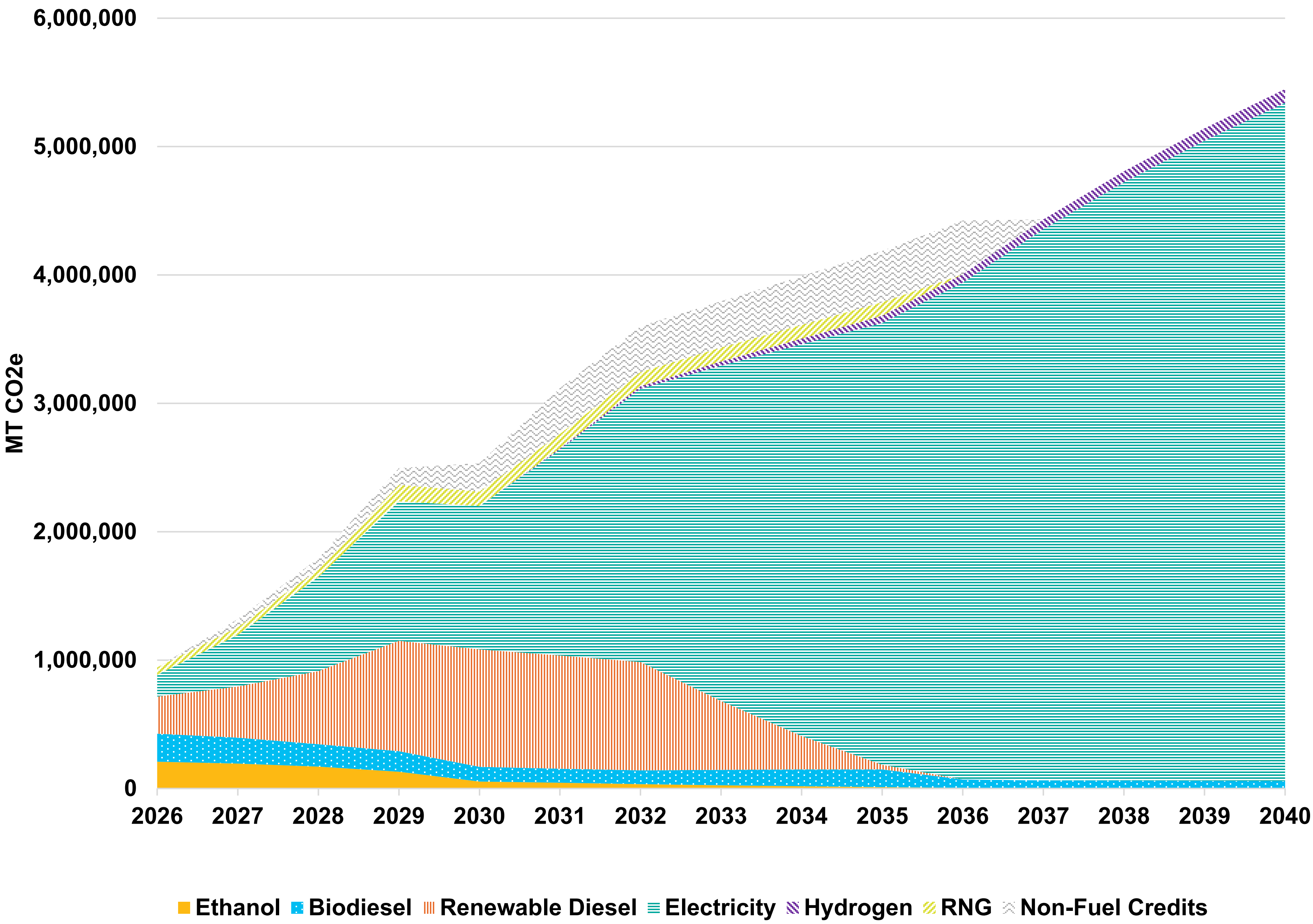

Emissions Reduction Value (Million 2024$)
$700
$600
$500
$400
$300
$200
$100
$0
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
CTFP-Only Emissions Reduction Value
NMVES + CTFP Policy Suite Emissions Reduction Value

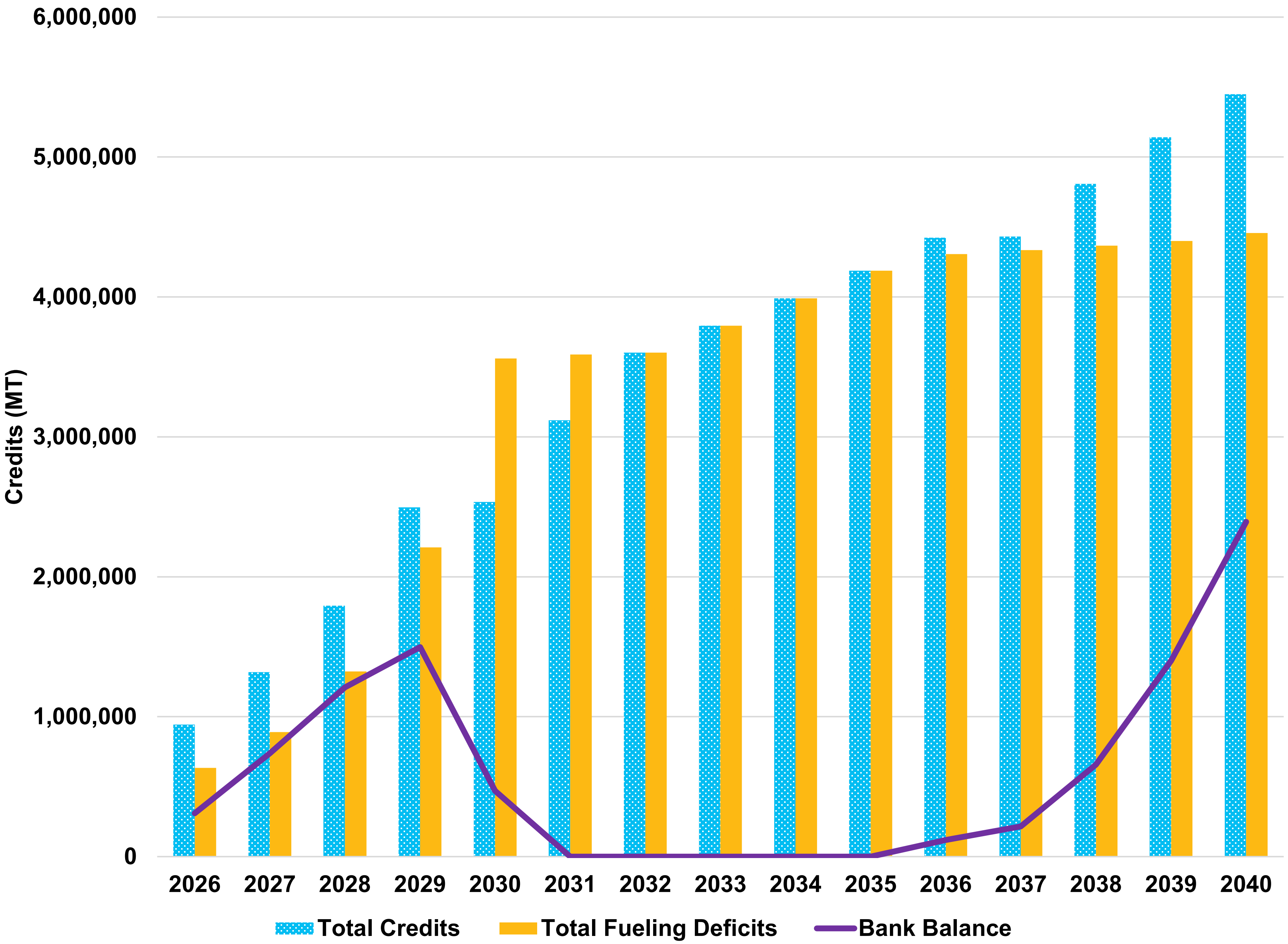


Emissions Reduction Value (Million 2024$)
$700
$600
$500
$400
$300
$200
$100
$0
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040

								Charting Purpose Only	
Year	CTFS CO2e Emissions (Million MT)	Baseline NMVES CO2e Emissions (Million MT)	Fed Baseline CO2e Emissions (Million MT)	Emissions Reductions Above NMVES (Million MT)	Emissions Reductions Above Fed Baseline (Million MT)	Emissions Reduction Value Above NMVES ($Million)	Emissions Reduction Value Above Fed Baseline ($Million)	Emissions Reduction Value Above NMVES (2024$ Million)	Emissions Reduction Value Above Fed Baseline (2024$ Million)
2025	21	21	21	0	0				
2026	20	20	20	0	0	$120.33	$119.96	$123.33	$122.96
2027	19	20	20	1	1	$162.79	$171.30	$166.86	$175.58
2028	19	20	20	1	1	$234.01	$267.46	$239.86	$274.15
2029	19	21	21	1	2	$385.54	$446.52	$395.18	$457.68
2030	19	21	21	2	2	$430.00	$524.09	$440.74	$537.19
2031	18	20	20	2	2	$434.47	$570.36	$445.33	$584.61
2032	18	19	20	2	2	$436.31	$628.96	$447.21	$644.67
2033	17	18	19	1	2	$313.92	$546.61	$321.77	$560.27
2034	17	18	19	1	2	$192.99	$468.58	$197.81	$480.29
2035	17	17	18	0	1	$86.46	$401.49	$88.63	$411.53
2036	17	17	18	0	1	$0.00	$353.62	$0.00	$362.45
2037	16	16	18	0	1	$0.00	$396.74	$0.00	$406.65
2038	16	16	17	0	1	$0.00	$432.84	$0.00	$443.65
2039	16	16	17	0	2	$0.00	$465.85	$0.00	$477.49
2040	15	15	17	0	2	$0.00	$492.36	$0.00	$504.67


$140
$120
$100
$80
$60
$40
$20
$0
2024$/MT
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040


6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
MT CO2e
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
Ethanol
Biodiesel
Renewable Diesel
Electricity
Hydrogen
RNG
Non-Fuel Credits


6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
Credits (MT)
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
Total Credits
Total Fueling Deficits
Bank Balance

Year	Ethanol	Biodiesel	Renewable Diesel	Electricity	Hydrogen	RNG	Non-Fuel Credits	Total Credits	Total Fueling Deficits	Bank Balance
2026	208,386	218,695	288,703	168,897	0	58,896	0	943,578	634,105	309,473
2027	194,483	200,496	398,166	403,175	0	59,195	63,411	1,318,924	890,038	738,359
2028	169,524	174,513	569,612	732,845	0	58,375	89,004	1,793,873	1,322,772	1,209,460
2029	130,147	159,395	860,755	1,085,450	0	128,616	132,277	2,496,640	2,209,553	1,496,547
2030	54,498	113,414	915,545	1,116,806	0	113,085	220,955	2,534,303	3,560,434	470,416
2031	44,005	109,889	882,513	1,602,871	10,523	111,777	356,043	3,117,621	3,588,037	0
2032	34,262	106,737	844,133	2,126,648	21,301	110,449	358,804	3,602,334	3,602,334	0
2033	25,360	119,232	537,521	2,610,150	32,331	109,099	360,233	3,793,927	3,793,927	0
2034	17,403	130,269	260,290	3,051,528	43,611	107,729	379,393	3,990,223	3,990,223	0
2035	10,385	138,435	36,240	3,441,143	55,136	106,337	399,022	4,186,698	4,186,698	0
2036	4,041	66,043	0	3,870,069	65,165	0	418,670	4,423,988	4,305,464	118,524
2037	0	63,885	0	4,293,202	75,424	0	0	4,432,512	4,334,518	216,518
2038	0	61,745	0	4,659,935	85,909	0	0	4,807,588	4,365,852	658,254
2039	0	59,621	0	4,985,475	96,619	0	0	5,141,715	4,399,659	1,400,310
2040	0	57,515	0	5,283,359	107,550	0	0	5,448,425	4,456,507	2,392,227

Energy Density of Fuels

Fuel (unit)	Unit	Value
Clear Gasoline (gallon)	MJ/gallon	122.48
Clear Diesel (gallon)	MJ/gallon	134.48
Compressed natural gas (therm)	MJ/therm	105.5
Electricity (kilowatt hour)	MJ/killowatt Hour	3.6
Denatured ethanol (gallon)	MJ/gallon	81.51
Clear biodiesel (gallon)	MJ/gallon	126.13
Liquefied natural gas (gallon)	MJ/gallon	78.83
Hydrogen (kilogram)	MJ/kilogram	120
Liquefied petroleum gas (gallon)	MJ/gallon	89.63
Renewable diesel (gallon)	MJ/gallon	129.65
Undenatured anhydrous ethanol (gallon)	MJ/gallon	80.53
Alternative jet fuel (gallon)	MJ/gallon	126.37
Renewable naphtha (gallon)	MJ/gallon	117.66

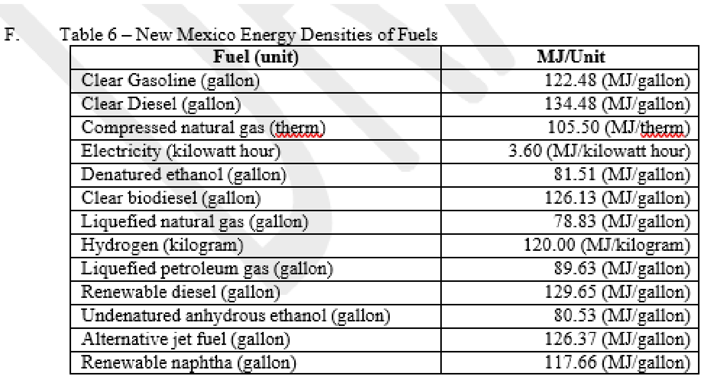
Calculated

Fuel (unit)	Unit	Value
Finished Gasoline at Assumed Ethanol Blend Wall	MJ/GGE	119.66
B5 (5% BD with 95% Fossil Diesel)	MJ/gallon	134.06
GGE/DGE	GGE/DGE	1.12

Fuel (unit)	Unit	Value
Clear Gasoline (gallon)	MMBtu/gallon	0.12
Clear Diesel (gallon)	MMBtu/gallon	0.13
Compressed natural gas (therm)	MMBtu/therm	0.10
Electricity (kilowatt hour)	MMBtu/kilowatt hour	0.00
Denatured ethanol (gallon)	MMBtu/gallon	0.08
Clear biodiesel (gallon)	MMBtu/gallon	0.12
Liquefied natural gas (gallon)	MMBtu/gallon	0.07
Hydrogen (kilogram)	MMBtu/kilogram	0.11
Liquefied petroleum gas (gallon)	MMBtu/gallon	0.08
Renewable diesel (gallon)	MMBtu/gallon	0.12
Undenatured anhydrous ethanol (gallon)	MMBtu/gallon	0.08
Alternative jet fuel (gallon)	MMBtu/gallon	0.12
Renewable naphtha (gallon)	MMBtu/gallon	0.11

Fuel (unit)	Unit	Value
Finished Gasoline at Assumed Ethanol Blend Wall	MMBtu/gallon	0.11

Source: Draft Rule Document



F. Table 6 – New Mexico Energy Densities of Fuels

Fuel (unit)	MJ/Unit
Clear Gasoline (gallon)	122.48 (MJ/gallon)
Clear Diesel (gallon)	134.48 (MJ/gallon)
Compressed natural gas (therm)	105.50 (MJ/therm)
Electricity (kilowatt hour)	3.60 (MJ/kilowatt hour)
Denatured ethanol (gallon)	81.51 (MJ/gallon)
Clear biodiesel (gallon)	126.13 (MJ/gallon)
Liquefied natural gas (gallon)	78.83 (MJ/gallon)
Hydrogen (kilogram)	120.00 (MJ/kilogram)
Liquefied petroleum gas (gallon)	89.63 (MJ/gallon)
Renewable diesel (gallon)	129.65 (MJ/gallon)
Undenatured anhydrous ethanol (gallon)	80.53 (MJ/gallon)
Alternative jet fuel (gallon)	126.37 (MJ/gallon)
Renewable naphtha (gallon)	117.66 (MJ/gallon)

Conversion	
MJ/MMBtu	1055.056
MMBtu/MJ	0.000947817
Gallons/BBl	42
MMBtu/Therm	0.1
Hydrogen Btu/gallon	6500

Source: https://www.eia.gov/tools/faqs/faq.php?id=45&t=8#:~:text=MMBtu%E2%80%941%2C000%2C000%20British%20thermal%20units,100%2C000%20Btu%2C%20or%200.10%20MMBtu

Conversion	
E85 Energy Density (Gallons/GGE)	0.78

Source: https://epact.energy.gov/fuel-conversion-factors

Calculated

Conversion	
E85 Ethanol by Energy	71%

Source: CARB ACC-II Analysis (EVMT)

Source: EPA MOVES (E85 Fuel Consumption %)

FFV E85 % (by Volume) 3.10%

eVMT fractions for PHEVs

CY	LDV	LDT
2020	0.6	0.49
2021	0.6	0.49
2022	0.6	0.49
2023	0.6	0.49
2024	0.6	0.49
2025	0.6	0.49
2026	0.6	0.49
2027	0.63	0.565
2028	0.645	0.58
2029	0.717	0.658
2030	0.737	0.678
2031	0.755	0.707
2032	0.776	0.727
2033	0.776	0.727
2034	0.776	0.727
2035	0.776	0.727
2036	0.79	0.74
2037	0.79	0.74
2038	0.79	0.74
2039	0.79	0.74
2040	0.79	0.74

Gasoline Allocation Fractions for PHEVs and FFV

CY	LDV - PHEV	LDT - PHEV	LDV - FFV	LDT - FFV
2020	0.40	0.51	0.98	0.98
2021	0.40	0.51	0.98	0.98
2022	0.40	0.51	0.98	0.98
2023	0.40	0.51	0.98	0.98
2024	0.40	0.51	0.98	0.98
2025	0.40	0.51	0.98	0.98
2026	0.40	0.51	0.98	0.98
2027	0.37	0.44	0.98	0.98
2028	0.36	0.42	0.98	0.98
2029	0.28	0.34	0.98	0.98
2030	0.26	0.32	0.98	0.98
2031	0.25	0.29	0.98	0.98
2032	0.22	0.27	0.98	0.98
2033	0.22	0.27	0.98	0.98
2034	0.22	0.27	0.98	0.98
2035	0.22	0.27	0.98	0.98
2036	0.21	0.26	0.98	0.98
2037	0.21	0.26	0.98	0.98
2038	0.21	0.26	0.98	0.98
2039	0.21	0.26	0.98	0.98
2040	0.21	0.26	0.98	0.98

Note: PHEV allocation is done on a VMT basis, because different fuel economies are used for gasoline and electric operation

Note: FFV allocation is done on an energy basis, because the same fuel economy is used for gasoline and E85

Source: New Mexico EER

BEV Light/Medium Duty EER	3.4
BEV Heavy Duty EER	5.0
Hydrogen Light/Medium	2.5
Hydrogen Heavy Duty EER	1.9

New Mexico EER from Draft Rules

Light-Medium-Duty Vehicle Applications		**Medium-Heavy-Duty Vehicle or Off-Road Applications**		**Aviation Applications**	
Fuel/Vehicle Combination	**EER Value Relative to Gasoline**	**Fuel/Vehicle Combination**	**EER Value Relative to Diesel**	**Fuel/Vehicle Combination**	**EER Value Relative to Conventional Jet**
Gasoline or any gasoline-ethanol blend	1	Diesel or any blend of diesel, biodiesel and renewable diesel	1	Alternative jet fuel	1
CNG/Internal Combustion Engine Vehicle	1	CNG, LNG, or LPG/Spark- Ignition Engines	0.9		
Electricity/Battery Electric Vehicle or Plug-In Hybrid Electric Vehicle	3.4	CNG, LNG or LPG/Compression- Ignition Engines	1		
Electricity/On- Road Electric Motorcycle	4.4	Electricity/Battery Electric Vehicle or Plug-In Hybrid Electric Vehicle	5		
Hydrogen/Fuel Cell Vehicle	2.5	Electricity/Fixed Guideway Light Rail	3.3		
		Electricity/Fixed Guideway Streetcar	2.1		
		Electricity/Fixed Guideway Aerial Tram	2.6		
		Electricity/Electric Forklift	3.8		
		Electricity/eTRU	3.4		
		Hydrogen/Fuel Cell Vehicle	1.9		
		Hydrogen/Fuel Cell Forklift	2.1		
		Electricity/Cargo Handling Equipment	2.7		

Source: 2022 EIA SEDS Data

Key	Description	Units
B1ACP	Renewable diesel consumed by the transportation sector	Thousand barrels
BDACP	Biodiesel consumed by the transportation sector	Thousand barrels
DFACP	Distillate fuel oil consumed by the transportation sector	Thousand barrels
DMACP	Distillate fuel oil, excluding biodiesel and renewable diesel, consumed by the transportation sector	Thousand barrels
ENACP	Fuel ethanol, including denaturant, consumed by the transportation sector	Thousand barrels
MGACP	Motor gasoline consumed by the transportation sector	Thousand barrels
B1ACB	Renewable diesel consumed by the transportation sector	Billion Btu
BDACB	Biodiesel consumed by the transportation sector	Billion Btu
DFACB	Distillate fuel oil consumed by the transportation sector	Billion Btu
DMACB	Distillate fuel oil, excluding biodiesel and renewable diesel, consumed by the transportation sector	Billion Btu
DFCCB	Distillate fuel oil consumed by the commercial sector	Billion Btu
DFICB	Distillate fuel oil consumed by the industrial sector	Billion Btu
EMACB	Fuel ethanol, excluding denaturant, consumed by the transportation sector	Billion Btu
MGACB	Motor gasoline consumed by the transportation sector	Billion Btu
MMACB	Motor gasoline, excluding fuel ethanol, consumed by the transportation sector	Billion Btu
MGCCB	Motor gasoline consumed by the commercial sector	Billion Btu
MGICB	Motor gasoline consumed by the industrial sector	Billion Btu

Data_Status	State	MSN	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
2022P	NM	B1ACP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2022P	NM	BDACP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2022P	NM	DFACP	1919	1840	2380	2589	2461	2618	2526	2223	2795	2943	3158	3265	4015	4550	4538	4200	4664	5213
2022P	NM	DMACP	1919	1840	2380	2589	2461	2618	2526	2223	2795	2943	3158	3265	4015	4550	4538	4200	4664	5213
2022P	NM	ENACP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2022P	NM	MGACP	9213	9356	9720	10099	10230	10511	10858	11025	11584	12294	12884	13891	14825	15832	15480	16257	17193	17780
2022P	NM	B1ACB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2022P	NM	BDACB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2022P	NM	DFACB	11179	10721	13866	15079	14335	15250	14714	12951	16283	17140	18396	19016	23386	26505	26435	24468	27166	30364
2023P	NM	DFCCB	623	539	501	431	570	380	296	220	323	396	663	739	802	1198	972	1043	1146	1742
2023P	NM	DFICB	5988	5241	6071	5555	8052	7022	5721	4289	7702	8802	12388	11622	13961	16684	12697	13390	14092	18957
2022P	NM	DMACB	11179	10721	13866	15079	14335	15250	14714	12951	16283	17140	18396	19016	23386	26505	26435	24468	27166	30364
2022P	NM	EMACB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2022P	NM	MGACB	48395	49147	51060	53052	53738	55212	57038	57914	60852	64582	67680	72970	77874	83163	81318	85398	90314	93398
2022P	NM	MMACB	48395	49147	51060	53052	53738	55212	57038	57914	60852	64582	67680	72970	77874	83163	81318	85398	90314	93398
2023P	NM	MGCCB	243	259	275	285	275	283	301	322	337	356	367	366	363	381	447	478	498	510
2023P	NM	MGICB	1552	1411	1386	1348	1171	1267	1232	1013	1113	972	1009	1050	1005	817	805	764	709	673

1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6156	5639	5411	8134	5608	3691	3974	4406	5283	5786	6001	5950	6016	6165	6993	5991	5484	2871	7804	8504	9296	9022
6156	5639	5411	8134	5608	3691	3974	4406	5283	5786	6001	5950	6016	6165	6993	5991	5484	2871	7804	8504	9296	9022
0	0	0	0	3	61	140	138	124	236	351	483	361	356	282	57	148	456	384	386	655	551
18716	17769	16721	16780	16966	16936	17142	17431	17840	18489	18852	18430	18190	18674	19004	19815	20187	20342	19570	20794	21403	21828
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35858	32847	31519	47378	32664	21499	23150	25666	30775	33705	34957	34656	35041	35909	40736	34896	31915	16709	45418	49495	54093	52501
1622	1107	772	3969	3252	2835	2243	1862	1751	2578	2076	2085	2481	2028	1056	1651	1081	1409	1023	983	804	1838
17742	20829	12792	20467	9490	14430	11421	15116	16381	14681	13207	9247	8658	10384	8390	7372	6305	11099	11777	12107	11032	12654
35858	32847	31519	47378	32664	21499	23150	25666	30775	33705	34957	34656	35041	35909	40736	34896	31915	16709	45418	49495	54093	52501
0	0	0	0	9	212	487	479	431	819	1216	1675	1254	1234	978	199	515	1583	1333	1337	2271	1911
98316	93338	87836	88144	89122	88964	90045	91564	93716	97122	99029	96812	95552	98096	99826	103376	105256	105861	101981	108232	111361	113551
98316	93338	87836	88144	89122	88964	90045	91564	93716	97122	99029	96812	95552	98096	99826	103177	104741	104278	100648	106895	109090	111641
531	546	569	629	652	556	500	594	612	645	618	627	665	593	526	93	94	95	95	95	95	96
551	544	439	380	286	246	1104	1895	1792	1729	1749	1826	1735	1896	1725	2928	3130	3400	3431	3607	2585	1779

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	2	4	3	6	22	62	84	73	77	62	212	264	299	326	317	320	355	393	415	409	345	330
9327	9824	9928	10517	11411	11752	13179	13043	11101	10641	11744	12434	12379	12597	13371	13878	13571	14633	16018	16312	16287	17409	16664
9327	9824	9928	10517	11411	11752	13179	13043	11101	10510	11646	12184	12112	12110	12885	13345	12869	13925	15331	15651	15567	17073	16350
627	206	175	140	155	291	282	368	786	1164	2261	2283	2248	2049	1867	2325	2276	2430	2183	2426	2180	2483	2340
20883	20986	21398	21451	22416	22262	22570	22403	21655	22609	21301	22094	22228	21975	22416	22312	21965	23344	23084	23087	20557	23254	21867
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	13	21	17	34	116	334	453	389	412	333	1135	1412	1603	1746	1697	1716	1902	2106	2226	2192	1846	1767
54274	57166	57770	61198	66391	68372	76477	75440	64162	61472	67823	71742	71391	72595	77056	79965	78126	84245	92249	93943	93746	100343	96066
1545	2036	1913	2333	2345	3656	1749	1093	3461	1564	1347	1384	1268	1264	1695	1717	1498	997	730	1713	1318	1325	1364
13215	12683	12092	13925	13265	11187	12858	13451	13409	8602	9404	9369	11019	11664	14437	8803	11946	13532	13724	13024	8915	12113	12245
54274	57166	57770	61198	66391	68372	76477	75440	64162	60761	67292	70377	69933	69925	74385	77042	74291	80374	88490	90321	89820	98509	94340
2173	713	607	484	536	1010	978	1277	2727	4031	7836	7917	7796	7110	6481	8073	7903	8448	7609	8447	7580	8637	8149
108612	109147	111246	111482	116475	115584	117024	115197	110573	115078	107933	111862	112518	111196	113403	112832	111032	117958	116669	1E+05	103854	117434	1E+05
106439	108434	110638	110998	115938	114573	116045	113920	107846	111047	100097	103945	104722	104086	106922	104760	103129	109510	109060	1E+05	96274	108797	1E+05
97	201	1754	2865	400	120	106	106	105	104	103	109	109	114	104	1923	1922	1951	1978	1979	1996	2028	2184
1797	3277	3232	3461	3925	3783	3890	2631	2394	2307	2048	2053	1939	1995	1732	2871	2973	2986	3160	2958	2991	2719	2984

Table 1 – New Mexico Clean Transportation Fuel Standard for Gasoline and Gasoline Substitutes

Compliance Period	CTFS (gCO_2e/MJ)	Percent Reduction
Baseline (2018)	95.01	0.0%
Initial	93.30	1.8%
2027	91.87	3.3%
2028	89.31	6.0%
2029	84.56	11.0%
2030	76.01	20.0%
2031	75.06	21.0%
2032	74.11	22.0%
2033	73.16	23.0%
2034	72.21	24.0%
2035	71.26	25.0%
2036	70.31	26.0%
2037	69.36	27.0%
2038	68.41	28.0%
2039	67.46	29.0%
2040 and beyond	66.51	30.0%

Table 2 – New Mexico Clean Fuel Standard for Diesel and Diesel Substitutes

Compliance Period	CTFS (gCO_2e/MJ)	Percent Reduction
Baseline (2018)	94.42	0.0%
Initial	92.72	1.8%
2027	91.30	3.3%
2028	88.75	6.0%
2029	84.03	11.0%
2030	75.54	20.0%
2031	74.59	21.0%
2032	73.65	22.0%
2033	72.70	23.0%
2034	71.76	24.0%
2035	70.82	25.0%
2036	69.87	26.0%
2037	68.93	27.0%
2038	67.98	28.0%
2039	67.04	29.0%
2040	66.09	30.0%

Table 4 - New Mexico Statewide Carbon Inensity Lookup Table

Fuel	Pathway ID Code	Fuel Pathway Description	Carbon Intensity $^{(\mathrm{gCO_2e/MJ})\ \text{Total Lifecycle Emissions}}$
Gasoline	NMGAS001	Clear gasoline – based on a weighted average of gasoline supplied to New Mexico	96.9
Diesel	NMULSD001	Clear diesel, based on a weighted average of diesel supplied to New Mexico	95.3
Fossil Compressed Natural Gas	NMCNG001	North American fossil CNG delivered via pipeline; compressed in New Mexico	74.3
Fossil Liquified Natural Gas	NMLNG001	North American fossil LNG delivered via pipeline; liquified in New Mexico using liquefaction with 80% efficiency	87.1
Liquified Petroleum Gas	NMLPG001	North American liquefied petroleum gas	87.0
Electricity	NMELEC001	Renewable power determined to have a carbon intensity of zero according to Section 206 of NMAC 20.2.92	0.0

Table 5 – New Mexico Temporary Carbon Intensities

Fuel	Pathway Identifier Code	Pathway Description	Carbon Intensity $^{\text{Values } (\mathrm{gCO_2e/MJ})}$
			Total Lifecycle Emissions
Ethanol	NMETOH001	Denatured fuel corn-based ethanol based on North American average (E100)	69.60
Biodiesel	NMBD001	Neat biodiesel (B100) derived from any non�palm virgin plant oil, based on North American average	56.60
	NMBD002	Neat biodiesel (B100) derived from an animal fat or waste oil feedstock, based on North American average	19.90
Renewable Diesel	NMRD001	Neat renewable diesel (R100) derived from any non-palm virgin plant oil, based on North American average	59.10
	NMRD002	Neat renewable diesel (R100) derived from an animal fat or waste oil feedstock, based on North American average	18.30
Renewable Compressed Natural Gas	NMR CNG001	Biomethane derived from anaerobic digestion of North American livestock manure, delivered by pipeline and compressed in New Mexico. Does not include counterfactual avoided emissions	62.70
	NMR CNG002	Biomethane derived from anaerobic digestion of North American livestock manure, delivered by pipeline and compressed in New Mexico; includes counterfactual avoided emissions	-27.30
	NMR CNG003	Biomethane derived from landfill gas or wastewater treatment, delivered by pipeline and compressed in New Mexico	21.40

Renewable Liquefied Natural Gas	NMRLNG001	Biomethane derived from anaerobic digestion of North American livestock manure, delivered by pipeline and liquefied in New Mexico using liquefaction with 80% efficiency. Does not include counterfactual avoided emissions.	71.80
	NMRLNG002	Biomethane derived from anaerobic digestion of North American livestock manure, delivered by pipeline and liquefied in New Mexico using liquefaction with 80% efficiency; includes counterfactual avoided emissions	-18.20
	NMRLNG003	North American NG derived from landfill gas or wastewater treatment delivered via pipeline; liquefied in New Mexico using liquefaction with 80% efficiency.	31.00
Gaseous Compressed Hydrogen	NMHYG001	Compressed H2 produced in North America via central steam methane reformation of North American natural gas	94.50
	NMHYG002	Compressed H2 produced in North America via central steam methane reformation (SMR) of biomethane from North American animal agriculture, with SMR process heat derived from North American fossil natural gas. Does not include counterfactual avoided emissions	88.30
	NMHYG003	Compressed H2 produced in North America via central steam methane reformation (SMR) of biomethane from North American animal agriculture, with SMR process heat derived from North American fossil natural gas; includes counterfactual avoided emissions	-1.70
	NMHYG004	Compressed H2 produced in North America via central steam methane reformation of biomethane from North American landfills or wastewater treatment, with SMR process heat derived from North American fossil natural gas	46.10
	NMHYG005	Compressed H2 produced in North America via electrolysis using American average grid electricity	217.80
	NMHYG006	Compressed H2 produced in North America via electrolysis using renewable electricity	14.30

Liquid Hydrogen	NMHYL001	Liquified H2 produced in North America via central steam methane reformation of North American fossil natural gas	135.70
	NMHYL002	Liquified H2 produced in North America via central steam methane reformation of biomethane from North American animal agriculture, with SMR process heat derived from North American fossil natural gas	127.00
	NMHYL003	Liquified H2 produced in North America via central steam methane reformation of biomethane from North American animal agriculture, with SMR process heat derived from North American natural gas; includes counterfactual avoided emissions	37.00
	NMHYL004	Liquified H2 produced in North America via central steam methane reformation of biomethane from North American landfills or wastewater treatment, with SMR process heat derived from North American fossil natural gas	89.80
	NMHYL005	Liquified H2 produced in North America via electrolysis using American average grid electricity	221.70
	NMHYL006	Liquified H2 produced in North America via electrolysis using renewable electricity	1.90

Source: Updated Carbon Intensity Tables for the New Mexico Clean Transportation Fuel Program

Source URL: NzMwNjFmNjQ1MDA1MzkxYzhjYjA2ODJjNF8xODY4OTU~.pdf

BBD-Derived Credit Price

Year	EIA Mountain Wholesale Diesel Price (2022$/gallon)	EIA Mountain Wholesale Diesel Price (2023$/gallon)	Soybean Oil Price (Nominal $/lb)	Soybean Oil Price ($2023/lb)	BD Soybean Oil Yield (lb soybean oil/gallon BD)	RD Soybean Oil Yield (lb soybean oil/gallon RD)	BD Non-Feedstock Prod. Costs net of Co-Products) (2023$/gallon BD)	RD Non-Feedstock Prod. Costs net of Co-Products (2023$/gallon RD)
2025	$3.00	$3.10	$0.54	$0.51	7.69	8.22	$0.54	$0.89
2026	$2.85	$2.95	$0.49	$0.46	7.69	8.22	$0.54	$0.89
2027	$2.72	$2.81	$0.46	$0.42	7.69	8.22	$0.54	$0.89
2028	$2.61	$2.70	$0.45	$0.40	7.69	8.22	$0.54	$0.89
2029	$2.62	$2.71	$0.44	$0.38	7.69	8.22	$0.54	$0.89
2030	$2.63	$2.72	$0.43	$0.37	7.69	8.22	$0.54	$0.89
2031	$2.66	$2.75	$0.42	$0.35	7.69	8.22	$0.54	$0.89
2032	$2.68	$2.77	$0.41	$0.34	7.69	8.22	$0.54	$0.89
2033	$2.70	$2.79	$0.40	$0.32	7.69	8.22	$0.54	$0.89
2034	$2.71	$2.81	$0.41	$0.32	7.69	8.22	$0.54	$0.89
2035	$2.75	$2.84	$0.42	$0.33	7.69	8.22	$0.54	$0.89
2036	$2.75	$2.84	$0.43	$0.33	7.69	8.22	$0.54	$0.89
2037	$2.77	$2.87	$0.44	$0.33	7.69	8.22	$0.54	$0.89
2038	$2.79	$2.89	$0.46	$0.33	7.69	8.22	$0.54	$0.89
2039	$2.80	$2.90	$0.47	$0.33	7.69	8.22	$0.54	$0.89
2040	$2.81	$2.91	$0.48	$0.34	7.69	8.22	$0.54	$0.89

Sources:

EIA Mountain Wholesale Diesel Price:	EIA 2023 AEO Table 57.8: https://www.eia.gov/outlooks/aeo/data/browser/#/?id=70-AEO2023&region=1-8&cases=ref2023
costs (Table 10.1.4.2-1) and Diesel Transportation Costs (Table 10.2.2.1-1) in Draft Regulatory Impact Analysis : RFS Standards for 2023-2025 and Other Changes	https://www.epa.gov/system/files/documents/2022-12/420d22003.pdf

PADD 3 Biodiesel Transportation Cost (2023$/gallon BBD)	Diesel Transportation Cost (2023$/gallon)	Transportation Price Differential (2023$/gallon BBD)	Unsubsidized BD Price (2023$/gallon BD)	Unsubsidized RD Price (2023$/gallon RD)	RIN Price ($/RIN)	Subsidized BD Price (2023$/gallon BD)	Subsidized RD Price (2023$/gallon RD)	BD Price Differential (2023$/DGE)	RD Price Differential (2023$/DGE)
$0.17	$0.08	$0.08	$4.57	$5.20	$0.75	$3.44	$3.92	$0.57	$0.96
$0.17	$0.08	$0.08	$4.15	$4.75	$0.67	$3.15	$3.61	$0.41	$0.80
$0.17	$0.08	$0.08	$3.85	$4.42	$0.62	$2.93	$3.38	$0.31	$0.69
$0.17	$0.08	$0.08	$3.71	$4.28	$0.61	$2.80	$3.24	$0.29	$0.67
$0.17	$0.08	$0.08	$3.58	$4.14	$0.56	$2.74	$3.18	$0.21	$0.59
$0.17	$0.08	$0.08	$3.45	$4.00	$0.52	$2.68	$3.12	$0.13	$0.51
$0.17	$0.08	$0.08	$3.33	$3.87	$0.47	$2.62	$3.07	$0.05	$0.43
$0.17	$0.08	$0.08	$3.21	$3.74	$0.43	$2.57	$3.02	-$0.03	$0.36
$0.17	$0.08	$0.08	$3.10	$3.63	$0.39	$2.52	$2.97	-$0.10	$0.29
$0.17	$0.08	$0.08	$3.12	$3.64	$0.39	$2.54	$2.98	-$0.10	$0.29
$0.17	$0.08	$0.08	$3.15	$3.67	$0.39	$2.57	$3.02	-$0.10	$0.29
$0.17	$0.08	$0.08	$3.15	$3.68	$0.38	$2.57	$3.02	-$0.10	$0.29
$0.17	$0.08	$0.08	$3.17	$3.70	$0.38	$2.59	$3.05	-$0.10	$0.29
$0.17	$0.08	$0.08	$3.19	$3.72	$0.38	$2.61	$3.06	-$0.10	$0.29
$0.17	$0.08	$0.08	$3.20	$3.72	$0.38	$2.62	$3.07	-$0.10	$0.29
$0.17	$0.08	$0.08	$3.20	$3.73	$0.38	$2.63	$3.08	-$0.10	$0.29

BD Blend CI Differential (gCO2e/MJ)	RD Blend CI Differential (gCO2e/MJ)	Credit Price - BD Blend Derived	Credit Price - RD Blend Derived	Bundled REC Price (2023$/MWh)	Grid CI (gCO2e/MJ)	EER-Adjusted LD CI	Breakeven Credit Price - REC Retirement ($/MT)	Credit Price - BBD Derived	Credit Price (2023$/MT)	Credit Price (2024$/MT)
60.02	52.91	70.62	135.23	$17.14	69.66	20.49	$68	$135.23	$0.00	$0.00
60.02	52.91	50.59	111.93	$17.14	62.32	18.33	$76	$111.93	$111.93	$114.72
60.02	52.91	37.90	96.92	$17.14	61.25	18.01	$78	$96.92	$96.92	$99.34
60.02	52.91	35.67	93.70	$17.14	60.47	17.79	$79	$93.70	$93.70	$96.04
60.02	52.91	25.51	82.47	$17.14	58.89	17.32	$81	$82.47	$82.47	$84.53
60.02	52.91	24.78	71.99	$17.14	48.88	14.38	$97	$71.99	$71.99	$73.79
60.02	52.91	24.78	60.90	$17.14	34.54	10.16	$138	$60.90	$60.90	$62.42
60.02	52.91	24.78	50.08	$17.14	24.38	7.17	$195	$50.08	$50.08	$51.33
60.02	52.91	24.78	40.49	$17.14	22.70	6.68	$210	$40.49	$40.49	$41.50
60.02	52.91	24.78	40.57	$17.14	22.38	6.58	$213	$40.57	$40.57	$41.59
60.02	52.91	24.78	40.80	$17.14	19.85	5.84	$240	$40.80	$40.80	$41.82
60.02	52.91	24.78	40.83	$17.14	18.51	5.44	$257	$40.83	$0.00	$0.00
60.02	52.91	24.78	40.99	$17.14	16.76	4.93	$284	$40.99	$0.00	$0.00
60.02	52.91	24.78	41.11	$17.14	16.89	4.97	$282	$41.11	$0.00	$0.00
60.02	52.91	24.78	41.18	$17.14	17.18	5.05	$277	$41.18	$0.00	$0.00
60.02	52.91	24.78	41.24	$17.14	14.44	4.25	$330	$41.24	$0.00	$0.00

For Charting Purpose

Year	EIA Mountain Wholesale Diesel Price (2022$/gallon)	EIA Mountain Wholesale Diesel Price (2024$/gallon)	Soybean Oil Price (Nominal $/lb)	Soybean Oil Price ($2024/lb)	BD Soybean Oil Yield (lb soybean oil/gallon BD)	RD Soybean Oil Yield (lb soybean oil/gallon RD)	BD Non-Feedstock Prod. Costs net of Co-Products) (2024$/gallon BD)	RD Non-Feedstock Prod. Costs net of Co-Products (2024$/gallon RD)
2025	$3.00	$3.18	$0.54	$0.53	7.69	8.22	$0.55	$0.91
2026	$2.85	$3.02	$0.49	$0.47	7.69	8.22	$0.55	$0.91
2027	$2.72	$2.88	$0.46	$0.43	7.69	8.22	$0.55	$0.91
2028	$2.61	$2.76	$0.45	$0.41	7.69	8.22	$0.55	$0.91
2029	$2.62	$2.78	$0.44	$0.39	7.69	8.22	$0.55	$0.91
2030	$2.63	$2.79	$0.43	$0.38	7.69	8.22	$0.55	$0.91
2031	$2.66	$2.82	$0.42	$0.36	7.69	8.22	$0.55	$0.91
2032	$2.68	$2.84	$0.41	$0.35	7.69	8.22	$0.55	$0.91
2033	$2.70	$2.86	$0.40	$0.33	7.69	8.22	$0.55	$0.91
2034	$2.71	$2.87	$0.41	$0.33	7.69	8.22	$0.55	$0.91
2035	$2.75	$2.91	$0.42	$0.34	7.69	8.22	$0.55	$0.91
2036	$2.75	$2.91	$0.43	$0.34	7.69	8.22	$0.55	$0.91
2037	$2.77	$2.94	$0.44	$0.34	7.69	8.22	$0.55	$0.91
2038	$2.79	$2.96	$0.46	$0.34	7.69	8.22	$0.55	$0.91
2039	$2.80	$2.97	$0.47	$0.34	7.69	8.22	$0.55	$0.91
2040	$2.81	$2.98	$0.48	$0.34	7.69	8.22	$0.55	$0.91

PADD 3 Biodiesel Transportation Cost (2024$/gallon BBD)	Diesel Transportation Cost (2024$/gallon)	Transportation Price Differential (2024$/gallon BBD)	Unsubsidized BD Price (2024$/gallon BD)	Unsubsidized RD Price (2024$/gallon RD)	RIN Price ($/RIN)	Subsidized BD Price (2024$/gallon BD)	Subsidized RD Price (2024$/gallon RD)	BD Price Differential (2024$/DGE)	RD Price Differential (2024$/DGE)
$0.17	$0.08	$0.08	$4.69	$5.33	$0.78	$3.52	$4.00	$0.57	$0.97
$0.17	$0.08	$0.08	$4.25	$4.86	$0.69	$3.22	$3.69	$0.41	$0.81
$0.17	$0.08	$0.08	$3.94	$4.53	$0.63	$2.99	$3.45	$0.31	$0.70
$0.17	$0.08	$0.08	$3.80	$4.38	$0.63	$2.86	$3.32	$0.29	$0.68
$0.17	$0.08	$0.08	$3.67	$4.24	$0.58	$2.80	$3.26	$0.21	$0.60
$0.17	$0.08	$0.08	$3.54	$4.10	$0.53	$2.74	$3.19	$0.13	$0.52
$0.17	$0.08	$0.08	$3.41	$3.97	$0.48	$2.69	$3.14	$0.05	$0.44
$0.17	$0.08	$0.08	$3.29	$3.83	$0.44	$2.64	$3.09	-$0.03	$0.37
$0.17	$0.08	$0.08	$3.18	$3.72	$0.39	$2.59	$3.05	-$0.10	$0.30
$0.17	$0.08	$0.08	$3.19	$3.73	$0.39	$2.60	$3.06	-$0.10	$0.30
$0.17	$0.08	$0.08	$3.22	$3.76	$0.39	$2.63	$3.10	-$0.10	$0.30
$0.17	$0.08	$0.08	$3.23	$3.77	$0.39	$2.64	$3.10	-$0.10	$0.30
$0.17	$0.08	$0.08	$3.25	$3.79	$0.39	$2.66	$3.12	-$0.10	$0.30
$0.17	$0.08	$0.08	$3.27	$3.81	$0.39	$2.68	$3.14	-$0.10	$0.30
$0.17	$0.08	$0.08	$3.27	$3.82	$0.39	$2.69	$3.15	-$0.10	$0.30
$0.17	$0.08	$0.08	$3.28	$3.83	$0.39	$2.70	$3.16	-$0.10	$0.30

BD Blend CI Differential (gCO2e/MJ)	RD Blend CI Differential (gCO2e/MJ)	Credit Price - BD Blend Derived	Credit Price - RD Blend Derived	Bundled REC Price (2024$/MWh)	Grid CI (gCO2e/MJ)	EER-Adjusted LD CI	Breakeven Credit Price - REC Retirement ($/MT)	Credit Price - BBD Derived	Credit Price
60.02	52.91	70.96	136.81	$17.14	69.66	20.49	$68	$136.81	$0.00
60.02	52.91	50.87	113.47	$17.14	62.32	18.33	$76	$113.47	$113.47
60.02	52.91	38.13	98.43	$17.14	61.25	18.01	$78	$98.43	$98.43
60.02	52.91	35.87	95.17	$17.14	60.47	17.79	$79	$95.17	$95.17
60.02	52.91	25.71	83.96	$17.14	58.89	17.32	$81	$83.96	$83.96
60.02	52.91	25.39	73.49	$17.14	48.88	14.38	$97	$73.49	$73.49
60.02	52.91	25.39	62.42	$17.14	34.54	10.16	$138	$62.42	$62.42
60.02	52.91	25.39	51.63	$17.14	24.38	7.17	$195	$51.63	$51.63
60.02	52.91	25.39	42.06	$17.14	22.70	6.68	$210	$42.06	$42.06
60.02	52.91	25.39	42.15	$17.14	22.38	6.58	$213	$42.15	$42.15
60.02	52.91	25.39	42.39	$17.14	19.85	5.84	$240	$42.39	$42.39
60.02	52.91	25.39	42.42	$17.14	18.51	5.44	$257	$42.42	$0.00
60.02	52.91	25.39	42.59	$17.14	16.76	4.93	$284	$42.59	$0.00
60.02	52.91	25.39	42.72	$17.14	16.89	4.97	$282	$42.72	$0.00
60.02	52.91	25.39	42.79	$17.14	17.18	5.05	$277	$42.79	$0.00
60.02	52.91	25.39	42.86	$17.14	14.44	4.25	$330	$42.86	$0.00

	Value	2024 USD	Source	Source URL
Intercept	$0.49	$0.50	Regression Analysis	
RIN Price per $1 of Soy Input to Wholesale Diesel Spread	$0.32	$0.32	Regression Analysis	
Price Floor	$0.35	$0.36	Rounded Minimum D4 RIN Price, 2010-2023	
Biodiesel RIN Equivalence Value	1.5		40 CFR 80.1415	https://www.ecfr.gov/current/title-40/section-80.1415
Renewable Diesel RIN Equivalence Value	1.7		40 CFR 80.1415	https://www.ecfr.gov/current/title-40/section-80.1415
Assumed Bundled REC Price	$17.93	$18.38	2024 PRC Report to the Legislature on the Renewable Portfolio Standard 2025 PNM Proposed Tariff Value, adjusted for RPS Target	https://www.prc.nm.gov/wp-content/uploads/2024/07/RPS-Report-6-28-Final.pdf

Source: EPA RFS RIA Table 10.1.2.3-1: Biodiesel Production Cost for 2023 (year 2022 dollars)

Production Costs for 10 Million Gallons BD

	Unit Demands	**Cost per Unit**	**Thousand Dollars**	**$/gal**
Soybean Oil Feed	76,875 (1000 lb)	82 cents/lb	63,109	6.31
Methanol	7422 (1000 lb)	1.88 $/gal	2,170	0.22
Sodium Methoxide	927 (1000 lb)	$800/ton	371	0.037
Hydrochloric Acid	529 (1000 lb)	$150/MT	36.1	0.004
Sodium Hydroxide	369 (1000 lb)	$420/ton	77.5	0.008
Water	2478 (1000 lb)	$3/1000 gals	1.2	0.00
Glycerine	9000 (1000 lb)	24 cents/lb	(2160)	(0.22)
Natural Gas	66.9 million cf	$6.76/1000cf	452	0.045
Electricity	1008 kW	8.18 cents/kWh	722	0.072
Labor				0.05
Capital Cost 2006$	11.35 ($million)	-	-	-
Capital Cost 2022$	18.54 ($million)		2,039	0.20
Fixed Cost		5.5%	1,019	0.10
Total Cost			67,838	6.83

Energy Density of Feedstock

	HHV(Btu/gal)
Tallow (Ali et al., 1995)	132,183
Soybean oil (Demirbas, 2008)	129,336
Palm oil (Demirbas, 2008)	131,603
Rapeseed oil (Demirbas, 2008)	129,315

Soy Oil Feedstock (lb/gallon)	7.6875	Calculated - 76875 derived from unit demands
Tallow and White Grease	7.857	Soybean oil adjusted for GREET energy density
Yellow Grease	7.688	Assumed Soybean Oil
Canola Oil	7.689	Soybean oil adjusted for GREET energy density

Sources:

Table 10.1.2.3-1	Draft Regulatory Impact Analy	https://www.epa.gov/system/files/documents/2022-12/420d22003.pdf
Energy Density of Feedstock:	Argonne National Laboratory	https://greet.anl.gov/files/tallow-13

Table 10.1.2.4-3: Renewable Diesel Production Cost Estimate for a Greenfield 220 Million Gallons/Yr Plant Processing Soy Oil in 2023 (2022 Dollars)

Stream		**Estimated value**	**MM$/yr**	**$/gal**
Soy Oil input	235 MMgals/yr	82c/lb	1483	6.74
Naphtha output	11.8 MMgals/yr	1.81 c/gal	(21.3)	(0.10)
Light fuel gas output	21.2 MMgals/yr	92 c/gal	(19.5)	(0.09)
Hydrogen input	4760 scf/100 gals	$3.73/thousand standard cubic feet	41.8	0.19
Other Operating Costs			15.2	0.07
Capital Costs (2022 dollars)		$1052 million	115.7	0.53
Fixed Costs		5.5%	57.8	0.26
Total Costs			1673	7.60

Energy Density of Feedstock

	HHV(Btu/gal)
Tallow (Ali et al., 1995)	132,183
Soybean oil (Demirbas, 2008)	129,336
Palm oil (Demirbas, 2008)	131,603
Rapeseed oil (Demirbas, 2008)	129,315

Feedstock-Adjusted Input (lb/gallon)

Soy Oil Feedstock (lb/gallon)	8.221	Calculated - $0.82 and 220 million are from estimated soy input cost in RIA and RIA capacity, respectively
Tallow and White Grease	8.044	Soybean oil adjusted for GREET energy density
Yellow Grease	8.221	Assumed Soybean Oil
Canola Oil	8.222	Soybean oil adjusted for GREET energy density

Sources:

Table 10.1.2.4-3:	Draft Regulatory Impact Analys	https://www.epa.gov/system/files/documents/2022-12/420d22003.pdf
Energy Density of Feedstock:	Argonne National Laboratory G	https://greet.anl.gov/files/tallow-13

Soybean Oil Projections - USDA Forecast

Units: Million Pounds

Item	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34
Beginning stocks, October 1	1,991	1,761	1,736	1,736	1,776	1,801	1,811	1,856	1,931	1,936	1,921	1,941
Production	26,265	27,025	27,925	28,590	29,025	29,335	29,595	29,850	30,105	30,360	30,620	30,935
Imports	375	400	425	400	300	300	300	300	300	300	300	300
Total Supply	28,631	29,186	30,086	30,726	31,101	31,436	31,706	32,006	32,336	32,596	32,841	33,176
Domestic Disappearance	26,500	27,100	28,000	28,550	28,700	28,825	28,950	29,075	29,200	29,325	29,450	29,500
Biofuel	12,100	12,800	13,600	14,000	14,100	14,175	14,250	14,325	14,400	14,475	14,550	14,550
Food, feed, and other industrial	14,400	14,300	14,400	14,550	14,600	14,650	14,700	14,750	14,800	14,850	14,900	14,950
Exports	370	350	350	400	600	800	900	1,000	1,200	1,350	1,450	1,650
Total Use	26,870	27,450	28,350	28,950	29,300	29,625	29,850	30,075	30,400	30,675	30,900	31,150
Ending Stocks, September 30	1,761	1,736	1,736	1,776	1,801	1,811	1,856	1,931	1,936	1,921	1,941	2,026
Soybean Oil Price (dollars per pound)	0.653	0.63	0.55	0.5	0.46	0.45	0.44	0.43	0.42	0.41	0.4	0.395

Calendarized Projections

Calendar Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
EIA Mountain Wholesale Diesel Forecast (2022$/gallon)	$3.51	$3.30	$3.00	$2.85	$2.72	$2.61	$2.62	$2.63	$2.66	$2.68	$2.70	$2.71	$2.75	$2.75	$2.77	$2.79	$2.80	$2.81
Biofuel Domestic Disappearance	12,275	13,000	13,700	14,025	14,119	14,194	14,269	14,344	14,419	14,494	14,550	14,622	14,695	14,768	14,841	14,915	14,989	15,064
Soybean Oil Price (dollars per pound)	$0.65	$0.61	$0.54	$0.49	$0.46	$0.45	$0.44	$0.43	$0.42	$0.41	$0.40	$0.41	$0.42	$0.43	$0.44	$0.46	$0.47	$0.48

Sources:

EIA Mountain Wholesale Diesel Forecast: EIA 2023 AEO Table 57.8	https://www.eia.gov/outlooks/aeo/data/browser/#/?id=70-AEO2023&region=1-8&cases=ref2023
Other Forward-Looking Projections: USDA Agricultural Projections to 2033	https://www.usda.gov/sites/default/files/documents/USDA-Agricultural-Projections-to-2033.pdf

2023 Volumes

Fuel	State	Units	Q1	Q2	Q3	Q4
Biodiesel	California	gal	68,541,019	60,275,869	67,129,512	72,940,256
Biodiesel	Oregon	gal	17,945,468	19,268,958	21,040,196	21,358,408
Biodiesel	Washington	gal	5,399,751	2,411,129	2,051,195	4,686,581
Renewable Diesel	California	gal	404,778,818	481,200,270	531,797,418	547,388,851
Renewable Diesel	Oregon	gal	24,006,743	26,676,462	39,693,310	37,055,030
Renewable Diesel	Washington	gal	7,467,781	11,624,232	20,498,492	20,358,924

2023 CIs

Fuel	State	Units	Q1	Q2	Q3	Q4
Biodiesel	California	gCO2e/MJ	32.41	28.42	30.50	33.78
Biodiesel	Oregon	gCO2e/MJ	45.53	44.29	44.74	45.83
Biodiesel	Washington	gCO2e/MJ	54.00	53.16	55.82	50.54
Renewable Diesel	California	gCO2e/MJ	41.51	43.74	43.01	41.62
Renewable Diesel	Oregon	gCO2e/MJ	46.66	32.46	32.83	29.25
Renewable Diesel	Washington	gCO2e/MJ	66.03	49.17	53.81	59.04

2023 Average Biodiesel	35.3
2023 Average Renewable Diesel	42.4

Sources:

California:	https://ww2.arb.ca.gov/sites/default/files/2025-01/quarterlysummary_Q32024.xlsx
Oregon:	https://www.oregon.gov/deq/ghgp/Documents/cfpQ12024.xlsx
Washington:	https://www.ezview.wa.gov/Portals/_1962/Documents/clean-fuel-data/CFSquarterlysummary_Q32024.xlsx

Source	Federal Reserve Bank of Philadelphia Fourth Quarter 2024 Survey of Professional Forecasters
Source URL:	https://www.philadelphiafed.org/surveys-and-data/real-time-data-research/spf-q4-2024
Long-term Headline PCE (2024-2033):	2.10%

Parameter	Value	Source
January 2025 Oil & Gas Distribution Cost of Capital	6.59%	Aswath Damodaran Cost of Equity and Capital (US); Source URL: https://pages.stern.nyu.edu/~adamodar/
Inflation Expectation	2.11%	Federal Reserve Bank of Philadelphia Survey of Professional Forecasters Long-Term Annual Average (2024-2033) Forecast of Headline PCE; Source URL: https://www.philadelphiafed.org/surveys-and-data/real-time-data-research/spf-q1-2025
Real Interest Rate Assumption	4.39%	

FRED Graph Observations

Federal Reserve Economic Data

Link: https://fred.stlouisfed.org

Help: https://fredhelp.stlouisfed.org

Economic Research Division

Federal Reserve Bank of St. Louis

PCEPI	Personal Consumption Expenditures: Chain-type Price Index, Index 2017=100, Monthly, Seasonally Adjusted

Frequency: Monthly

observation_date	PCEPI
2020-01-01	104.419
2020-02-01	104.541
2020-03-01	104.252
2020-04-01	103.817
2020-05-01	103.914
2020-06-01	104.233
2020-07-01	104.564
2020-08-01	104.887
2020-09-01	105.046
2020-10-01	105.106
2020-11-01	105.225
2020-12-01	105.690
2021-01-01	106.083
2021-02-01	106.471
2021-03-01	107.032
2021-04-01	107.632
2021-05-01	108.184
2021-06-01	108.748
2021-07-01	109.275
2021-08-01	109.720
2021-09-01	110.047
2021-10-01	110.741
2021-11-01	111.510
2021-12-01	112.221
2022-01-01	112.776
2022-02-01	113.489
2022-03-01	114.489

2022-04-01	114.845
2022-05-01	115.542
2022-06-01	116.631
2022-07-01	116.662
2022-08-01	117.002
2022-09-01	117.377
2022-10-01	117.891
2022-11-01	118.221
2022-12-01	118.403
2023-01-01	119.007
2023-02-01	119.401
2023-03-01	119.553
2023-04-01	119.970
2023-05-01	120.140
2023-06-01	120.435
2023-07-01	120.598
2023-08-01	120.965
2023-09-01	121.387
2023-10-01	121.421
2023-11-01	121.415
2023-12-01	121.602
2024-01-01	122.115
2024-02-01	122.494
2024-03-01	122.912
2024-04-01	123.234
2024-05-01	123.224
2024-06-01	123.369
2024-07-01	123.564
2024-08-01	123.708
2024-09-01	123.931
2024-10-01	124.226

Table 2.3.4. Price Indexes for Personal Consumption Expenditures by Major Type of Product

Table 2.3.4. Price Indexes for Personal Consumption Expenditures by Major Type of Product

Last Revised on: July 30, 2025 - Next Release Date August 28, 2025

Line		2016	2017	2018	2019	2020	2021	2022	2023	2024	**2023 to 2024 Multiplier**
Line											
1	Personal consumption expenditures (PCE)	98.284	100	102.047	103.509	104.641	108.972	116.111	120.491	123.502	**1.024989418**
2	Goods	99.71	100	100.811	100.426	99.656	104.597	113.638	115.03	114.552	
3	Durable goods	102.337	100	98.633	97.686	96.822	102.201	108.808	107.981	105.748	
4	Motor vehicles and parts	101.309	100	100.016	100.844	102.492	114.198	127.568	127.765	125.134	
5	Furnishings and durable household equipment	102.902	100	99.028	99.756	100.701	105.883	115.599	114.663	111.143	
6	Recreational goods and vehicles	103.842	100	96.69	92.848	88.827	90.205	90.662	87.856	86.005	
7	Other durable goods	101.367	100	98.107	95.883	93.17	93.662	95.47	97.677	97.269	
8	Nondurable goods	98.405	100	101.935	101.848	101.129	105.817	116.258	118.945	119.508	
9	Food and beverages purchased for off-premises consumption	100.13	100	100.517	101.528	104.892	108.159	119.324	125.334	127.017	
10	Clothing and footwear	100.607	100	100.134	98.822	93.825	95.782	100.746	103.306	104.138	
11	Gasoline and other energy goods	88.641	100	113.506	109.552	93.012	123.939	163.956	147.235	139.269	
12	Other nondurable goods	98.964	100	100.49	100.933	101.874	102.767	107.626	111.993	113.437	
13	Services	97.629	100	102.626	104.965	107.055	111.045	117.146	123.067	127.866	
14	Household consumption expenditures (for services)	97.632	100	102.685	105.008	107.16	110.948	116.759	122.458	127.148	
15	Housing and utilities	96.679	100	103.114	106.256	109.079	112.29	119.855	128.233	134.807	
16	Health care	98.556	100	101.865	103.688	106.313	109.396	112.024	114.647	117.694	
17	Transportation services	98.801	100	102.087	104.144	102.878	107.676	119.611	128.228	131.902	
18	Recreation services	97.304	100	102.144	104.204	106.406	109.667	115.427	121.575	125.87	
19	Food services and accommodations	97.949	100	102.315	105.18	107.249	113.146	121.943	129.505	133.845	
20	Financial services and insurance	95.188	100	105.358	107.974	109.273	116.025	122.127	126.914	134.004	
21	Other services	99.619	100	101.705	102.877	104.742	106.824	110.586	115.082	118.242	
22	households (NPISHs)1	97.582	100	101.337	104.037	104.874	113.079	125.846	136.976	144.371	
23	Gross output of nonprofit institutions2	97.933	100	102.15	104.529	107.034	111.492	117.351	122.789	127.506	
24	Less: Receipts from sales of goods and services by nonprofit institutions3	98.06	100	102.446	104.71	107.847	110.92	114.416	117.934	121.773	
	Addenda:										
25	PCE excluding food and energy4	98.426	100	101.897	103.573	104.951	108.705	114.521	119.268	122.62	
26	PCE excluding food, energy, and housing4	98.799	100	101.589	102.891	103.916	107.878	113.537	117.441	120.107	
27	Energy goods and services5	91.982	100	108.054	105.725	96.753	116.9	146.923	138.935	135.996	
28	PCE services excluding energy and housing	97.948	100	102.472	104.552	106.401	110.677	116.255	121.351	125.581	
29	Housing	96.666	100	103.391	106.915	109.978	112.744	119.342	128.362	135.265	
30	Market-based PCE6	98.587	100	101.821	103.142	104.191	107.966	114.929	119.087	121.731	
31	Market-based PCE excluding food and energy6	98.801	100	101.609	103.159	104.482	107.496	112.901	117.449	120.438	

NMED EXHIBIT 80

STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT BOARD

IN THE MATTER OF PROPOSED
ADOPTION OF 20.2.92 NMAC –
Clean Transportation Fuel Program **No. EIB 25-23(R)**

NEW MEXICO ENVIRONMENT DEPARTMENT
TESTIMONY OF JOHN KOUPAL

I. Introduction

My name is John Koupal, I'm a Vice President for Eastern Research Group (ERG) and lead of our firm's clean transportation practice. ERG is an environmental consulting firm founded in 1984 that provides expertise in environmental, energy, economic, and public health issues primarily to federal, state, and local government clients. The New Mexico Environment Department (NMED) has retained ERG to support the environmental and economic analyses of the rules under consideration today, and for me to provide today's testimony. This testimony addresses New Mexico Environment Department's Petition for Regulatory Change to Adopt 20.2.92 NMAC, *Clean Transportation Fuel Program* (hereinafter the "Petition") (filed May 16, 2025).

I have worked in the vehicle emissions field for over 35 years. Before joining ERG, I spent 22 years with the U.S. EPA's Office of Transportation and Air Quality. While at EPA I conducted emission control technology research, helped to develop federal regulations to reduce criteria air pollutants, ozone-precursors, and greenhouse gases from motor vehicles and their fuels, and led the group responsible for assessing transportation emissions and the benefits of EPA rules under the Clean Air Act.

One of the rules I was closely involved with was the Renewable Fuels Standard, or RFS, which laid the foundation for state low-carbon fuel programs such as the proposed Clean Transportation Fuels Program (CTFP) under consideration today. I also led the development of the U.S. EPA MOVES model used in our analysis to help quantify the emission benefits of the CTFP. Prior to joining ERG, I also worked for Nissan Motor Company, representing Nissan with government agencies and industry trade associations on a variety of environment and energy-related regulatory issues. Since joining ERG in 2012, I have supported numerous federal, state, local and international efforts to assess and reduce air pollution from cars and trucks for clients including U.S. EPA, Federal Highways Administration, USAID, The International Council on Clean Transportation (ICCT), California Air Resources Board, Latin America Clean Fuels Association, Asian Clean Fuels Association, and the Northeast States for Coordinated Air Use Management (NESCAUM). My experience with evaluating the costs and benefits of clean vehicle and fuel regulations from the perspective of the federal government, automotive industry, and states offers a unique perspective on the merit of the rule before us today.

These qualifications led me to testify before this Board in November 2023 in support of New Mexico's Vehicle Emission Standards (NMVES) and I am thankful to have been asked to again provide testimony here today and for submission in NMED's CTFP Notice of Intent to Present Technical Testimony. For further reference, relevant credentials are highlighted in my resume, attached as **NMED Exhibit 81**.

II. Overview

My testimony today will focus on the analysis performed by ERG in support of the rule, documented in **NMED Exhibit 82** (Regulatory Analysis for New Mexico's Clean Transportation

Fuel Program).[1] Our team developed fuel carbon intensities that are the foundation of the rule and that form the basis for projections of greenhouse gas reductions from the CTFP itself and for the CTFP+NMVES policy suite. We estimated the criteria and ozone-precursor emission reductions from the CTFP by itself and for the CTFP+NMVES policy suite, and quantified the monetized value of the health benefits to New Mexicans as a result of these emissions reductions. Finally, in conjunction with our colleagues at Berkeley Research Group (BRG), we conducted economic analysis to quantify the costs and savings of the CTFP. Drawing from these analyses, today I will lay out the environmental case for adopting the CTFP and show how the benefits of enacting CTFP outweigh the associated costs more than two-to-one. I will also discuss how we developed Carbon Intensities (CIs) for the rule, focusing on the methods used to tailor CI values to New Mexico.

III. How Clean Fuel Requirements Complement NMVES

During my time at the U.S. EPA, I had the opportunity to work on major clean vehicle and clean fuel emission rules; EPA addressed vehicles and fuels together recognizing that they work as a system to effectively reduce air pollution from motor vehicles. While vehicle emission standards have been very successful in driving down pollution through the introduction of clean vehicles, it takes decades of fleet turnover to realize the full benefit of these standards. In New Mexico, the full benefits of NMVES will not be realized until beyond 2050. In contrast, emissions reductions from CTFP will be realized starting with vehicles on the road today, as soon as they put cleaner fuels in the tank. At least through 2030, much of the emission benefits for the combined policy suite are coming from CTFP, whereas the majority of NMVES benefits will be realized past 2035. In this way the two programs complement each other to reduce emissions from New Mexico's current vehicles in addition to transitioning the fleet to clean technology.

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[1] The Regulatory Analysis for New Mexico's Clean Transportation Fuel Program is supported by **NMED Exhibit 83-A** through **NMED Exhibit 83-MM**.

Another benefit of the CTFP is its ability to reduce emissions from nonroad sources, such as construction equipment and agricultural tractors, which can be in use for several decades and are often slower to turn over to clean technologies. These nonroad sources contribute one-quarter of $PM_{2.5}$ emissions from mobile sources in New Mexico, according to the U.S. EPA.[2]

IV. What These Rules Do for New Mexico Climate, Air Quality, and Health

A. *Greenhouse Gases & Climate*

Now I want to shift focus to how the Proposed Rule support New Mexico's progress towards climate action and healthier air. Emission reductions of the CTFP and CTFP+NMVES policy suite were quantified for greenhouse gases focused on New Mexico's climate burden, while criteria pollutants and ozone precursors focused on New Mexico's air quality. Greenhouse gas reductions flow directly from the statewide carbon intensity targets that decline over time under this rule. As New Mexico's transportation energy needs are met with lower carbon-intensive fuels, the sector will emit less and less carbon dioxide (CO_2) and other greenhouse gases (GHGs), together referred to as CO_2 equivalent or CO_2e. Our BRG colleagues quantified the total GHG emission reductions based on information on the state's vehicle fleet and travel behavior provided by ERG.

Emission reductions from this rule need to be considered in the context of the state's efforts to combat climate change. Governor Lujan Grisham's Executive Order On Addressing Climate Change and Energy Waste Prevention lays out the Governor's climate reduction goals: to meet an overall 2030 target of emissions at least 45% below 2005 levels, and an overall 2050 target of New

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[2] **NMED Exhibit 84** (U.S. EPA 2022v1 Emissions Modeling Platform, https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform (accessed August 20, 2025)).

Mexico reaching net zero emissions.[3] Reduction targets are set for each of the major energy and industrial sectors, including transportation, which is projected to account for 22% of the state's greenhouse gas emissions in 2025.[4] These targets are already in jeopardy, however; an analysis published by the consulting firm E3 in late 2024 projects that New Mexico will fall short of the 2030 target by over 12 million metric tons of CO_2e (MMT CO_2e) with policies currently on the books (including NMVES but excluding the CTFP).[5] The need for additional short-term reductions is critical to stay on track and demonstrates the strength of the CTFP. By achieving carbon reductions from vehicles already on the road in New Mexico, our colleagues at BRG project, cumulatively, that the CTFP will avoid approximately 5.1 MMT CO_2e through 2030 and 10.5 MMT CO_2e through 2035. In parallel, as clean vehicles enter the fleet under NMVES the benefit of the combined program continues to grow to 22.4 MMT CO_2e through 2040.

The Governor's emission reduction targets are critical to meet because New Mexico is already experiencing the effects of climate change. An analysis published in 2019 found that between 1970 and 2018 New Mexico had the largest temperature increase of any state in the continental U.S.: 3.3 degrees Fahrenheit. In the same time span, temperatures in Las Cruces rose by 4.0 degrees Fahrenheit, making it the city with the 10th greatest temperature change nationally.[6]

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[3] **NMED Exhibit 85** (New Mexico Interagency Climate Change Task Force: Progress and Recommendations (2021)).

[4] **NMED Exhibit 86** ("New Mexico Greenhouse Gas Emissions Inventories (2005 Oil & Gas and 2021) and Forecasts,"

[5] **NMED Exhibit 9** (Energy & Environmental Economics (E3), "New Mexico Greenhouse Gas Emissions Inventory and Forecast", December 2024).

[6] **NMED Exhibit 87** (Climate Central, "AMERICAN WARMING: The Fastest-Warming Cities and States in the U.S." https://www.climatecentral.org/report/report-american-warming-us-heats-up-earth-day (accessed August 20, 2025)).

Projections suggest that within the next 50 years, the annual mean temperature in New Mexico could be 5 to 7 degrees Fahrenheit warmer than it was at the end of the 20th century.[7]

Higher temperatures in turn bring increased risk of drought, wildfires, flooding, and snowmelt, threatening the state's economy, health, and quality of life. I'll provide a few examples of how the state is already experiencing these effects:

- New Mexico's fire season has increased in duration, with 50 more days per year of extreme wildfire risk than 50 years ago.[8] In 2022, the economic losses from the most destructive wildfire in state history— Calf Canyon/Hermits Peak — were estimated to be 5.1 billion dollars.[9]
- Since 2000, the U.S. Southwest has been experiencing the driest megadrought in the last 1,200 years of the region's history.[10] Droughts are expected to continue into the future –the Governor's 50-year Water Action Plan estimates that New Mexico could lose 25% of its

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[7] **NMED Exhibit 88** (Dunbar, N. et al. (2022), "Climate Change in New Mexico over the Next 50 Years: Impacts on Water Resources", New Mexico Bureau of Geology and Mineral Resources Report, March 2022. https://mainstreamnm.org/wp-content/uploads/2024/01/Leap-Ahead-Report.pdf (accessed August 22, 2025)).

[8] **NMED Exhibit 89** (New Mexico Energy, Minerals, and Natural Resources Dept (EMNRD 2023), "Summary of Climate Change Projections for New Mexico", June 2023 https://www.climateaction.nm.gov/wp-co).

[9] **NMED Exhibit 90** (KRQE.com, "Ski resort closing dates in New Mexico and southern Colorado", News Article 3/24/25 https://www.krqe.com/news/new-mexico/list-ski-resort-closing-dates-in-new-mexico-and-southern-colorado/ (accessed August 22, 2025)).

[10] **NMED Exhibit 91-A** (Williams, A.P., Cook, B.I. & Smerdon, J.E. Rapid intensification of the emerging southwestern North American megadrought in 2020–2021. Nat. Clim. Chang. 12, 232–234 (2022). https://doi.org/10.1038/s41558-022-01290-z (accessed August 22, 2025)); **NMED Exhibit 91-B** (copyrighted version).

water supply in the next 50 years, due in part to reduced flows in New Mexico's major river systems and increased evaporation of surface water sources.[11,12]

- Climate change-induced droughts are likely to harm many industries and professions, including the farmers and ranchers who uses 80% of the state's freshwater supply.[13] Droughts have a direct correlation to cattle herd size: a 2022 survey of New Mexican cattle ranchers found that 43% had to sell off part of their herd during the previous year.[14,15] Drought conditions not only put an economic strain on New Mexico's farmers and ranchers but also pose a threat to their way of life.
- New Mexico's recreation and tourism industries are also feeling the effect of a changing climate. In 2025, New Mexico experienced a record low snowpack, which for many ski resorts meant ending the season earlier than anticipated.[16,17] A 2012 study found that lower snowfall years in New Mexico resulted in a loss of $48 million dollars in revenue, 578

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[11] **NMED Exhibit 92** ("New Mexico 50-Year Water Action Plan", Office of Governor Michelle Lujan Grisham, https://www.nm.gov/wp-content/uploads/2024/01/New-Mexico-50-Year-WaterAction-Plan.pdf (accessed August 22, 2025)).

[12] **NMED Exhibit 93** (Dunbar, N. et al. (2022)).

[13] **NMED Exhibit 94** (Food and Water Watch, "Big Ag Fuels New Mexico's Water Crisis", Report July 2023 https://www.foodandwaterwatch.org/2023/07/06/new-mexico-water-crisis/ (accessed August 22, 2025)).

[14] **NMED Exhibit 95** (U.S. Dept. of Agriculture Economic Research Service, "Drought conditions influence annual fluctuations in U.S. beef cattle herd size", Charts of Note 3/11/20245, https://www.ers.usda.gov/data-products/charts-of-note/chart-detail?chartId=108718 (accessed August 22, 2025)).

[15] **NMED Exhibit 96** (Farm Bureau, "New AFBF Survey Shows Drought's Increasing Toll on Farmers and Ranchers", Market Intel 8/14/22, https://www.fb.org/market-intel/new-afbf-survey-shows-droughts-increasing-toll-on-farmers-and-ranchers (accessed August 22, 2025)).

[16] **NMED Exhibit 97** (KRQE.com, "Ski resort closing dates in New Mexico and southern Colorado", News Article 3/24/25 https://www.krqe.com/news/new-mexico/list-ski-resort-closing-dates-in-new-mexico-and-southern-colorado/ (accessed August 22, 2025)).

[17] **NMED Exhibit 98** (NOAA Drought.gov, "Special Snow Drought Update: Rapid Snowmelt", https://www.drought.gov/drought-status-updates/special-snow-drought-update-rapid-snowmelt-2025-05-20 (accessed August 22, 2025)).

fewer jobs, and a 30% decline in skier visits.[18] National projections suggest that the ski season will decrease 15-24% by 2050 with lower latitude resorts being the most affected.[19]

- Climate change is also harming the health of New Mexicans. Smoke from the Calf Canyon/Hermits Peak wildfire resulted in an 18% increase in air-quality-related emergency room visits.[20] From 2013 to 2022, there was a five-fold increase in heat-related deaths in New Mexico.[21] Projections suggest that by 2030 the number of deaths caused by heat-related illnesses will double when compared to a 2012-2015 baseline.[22]

There is a common thread running through all of these statistics: climate change is having a quantifiable effect on New Mexico's economy, health, and overall quality of life. This means that the benefits of reducing climate-forcing gases can also be quantified. The federal government provides a means of converting greenhouse reductions to tangible financial benefit to society through a metric known as the Social Cost of Carbon (SCC), which attaches a price tag to potential damages – to society, the environment, and public well-being just discussed – per ton of greenhouse gases avoided. In this way, the Social Cost of Carbon provides a peer-reviewed method for quantifying the outcome of climate action. Using EPA's social cost of carbon methodology,

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[18] **NMED Exhibit 99** (Burakowski, E. & Magnusson, M., "Climate Impacts on the Winter Tourism Economy in the United States", Report for NRDC and Protect our Winters, December 2012 https://uvpublichealth.org/wp-content/uploads/2016/02/climate-impacts-winter-tourism-report.pdf (accessed August 22, 2025)).

[19] **NMED Exhibit 100-A** (Scott, D., & Steiger, R. (2024). "How climate change is damaging the US ski industry." Current Issues in Tourism, 27(22), 3891–3907. https://doi.org/10.1080/13683500.2024.2314700); **NMED Exhibit 100-B** (copyrighted version).

[20] **NMED Exhibit 101** (New Mexico Legislature, "Statewide Public Health and Climate PGM", 2024 Legislative Session Agency Bill Analysis, January 2024. https://www.nmlegis.gov/Sessions/24%20Regular/AgencyAnalysis/HB0104_665.pdf (accessed August 22, 2025)).

[21] Ibid.

[22] **NMED Exhibit 102** (New Mexico Epidemiology, "Climate Change and Heat-Related Morbidity in New Mexico in 2030", 7/17/2020 Volume 2020 Number 4. https://www.nmhealth.org/data/view/report/2406/ (accessed August 22, 2025)).

BRG has estimated that the greenhouse gas reductions will translate to a cumulative monetized benefit between \$2.4 billion for CTFP and \$5.0 billion for the NMVES+CTFP policy suite through 2040. Let me be clear, these climate benefits are not specific to New Mexico, though I plan to talk in a moment about the state-specific health benefits.

The parallel environmental benefit of the Proposed Rule is the reduction of harmful pollutants in tailpipe exhaust that New Mexicans are exposed to every day. These include fine particulate matter ($PM_{2.5}$), oxides of nitrogen (NO_x), volatile organic compounds (VOCs), and sulfur dioxide (SO_2). Air toxic emissions will also be reduced, though we didn't explicitly quantify this in our analysis. The negative health effects of these pollutants are well documented. Exposure to $PM_{2.5}$ has also been linked to decreased lung function, cardiovascular and respiratory disease, diabetes, lung cancer, neurological impairments, and premature death. Diesel exhaust is a dominant source of transportation-related $PM_{2.5}$ and has been classified by International Agency for Research on Cancer as a carcinogen. Even exposure to low levels of fine particulates elevates the risk of premature death in older adults. NO_x and VOC contribute to ground-level ozone as well as the secondary formation of ambient $PM_{2.5}$. According to the American Lung Association (ALA), ozone exposure causes lung damage, including new cases of asthma and Chronic Obstructive Pulmonary Disease (COPD), and increases the risk of premature death, particularly for older adults. Additional effects from exposure to ozone include an increased risk of metabolic disorders, brain inflammation, and an increased likelihood of reproductive and developmental harm.

The American Lung Association's "State of the Air 2025" report card gives five counties in New Mexico an "F" grade for ozone and two an "F" grade for PM, according to the number of days above the threshold considered "healthy" based on the EPA's National Ambient Air Quality

Standards (NAAQS).[23] Over half of New Mexicans reside in the counties receiving an "F" grade. From 2021 through 2023 Bernalillo County, for example, had 14 days of particulate matter levels and 29 days of ozone levels considered "unhealthy for sensitive groups" such as children, people with heart and lung disease, and the elderly. Statewide, the ALA reports roughly 200,000 asthma cases, including 32,000 children; 81,000 COPD cases, and 138,000 with cardiovascular disease.[24] Health effects of air pollution are often assessed at the regional level, but studies report that people who live, work, or go to school near major roadways – in other words, many of us – have even higher rates of respiratory and cardiovascular illness.[25]

All of this sets the stage for understanding why emission reductions from the Proposed Rule are so beneficial to the citizens of New Mexico. Our report quantifies the reduction in emissions through 2050 for the CTFP alone, and for the CTFP+NMVES policy suite. The CTFP and NMVES rules again complement each other in addressing both ozone and particulate matter benefits: CTFP provides immediate emission reductions for the existing on-road and non-road fleets, focused on $PM_{2.5}$; whereas the NMVES program emphasizes VOC and NOx reductions from the transition to cleaner vehicles, providing longer-term benefits.

B. *Emission and Health Benefits*

To estimate the benefits of criteria pollutants we used the latest version of EPA's Motor Vehicle Emission Simulator (MOVES5) run with New Mexico-specific input data for each county compiled as part of the National Emissions Inventory. MOVES5 includes the latest "on-the-

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[23] American Lung Association State of the Air 2025: New Mexico https://www.lung.org/research/sota/city-rankings/states/new-mexico (accessed July 8, 2025).

[24] Ibid.

[25] **NMED Exhibit 104** (Health Effects Institute, "Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects", January 2010 https://www.healtheffects.org/system/files/SR17TrafficReview.pdf (accessed October 20, 2023August 20, 2025)).

books" Federal vehicle emission standards and the Renewable Fuel Standard (RFS) – so it is a true baseline from which to evaluate added benefits of CTFP and NMVES. We modeled future years based on projections of vehicle activity from the U.S. Energy Information Administration. To quantify the added benefit of the NMVES compared to the federal baseline, we ran MOVES5 with the EV market shares required for cars, light trucks, and heavy-duty trucks under NMVES.

To assess CTFP benefits and scale benefits directly to the fuel quantities generated by our colleagues at BRG, we converted MOVES5 results to separate on-road and non-road emission factors of NOx, VOC, $PM_{2.5}$, and SO2 per megajoule of energy by fuel type.

Finally, we made some updates to the initial MOVES5 results to account for the emission impacts of fuels based on literature but not currently reflected in the default model. These emission updates focused on fuel effects for biodiesel (BD) and renewable diesel (RD). Biodiesel is modeled in MOVES5 for on-road vehicles, but the model does not extend to non-road engines. Based on separate meta-analyses of biodiesel emissions studies conducted by the U.S. EPA and the International Council on Clean Transportation (ICCT), we applied the on-road biodiesel fuel effects by vintage to nonroad engines for completeness in our analysis.

Our analysis also accounted for RD emission effects, which are not included in MOVES5 at all. These RD effects were based on a study published by the University of California at Riverside of RD blends tested on a legacy non-road engine, legacy on-road engine, and modern on-road engine. This study found reductions across all pollutants for legacy diesel engines, highlighted by a roughly 30% reduction in $PM_{2.5}$, 40% reduction for hydrocarbon (HC, applied to VOC in our analysis), and 5% reduction in NOx when running on R99 (99% renewable diesel by volume). However, as is the case with biodiesel, no significant RD effects on PM, HC, or NOx emissions were found for modern diesel engines with aftertreatment systems. Because emission updates for BD and RD blends were restricted to legacy engines, the emissions impact of CTFP is largest at the beginning of the program, and are projected to taper off as legacy engines leave the fleet – though these effects also wane over time due to diminishing RD volumes projected by BRG.

In our report, we present statewide reductions in $PM_{2.5}$, VOC, NOx, and SO_2 from both on-road motor vehicles and non-road equipment. We then converted emission reductions into health benefits using EPA's CO-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA) to estimate the improvements in health outcomes and the resulting monetized benefits. The primary driver of health benefits from these rules are the $PM_{2.5}$, VOC, and NOx reductions shown in Figures 1, 2 and 3 by calendar year. Reductions are driven by displacing conventional diesel with RD and track growth in statewide RD consumption over time. The per-year reductions shown here grow over time as the fleet transitions to the cleaner vehicles introduced by NMVES. We project the CTFP+NMVES policy suite would reduce New Mexico's cumulative NOx emissions from on-road and non-road vehicles by approximately 7,000 tons, VOC emissions by 6,500 tons, and $PM_{2.5}$ emissions by 280 tons cumulatively through 2050.[26]

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[26] Because these emissions reductions are cumulative totals through 2050, they will not match the emissions reductions numbers in the BCA, which examines emissions reductions through 2030 and 2040.

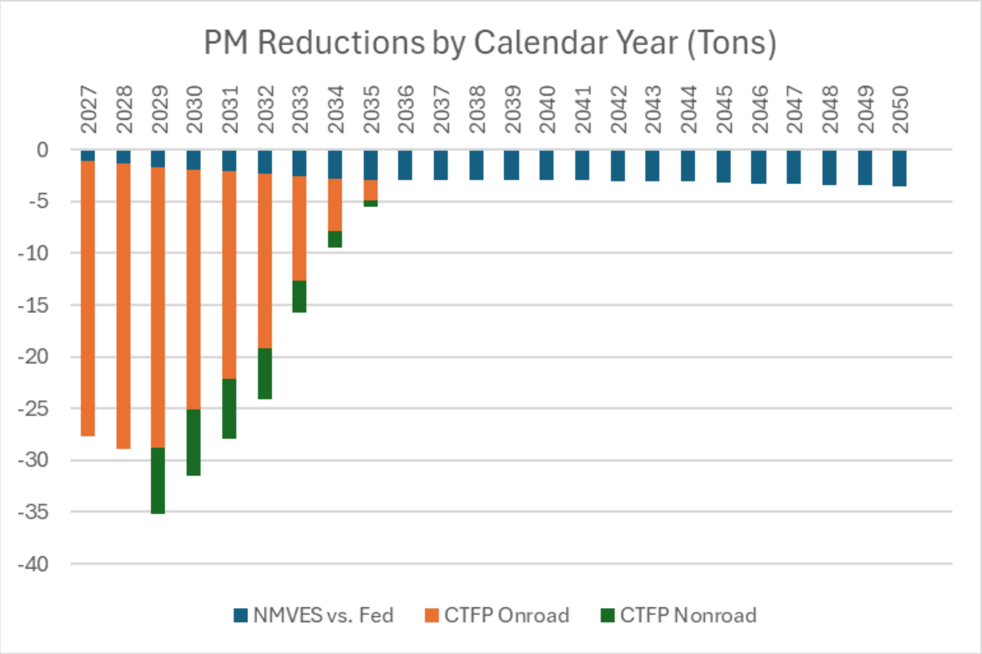

Figure 1. Statewide PM2.5 Reductions of CTFP and NMVES for Calendar Year 2027-2050

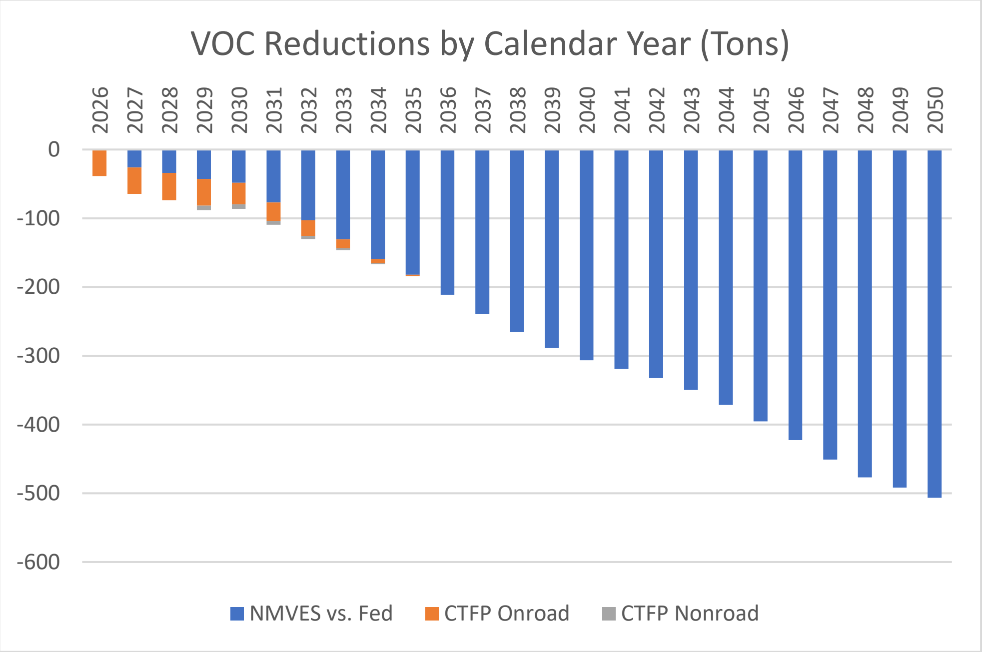

Figure 2. Statewide VOC Reductions of CTFP and NMVES for Calendar Year 2027-2050

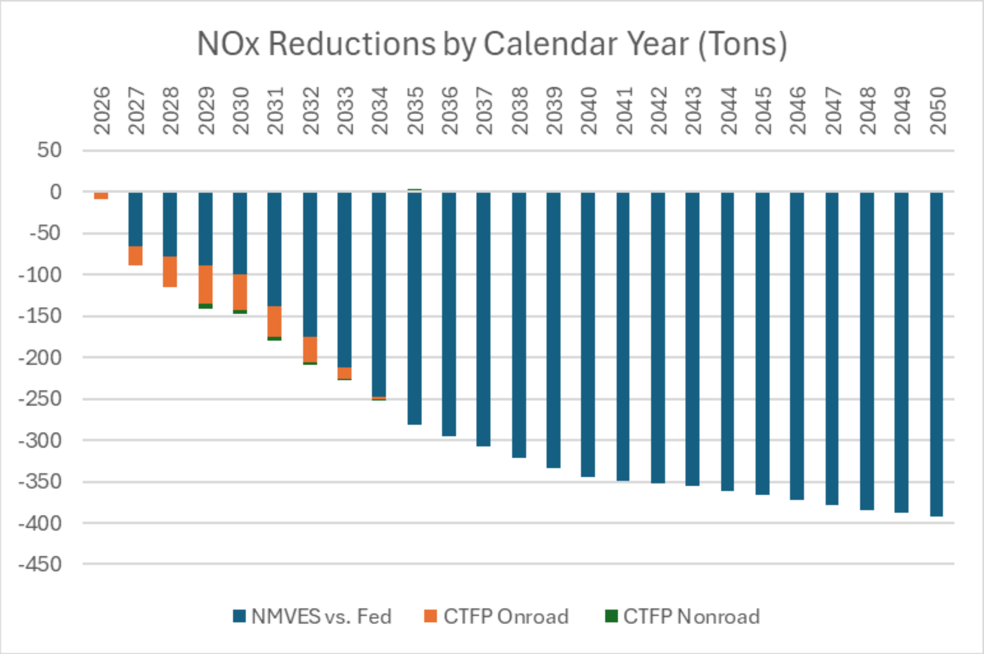

Figure 3. . Statewide NOx Reductions of CTFP and NMVES for Calendar Year 2027-2050

In real terms, these numbers mean a reduction in smog and soot in the lungs of New Mexicans. In our report, we provide monetized benefits for reduced incidences of outcomes including mortality, heart attacks, bronchitis, hospital admissions, respiratory illness, and work outages across the state. For the CTFP-only scenario, we estimate that cumulative statewide health benefits from reduced criteria pollutants through 2040 range from an estimated $11.0 to $20.8 million and cumulative benefits of the NMVES+CTFP policy suite range from $38.2 to $51.5 million (in $US 2024).[27] The year-over-year health benefits of the policy suite are shown in Figure 4, again highlighting the complementarity of fuel and vehicle elements; CTFP improves health outcomes in the initial years of the program, while the health benefits of NMVES grow over time with fleet transition to cleaner vehicles.

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[27] Will not match with the totals in Table 1, which discounts the value of these reductions at a three-percent annual rate.

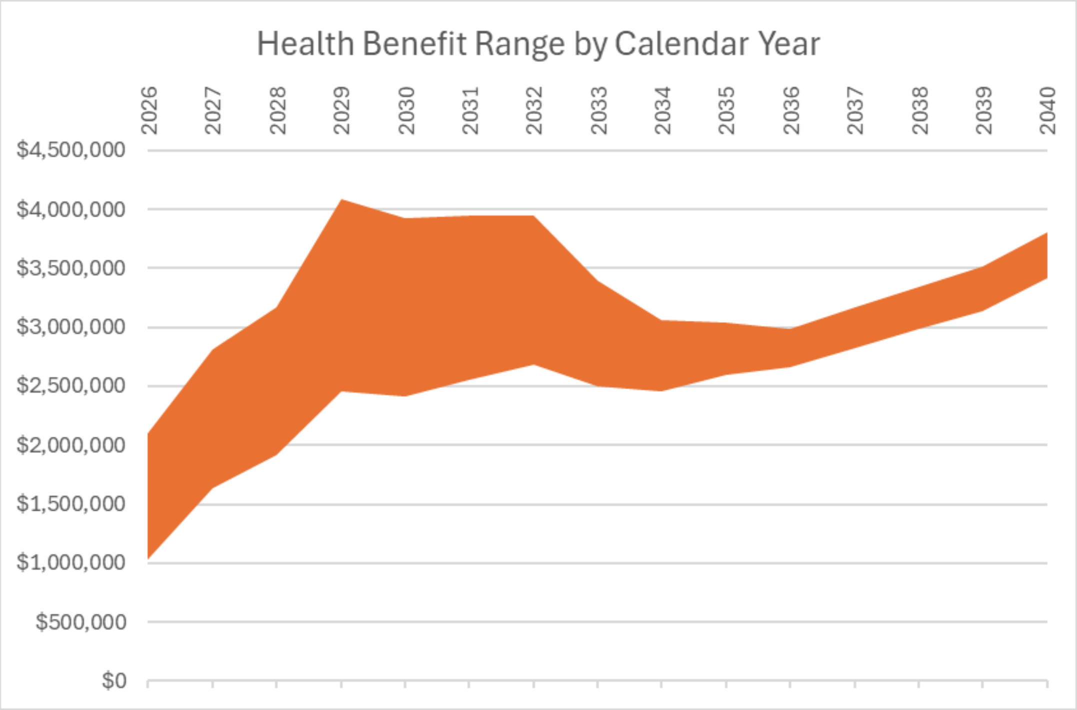

Figure 4. Monetized Health Benefit Range for CTFP+NMVES Policy Suite for Calendar Year 2026-2040.

V. Benefit-Cost Analysis

In collaboration with BRG, our team also assessed the costs and savings of the CTFP for New Mexico's economy. We looked at economic impacts holistically, accounting for three types of impacts on New Mexico: direct effects, which are the immediate impact of a change on its own sector; indirect effects, which are the impacts on supporting sectors, such as maintenance on hydrogen refueling equipment; and induced effects, which are the product of changes in labor income resulting from direct and indirect effects – for example, staff who work at a facility generating hydrogen spending their income within the local economy.

CTFP will affect a wide range of industries. Regulated suppliers generate either credits or deficits from producing, importing, or dispensing transportation fuel for use in New Mexico. Credits and deficits are dependent upon each transportation fuel pathway's carbon intensity (CI) compared to annual CI targets. Low-carbon fuels either produced in-state or imported for consumption within the state generate credits. Conversely, fossil fuels would generate deficits that must be offset by purchasing and retiring credits. Consumers under this rule include all entities that purchase transportation fuel—such as governments, businesses, and households.

Beyond the credit market, as detailed in our report, the CTFP is expected to induce other benefits, such as avoided health damages from criteria pollutant reductions mentioned earlier, credits for eligible fuel supply equipment (known as FSE), and, primarily, the monetized benefits of reducing greenhouse gas emissions.

To estimate costs and savings, we used an industry standard economic input/output model known as IMPLAN to estimate impacts of the CTFP over time, which fit into three main components: 1) the credit and deficit impacts, 2) the emission impacts on health, and 3) the FSE credit impacts. We looked at two scenarios for how added costs and savings would be handled by fuel producers: one scenario where we assume they were all passed on to the consumer (100% pass-through), and one where we assumed the companies would absorb all additional costs and savings (0% pass-through). In the 100% pass-through scenario, New Mexico consumers who spent money on deficit-generating industries, such as gasoline and diesel, would pay more for fuel, while consumers paying for credit-generating industries, such as electricity and hydrogen, would save money on fuel. In the 0% pass-through scenario, businesses would internalize the full effect of the CTFP's program benefits and costs though only in proportion to how much of their business is in New Mexico. For the benefit cost analysis, we used the average results of the 0% and 100% pass-through scenarios.

As I discussed earlier, health impacts from emission reductions were first modeled in EPA's COBRA model. We included premature mortality in the direct effects, but only included conditions that would result in hospitalization and productivity changes for the indirect and induced effects. We modeled hospitalization changes as changes in hospital utilization and productivity changes as labor income changes. Finally, BRG calculated direct jobs from FSE credits. We modeled these as fuel industry jobs in IMPLAN to align with BRG's calculations.

Our summary of all the benefits and costs I've discussed is shown in Table 1, which shows cumulative CTFP benefits and costs along with the net benefits of a combined CTFP+NMVES policy suite. When taken together, we project that these benefits, led by the monetized benefits of greenhouse gas reduction, outweigh the costs of the program by more than two-to-one by 2040. The CTFP alone is anticipated to deliver $1.7 billion in cumulative net benefits through 2040, and the combined policies delivering $1.8 billion over the same timeframe.

Table 1. Summary of benefits and costs through 2040 for CTFP as an individual policy and combined with NMVES (Million US 2024 dollars, discounted at a three-percent real discount rate)

	Benefits	Costs	Net
Fuel Markets[28]	N/A	-$959	-$959
Health Effects[29]	$16	N/A	$16
GHG Emissions	$2,436	N/A	$2,436
Direct Jobs from FSE	$162	N/A	$162
CTFP Total	**$2,614**	**-$959**	**$1,654**
NMVES Total[30]	*N/A*	*N/A*	*$188*
NMVES + CTFP Suite	**N/A**	**N/A**	**$1,842**

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[28] The fuel market impacts are the 50 percent pass-through scenario that averages the results from the 0 percent and 100 percent passthrough scenarios.

[29] Represents an average between a lower- and upper-bound estimate of health benefits from criteria pollutant and ozone precursor reductions.

[30] Accounts for indirect and induced consumer effects and baseline of EPA Multi-Pollutant and Phase 3 Heavy-Duty Rules; health benefits averaged.

VI. Carbon Intensities

Finally, I would like to talk a bit about CI values that ERG developed for the CTFP, and highlight improvements we made to better tailor these values to New Mexico.[31] ERG's Life Cycle Services group developed the CIs which are the underpinnings of the CTFP rule. Franklin Associates—which later became part of ERG—helped pioneer the life cycle inventory (LCI) concept over 50 years ago and have been industry leaders ever since. Our experience with hundreds of life cycle assessments (LCA) and developing LCA models for public and private sector organizations is the foundation with which we approached the development of the CIs for this rule.

ERG relied on well-to-wheel LCA modeling of transportation fuels to calculate the lifecycle CIs. For each fuel pathway, GHGs emitted or sequestered during each stage of the fuel's lifecycle (*e.g.*, extraction or harvesting, processing, and combustion) are normalized to the fuel's energy content upon delivery to a vehicle and then summed together. In developing values appropriate for New Mexico, we first evaluated CIs developed in California, Washington, and Oregon along with updates made to U.S. DOE Argonne National Laboratory's GREET model (known as R&D GREET) from which the other states have developed spin-off models. ERG developed a first iteration of the New Mexico GREET model (NM-GREET) starting from the GREET v2023-rev1 with parameter settings appropriate for New Mexico to prioritize transparency and reproducibility. We then incorporated results from select external models to overcome limitations in R&D GREET and more explicitly tailorize results for New Mexico. Values for key GREET and external-model parameters were chosen and implemented to best reflect the typical life-cycle CI and associated upstream supply chain activities of CTFP fuels sold in New Mexico (both produced in-state and imported). Finally, we cross-referenced R&D GREET adaptations,

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[31] **NMED Exhibit 106**; **NMED Exhibit 107**.

fuel pathway definitions, and usage of external models against other states' low carbon fuel programs to validate modeling decisions and resulting CI values.

Three significant methodology updates were made in NM-GREET from the underlying GREET model to improve our estimates for New Mexico's CTFP. The first was to incorporate indirect land-use change (ILUC), which affects the carbon intensities for crop-based biofuels. The CIs used by California, Washington and Oregon all account for ILUC for crop-derived fuels. All three states rely on an agriculture economic model produced by Purdue University known as Global Trade Analysis Project, or GTAP. The model estimates the emissions generated when increased demand for crop-based biofuels requires land conversion or deforestation to accommodate displaced agricultural sectors. Among the three states, the only exception to the use of GTAP is Oregon's ILUC value for corn-based ethanol which uses an alternative based on the Carbon Calculator for Land Use and Land Management Change from Biofuels Production model (CCLUB). In considering the differences between corn ethanol ILUC values between Oregon, California, and Washington, we reviewed a 2022 report which analyzed ILUC estimates across all models and found that the corn ethanol value derived from the GTAP model (GTAP AEZ-EF specifically) was more consistent with the average value for that fuel type than the CCLUB value.[32] Based on this, we determined that the GTAP AEZ-EF model provided a more accurate ILUC value for corn ethanol supplied to New Mexico.

The second update was related to crude oil supplied to the petroleum distribution region for New Mexico, known as Petroleum Administration for Defense District 3 (PADD 3), affecting

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[32] **NMED Exhibit 105** (Daioglou, V. "Review of Land Use Change Emission Estimates", Presentation at U.S. EPA Workshop on Biofuel Greenhouse Gas Modeling, March 2022 https://www.epa.gov/system/files/documents/2022-03/biofuel-ghg-model-workshop-luc-emission-estiim-2022-03-01.pdf (accessed August 22, 2025)).

petroleum CIs. To better account for the specific crude oil slate (both domestic and foreign) used in petroleum-derived fuels destined for New Mexico, ERG used the Oil Production Greenhouse Gas Emissions Estimator (OPGEE) v2.0 model to develop well-to-refinery gate CIs for petroleum fuels to replace those in GREET. A similar approach is used for CA-GREET, although California is in a different refining region with slightly higher well-to-refinery-gate crude CI estimates.

The final update was the account for methane emissions from manure, affecting CIs for renewable natural gas sources from animal waste. We relied on the recently published 45V GREET methodology to estimate the national-average counterfactual avoided GHG emissions from generating biomethane via anaerobic digestion of manure, rather than status-quo manure management. For each fuel pathway with an animal waste feedstock, these counterfactual avoided emissions (*i.e.*, credits) can be claimed upon fulfilling the additionality criterion established by NMED. Additionally, the manure recovery, AD biomethane generation, and biomethane upgrader unit process CI values from this methodology are also incorporated into these pathways in NM-GREET.

With these updates, the default CIs developed for New Mexico's CTFP reflect the state-of-the-science and have been tailored for New Mexico where possible. Producers will of course have the opportunity to refine CI estimate for their fuel as part of Tier 2 application submissions.

VII. Conclusions

I would like to close by summarizing our key takeaways. After rigorous evaluation of both the benefits and costs of the CTFP, our conclusion is that the Proposed Rule a) will result in substantial reductions of greenhouse gas emissions in support of the New Mexico's climate goals; b) will reduce particulate matter and ozone precursors from motor vehicles; and c) has benefits that outweigh costs more than two-to-one. Our analysis demonstrates how the CTFP and NMVES complement one another, with the CTFP delivering more short-term benefits from cleaner fuel on today's engines, while NMVES delivering long-term benefits as today's engines transition to clean vehicles. The short-term benefits of the CTFP make it a key element for New Mexico's progress towards the 2030 climate goals, while also improving the health of New Mexicans.

Thank you for your time and attention today.

NMED EXHIBIT 81

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OVERVIEW

- Industry leader with 30+ years' experience in transport emissions research, modeling, and policy
- Expert knowledge of clean vehicle and fuel regulations, compliance and trends worldwide
- Seasoned principal consultant adept at growing business while managing a diverse project portfolio
- Capacity builder for transport decarbonization and air quality in Latin America and Asia

PROFESSIONAL EXPERIENCE

Eastern Research Group (ERG) – Clean Transportation Group

Vice President (2022-present) – Ann Arbor, MI

Leads ERG's transportation emissions modeling practice and market development with a broad client base including U.S. EPA, Federal Highway Administration, California Air Resources Board, World Bank, Northeastern States for Coordinated Air Use Management, Houston-Galveston Area Council, Hong Kong Environmental Protection Department, and Latin America Clean Fuels Association. Leading ERG's expansion of energy sector lifecycle GHG analysis into Latin America, Europe, and Asia.

Principal Engineer (2012-2022) – San Diego, CA / Ann Arbor, MI

Managed a wide range of air quality and decarbonization projects for major international, federal, state and municipal clients. Identified marketing opportunities in response to evolving policies and technologies. Added several new clients to ERG's portfolio. Responsible for proposal development, client communication, and managing project staff, budget, and deliverables.

Successfully managed a wide array of projects, including:

- Support for U.S. EPA's effort to build capacity and share best practices for green shipping in China.
- Evaluation of plug-in hybrid vehicle travel, charging, and emissions characteristics for the California Air Resources Board.
- Innovating the application of vehicle telematics data toward improving emissions inventories.
- Policy assessment of how emissions from the production and distribution of alternative fuels could be accounted for in GHG emission standards for heavy trucks.
- Guidelines for compiling short-lived climate pollutant emission inventories across Canada, Mexico and the U.S., addressing major sources such as wildfires, transportation, power generation, and residential combustion.
- Sensitivity analysis of Houston-area transport emissions in response to varying EV penetration trajectories.
- Adaptation of U.S. EPA's vehicle emissions model to Mexico and assessing the potential benefit of clean vehicles and fuels.
- Trainings for international, federal, state and municipal audiences.

U.S. Environmental Protection Agency - Office of Transportation and Air Quality (Ann Arbor, MI)

Director, Air Quality and Modeling Center *(2006–2012)*

Directed research, analysis, modeling, and inventory development in support of national policy issues including emission standards, renewable fuels, and greenhouse gases. Coordinated emission impact analyses and supported air quality modeling for several major EPA rules. Oversaw EPA's vehicle emissions modeling program, including development and public rollout of the official U.S. model MOVES. Managed a technical staff of 15 and a multimillion-dollar budget. Recruited, developed, and mentored entry-level staff currently in leaderships roles within the Agency.

Environmental Engineer *(1989–95, 1997–2006)*

Innovated methods and tools to assess the impacts of environmental policy. Led a team in the design and development of the new generation vehicle emissions model MOVES. Performed proof-of-concept research on emissions control technologies to support development of regulations mandated under the Clean Air Act.

Delivered solutions to environmental challenges:

- Developed innovative approaches to quantify emission impact of major EPA rules addressing clean vehicles and fuels, renewable fuel standards (RFS), and greenhouse gases.

- Implemented major update to EPA's vehicle emissions modeling program in response to critique of the program by the National Academy of Sciences.

Spearheaded innovative research:

- Developed prototype emission control systems, including an on-board catalytic convertor failure detection system for which a U.S. patent was granted, to satisfy technical feasibility requirements for EPA rules.
- Advanced EPA's capacity to analyze lifecycle energy use and emissions for hydrogen fuel cell vehicles. Implemented research programs to evaluate “real world” vehicle emissions and prototype control technologies.

Forged collaboration:

- Led collaboration with U.S. DOT, U.S. DOE, and California Air Resources Board on several research efforts.
- Coordinated outreach on EPA's mobile source emission modeling program with industry, academia, state/local government, and environmental groups.

Nissan Motor Company – *Senior Staff Engineer (1995–97)*

Represented corporate policy positions:

Represented Nissan with federal/state agencies and industry trade associations on environment and energy-related regulatory issues including test protocols, certification processes, and joint industry research programs.

- Formulated consensus company positions between manufacturing, engineering, and sales departments; presented these positions to industry panels and government agencies.
- Interpreted regulatory actions of federal/state agencies for other departments in Nissan.
- Participated in formulation of industry-wide positions and their presentation to government agencies.

Managed compliance program:

Led U.S.-based coordination of emissions and fuel economy certification for Nissan’s product line.

- Met with federal and state regulatory agencies to preview Nissan’s products and proactively address agency questions.
- Managed submission of certification applications and data.
- Negotiated certification issues with agency staff.

PUBLICATIONS, PRESENTATIONS, TRAININGS & ADVISORY ROLES

Select Publications (lead author): Atmospheric Environment (peer-reviewed journal) • Environmental Manager Magazine • Transportation Research Record (peer-reviewed journal) • Society of Automotive Engineers Technical Paper • International Emissions Inventory Conference Proceedings • Transportation Research Board (TRB) Annual Meeting Proceedings

Select Presentations: TRB Annual Meeting (multiple) • ITS Annual Meeting • Coordinating Research Council Vehicle Emissions Workshop (multiple) • Clean Air Act Advisory Committee Mobile Source Workgroup • Society of Automotive Engineers Government/Industry Meeting • California Fuel Cell Partnership • World LPG Association Summit (Seoul) • International Workshop on Vessel Emission Control Areas (Beijing) • International Workshop on Green Freight Initiatives (Brasilia) • Hong Kong Vehicle/Vessel Emissions Workshop • International Workshop on Particulate Matter Control (Beijing) • International Seminar for On-Road Emissions (Seoul) • International Workshop on Air Quality Policies (Mexico City) • U.S.-China Green Port & Vessel Initiative Workshop (multiple) • International Emissions Inventory Conference (multiple)

Trainings Developed & Presented: Transport Emissions 101 • U.S. EPA MOVES Model Hands-On Training • MOVES-Mexico Model Hands-On Training • Emissions Modeling Short Course • Emissions Inventory Development • U.S. Particulate Matter Sources

Advisory Committees: National Mobile Source Emission Inventory of China • UC Riverside Center for Environmental Research & Technology • TranLIVE Tier 1 University Transportation Research Center • TRB Air Quality Committee • Federal Advisory Committee Act Vehicle Emissions Workgroup • Coordinating Research Council Vehicle Emissions Workshop

EDUCATION

University of Michigan - B.S.E., Industrial and Operations Engineering (Cum Laude), 1989

NMED
EXHIBIT
82

Regulatory Analysis for New Mexico's Clean Transportation Fuel Program

Prepared for:

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Department
Santa Fe, New Mexico, 87502

Prepared by:

Eastern Research Group, Inc.
Concord, Massachusetts, 01742

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List of Abbreviations

ACC II	Advanced Clean Cars II
ACT	Advanced Clean Trucks
AR5	Fifth Assessment Report (of the Intergovernmental Panel on Climate Change)
AVFT	alternative vehicle fuel and technology
AW	animal waste (i.e., manure)
bbl	barrel
B0	fossil diesel (0 percent biodiesel)
B5	5 percent biodiesel blend
BD	biodiesel
BCA	benefit-cost analysis
BenMAP	Benefits Mapping and Analysis Program
BRG	Berkeley Research Group
CARB	California Air Resources Board
CA-GREET	California-modified GREET model
CDB	county database (MOVES)
C.H_2	compressed gaseous hydrogen
CI	carbon intensity
CIDI	compression-ignition direct-injection
CLCA	consequential lifecycle analysis
CNG	compressed natural gas
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
COBRA	CO-Benefits Risk Assessment
CTFP	Clean Transportation Fuel Program
DPF	diesel particulate filter
EFs	emission factors
EIA	economic impact analysis
EPA	U.S. Environmental Protection Agency
ERG	Eastern Research Group, Inc.
FCEV	fuel cell electric vehicle
FCMM	Fuel and Credit Markets Model
FHWA	Federal Highway Administration
FSE	fueling supply equipment
GHG	greenhouse gas
GREET	Greenhouse gases, Regulated Emissions, and Energy use in Technologies model
GTAP	Global Trade Analysis Project Model
GWP	global warming potential
H_2	hydrogen
ICCT	International Council on Clean Transportation
ICEV	internal combustion engine vehicle
ILUC	indirect land use change
IMPLAN	Impact Analysis for Planning
I-O	input-output (modeling)
IPCC	Intergovernmental Panel on Climate Change
LCA	lifecycle analysis

LF	landfill
LFG	landfill gas
L.H_2	liquefied hydrogen
LNG	liquefied natural gas
LPG	liquefied petroleum gas
LUC	land use change
MHDV	medium- and heavy-duty vehicle
MJ	megajoule
mmBtu	million British thermal units
MOVES	Motor Vehicle Emission Simulator
NEI	National Emissions Inventory
NG	natural gas
NMED	New Mexico Environment Department
NM-GREET	New Mexico–specific version of GREET for the CTFP
NMVES	New Motor Vehicle Emission Standards
NO_x	nitrogen oxides
OPGEE	Oil Production Greenhouse gas Emissions Estimator
PADD	Petroleum Administration for Defense Districts
PEM	proton exchange membrane
$PM_{2.5}$	particulate matter with diameter of 2.5 microns or smaller
RD	renewable diesel
R100	100 percent renewable diesel
REC	renewable energy credit
RNG	renewable natural gas or biomethane
scf	standard cubic foot
SMR	steam methane reforming
SO_2	sulfur dioxide
UNM	University of New Mexico
VOC	volatile organic compound
VMT	vehicle miles traveled
WTW	well-to-wheel
ZEV	zero emission vehicle

Acknowledgements

Eastern Research Group, Inc. (ERG) enlisted a multidisciplinary team of subject matter experts and project management professionals across several service areas—Lifecycle Analysis, Clean Transportation, Economics, and Strategic Communications—to assist the New Mexico Environment Department with establishing its Clean Transportation Fuel Program. Collectively, ERG brings over 132 years of experience to this analysis.

Lifecycle Analysis (LCA)

- Andrew Beck has six years of experience working with LCA models of fossil and biological transportation fuels and chemicals, with a focus on improving reproducibility and scalability via open-source tools and data.
- Kyle McGaughy has four years of experience in fuel cycle assessments, with a focus on using the Oil Production Greenhouse gas Emissions Estimator (OPGEE) to assess unconventional extraction in North American fuel production pathways.
- James Santa Ana has two years of experience performing lifecycle assessments and data analysis support for the energy sector using the Greenhouse gases, Regulated Emissions, and Energy use in Technologies model (GREET) and other LCA models.
- Ben Young has nine years of experience in fuel cycle assessments for fossil fuels and other energy pathways, specializing in the use of publicly available datasets to develop tools for assessing emissions from the transportation sector.

Clean Transportation

- Andrew Eilbert has 13 years of experience in regulatory support and emissions modeling, which includes time spent on the U.S. Environmental Protection Agency's (EPA's) Motor Vehicle Emission Simulator (MOVES) development team, as well as implementing federal vehicle greenhouse gas and fuel economy standards.
- Alex Dumont has two years of experience providing alternative fuel vehicle technical assistance and research to private fleets, government entities, and policymakers.
- Audrey Njo has two years of experience supporting government communications, including circular economy and battery recycling initiatives, and supporting charging station infrastructure incentives through the Massachusetts Electric Vehicle Incentive Program.
- John Koupal has 35 years of experience modeling and helping to regulate vehicle emissions, including a breadth of expertise in characterizing fleets, vehicle activity, and emission fuel effects for EPA and other federal agencies along with many states and international nongovernmental organizations.

Economics

- Owen Stokes-Cawley has seven years of experience conducting economic and public health analyses, including modeling impacts in input-output models such as Impact Analysis for Planning (IMPLAN) and interpreting health outcomes with tools such as EPA's CO-Benefits Risk Assessment (COBRA) model for recent policies, including New Mexico's New Motor Vehicle Emission Standards (NMVES).
- Paige McKibben has four years of experience supporting benefit and cost analyses for government agencies, including regularly modeling macroeconomic impacts of policy changes and other market shocks using IMPLAN.
- Natalie Rodman has three years of experience analyzing economic and health impacts from clean transportation policies, including a COBRA analysis of New Mexico's NMVES.
- Janet Carpenter has over 25 years of experience analyzing benefits and costs of technological innovations and policy changes in a variety of contexts, including recent support applying economic impact analysis and health impact analysis for NMVES.

Project Management

- Joanna Kind has 20 years of experience as an environmental scientist and contract manager, and leads ERG's Santa Fe office, which involves coordinating with New Mexico public agencies—in particular, the New Mexico Environment Department.
- John Koupal, in addition to his clean transportation subject matter expertise, leads ERG's Clean Transportation Group and has extensive experience managing contracts and ERG personnel for federal and state clients, including for New Mexico's NMVES policy.

1. Executive Summary

In this uncertain regulatory landscape for federal emission programs, New Mexico has sought more predictability by recently adopting the Advanced Clean Cars II (ACC II), Advanced Clean Trucks (ACT), and Heavy-Duty Low NO_x Omnibus rules, modeled off California's clean vehicle programs and collectively referred to as New Mexico's Motor Vehicle Emission Standards (NMVES). Ongoing legal challenges to California's emissions preemption waiver aside, until a final decision is reached, the NMVES will presumably meet these goals through vehicle electrification; however, there is a growing interest in alternative fuels to help reach the state's climate goals, including biofuels, natural gas, and hydrogen. Like California, Oregon, and Washington, New Mexico is seeking to adopt a Clean Transportation Fuel Program (CTFP), which would create a credit market for low-carbon fuels either produced in state or imported for consumption within the state. Conversely, fossil fuels sold in New Mexico for transportation use would generate deficits that must be offset by purchasing and retiring credits.

Beyond the credit market, New Mexico's CTFP is expected to lead to other benefits and costs, such as avoided health damages from criteria pollutant reductions, improved productivity for alternative fuel producers, credits for eligible fuel supply equipment (FSE), and added program revenue from the social cost of carbon and other greenhouse gas (GHG) externalities. These cumulative CTFP benefits and costs have been summarized in **Error! Reference source not found.**, along with the net benefits of a combined CTFP and NMVES policy suite. The combined policy suite is anticipated to deliver more than $1.8 billion in net benefits, with over $1.6 billion coming from the CTFP alone.

Table 1-1 Summary of total CTFP and NMVES benefits and costs through 2040 (in 2024 USD) Error! Reference source not found. [1]

NMVES Total	$188,043,999		$188,043,999
CTFP	**Benefits (average)**	**Costs**	**Net**
Fuel Markets	$0	-$959,423,181	-$959,423,181
Direct Fuel Markets		*-$577,919,646*	
Indirect and Induced		*-$381,503,535*	
Health Effects	$15,712,160		$15,712,160
GHG Emissions	$2,435,963,386		$2,435,963,386
Direct Jobs from FSE	$161,894,181		$161,894,181
CTFP Total	$2,613,569,726	-$959,423,181	$1,654,146,545
NMVES + CTFP suite	$2,801,613,725	-$959,423,181	$1,842,190,544

Eastern Research Group, Inc. (ERG) has been involved in nearly all facets of New Mexico's CTFP development, particularly fuel carbon intensities, emission projections, public health effects, and macroeconomic input-output modeling of the program. This executive summary highlights findings from ERG's CTFP analysis among these four focus areas.

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[1] See Table 6-22 for further description and notes on the program's full benefit-cost analysis.

1.1 Fuel Carbon Intensities

As with low-carbon fuel programs in other states, the ERG team has built a custom version of Argonne National Laboratory's Greenhouse gases, Regulated Emissions and Energy use in Transportation (GREET) model for New Mexico's CTFP—referred to as NM-GREET—based on the best available state data. A menu of fuel pathways in NM-GREET have been tailored to represent New Mexico–specific carbon intensity (CI) values in grams of carbon dioxide per megajoule of energy (g CO_2/MJ).

Several key assumptions differentiate NM-GREET CIs from default values and those in other states' programs; namely, indirect land use change (ILUC), use of well-to-refinery emissions from a crude oil production model called Oil Production Greenhouse gas Emissions Estimator (OPGEE) rather than GREET, and process credits for biogas from manure. While New Mexico's ILUC values are in line with other states' low-carbon fuel programs, OPGEE assumptions have been parameterized for Petroleum Administration for Defense District 3 (PADD3) and animal waste pathways yield additional credit when using biomethane as a process fuel, particularly for natural gas and hydrogen.

Table 1-2 summarizes all possible CTFP conventional and alternative fuel pathways available in NM-GREET. Upon development and thorough review, ERG passed NM-GREET CI values to another CTFP contractor, Berkeley Research Group (BRG), for credit market forecasting under varying policy scenarios: CTFP, NMVES, and federal baseline.

Table 1-2. Carbon intensities for the full list of CTFP pathways

Pathway ID	Alias	Fuel	CI (g CO_2/MJ)
NMGAS001	Gasoline, clear	Gasoline	96.9
NMETOH001	Corn ethanol	Ethanol	69.6
NMULSD001	Diesel, clear	Diesel	95.3
NMBD001	B100 soy	Biodiesel	56.6
NMRD001	R100 soy	Renewable diesel	59.1
NMLPG001	LPG	Liquefied petroleum gas	87.0
NMCNG001	CNG fossil	Compressed natural gas	74.3
NMRCNG001	CNG AW	Compressed natural gas	62.7
NMRCNG002	CNG AW	Compressed natural gas	-27.3
NMRCNG003	CNG LF	Compressed natural gas	21.4
NMLNG001	LNG fossil	Liquified natural gas	87.1
NMRLNG001	LNG AW	Liquified natural gas	71.8
NMRLNG002	LNG AW, alt.	Liquified natural gas	-18.2
NMLNG003	LNG LF	Liquified natural gas	31.0
NMELEC001	Elec. net-zero	Electricity	0.0
NMHYG001	C.H_2 fossil	Gaseous compressed hydrogen	94.5
NMHYG002	C.H_2 AW	Gaseous compressed hydrogen	88.3
NMHYG003	C.H_2 AW, alt.	Gaseous compressed hydrogen	-1.7
NMHYG004	C.H_2 LF	Gaseous compressed hydrogen	46.1
NMHYG005	C.H_2 avg.-grid	Gaseous compressed hydrogen	217.8
NMHYG006	C.H_2 net-zero	Gaseous compressed hydrogen	14.3

Pathway ID	Alias	Fuel	CI ($g\ CO_2/MJ$)
NMHYL001	$L.H_2$ fossil	Liquid hydrogen	135.7
NMHYL002	$L.H_2$ AW	Liquid hydrogen	127.0
NMHYL003	$L.H_2$ AW, alt.	Liquid hydrogen	37
NMHYL004	$L.H_2$ LF	Liquid hydrogen	89.8
NMHYL005	$L.H_2$ avg.-grid	Liquid hydrogen	221.7
NMHYL006	$L.H_2$ net-zero	Liquid hydrogen	1.9

For more information on CI development, please review Chapter 3, which provides detailed descriptions of each pathway, as well as further discussion of how NM-GREET differs from the default model and how New Mexico's CI values differ from those of other states.

1.2 Projected Emission Reductions from Fuel Changes

Using fuel volume projections from BRG based on credit market forecasts for the CTFP and NMVES scenarios, ERG was able to estimate expected emission reductions in tailpipe exhaust. Switching from fossil fuels to low-carbon alternatives—namely, from diesel to biodiesel (BD) and renewable diesel (RD) blends—is anticipated to reduce both adverse air quality and climate impacts. While BRG determined GHG reductions directly from NM-GREET CI values and fuel volume changes with a few notable exceptions discussed further in Section 6.4. ERG calculated onroad and nonroad reductions in criteria air pollutants using New Mexico–specific emission factors derived from the latest release of the Motor Vehicle Emission Simulator (MOVES5) and BRG's fuel volume changes between scenarios.

Most of the emission benefits that reduce nitrogen oxides (NO_x), fine particulate matter ($PM_{2.5}$), sulfur dioxide (SO_2), and volatile organic compounds (VOCs) are a result of increased renewable diesel (R100) adoption to offset decreased fossil diesel consumption in New Mexico over time, as shown in Table 1-3. To a lesser degree, increases in biodiesel blends (5 percent biodiesel, or B5, in this case) also offset fossil diesel and result in emission benefits—though there is a slight NO_x disbenefit for legacy diesel engines running on B5. Emission benefits for the final rule are somewhat greater than for the draft rule due to dampened electrification curves in the NMVES scenario, leading to more RD and BD consumption in the CTFP scenario.[2]

Table 1-3. Summary of annual emission reductions through 2050 by pollutant and policy scenario (negative values equate to reductions in tons)

	NO_x		VOC		$PM_{2.5}$		SO_2	
Year	**Combined**	**CTFP-Only**	**Combined**	**CTFP-Only**	**Combined**	**CTFP-Only**	**Combined**	**CTFP-Only**
2026	-9.12	-9.12	-38.39	-38.39	-26.76	-26.76	0.09	0.09
2027	-88.30	-22.54	-64.53	-38.56	-27.73	-26.65	-1.97	0.08
2028	-115.16	-37.73	-73.92	-40.01	-28.93	-27.56	-2.34	0.06
2029	-140.75	-52.08	-88.02	-45.30	-35.26	-33.59	-2.75	0.05
2030	-147.49	-47.73	-86.10	-37.70	-31.52	-29.64	-3.02	0.03
2031	-179.24	-41.20	-109.55	-32.55	-27.89	-25.79	-3.71	0.03

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[2] New Mexico Environment Department, "Clean Transportation Fuel Program," accessed July 3, 2025, https://www.env.nm.gov/climate-change-bureau/clean-fuel-program/.

	NO_x		VOC		$PM_{2.5}$		SO_2	
Year	**Combined**	**CTFP-Only**	**Combined**	**CTFP-Only**	**Combined**	**CTFP-Only**	**Combined**	**CTFP-Only**
2032	-209.47	-34.48	-130.46	-27.32	-24.17	-21.87	-4.34	0.03
2033	-228.22	-16.78	-146.48	-15.95	-15.70	-13.17	-5.01	0.05
2034	-251.79	-4.43	-166.81	-7.54	-9.43	-6.66	-5.72	0.06
2035	-278.77	2.26	-184.36	-2.29	-5.46	-2.51	-6.26	0.08
2036	-294.77	0.00	-211.00	0.00	-2.96	0.00	-6.75	0.00
2037	-308.30	0.00	-239.11	0.00	-2.98	0.00	-7.14	0.00
2038	-321.36	0.00	-265.15	0.00	-2.99	0.00	-7.50	0.00
2039	-333.89	0.00	-288.71	0.00	-2.99	0.00	-7.80	0.00
2040	-345.19	0.00	-306.37	0.00	-2.96	0.00	-7.99	0.00
2041	-348.39	0.00	-319.06	0.00	-2.97	0.00	-8.12	0.00
2042	-351.75	0.00	-332.32	0.00	-3.00	0.00	-8.27	0.00
2043	-355.95	0.00	-349.74	0.00	-3.04	0.00	-8.51	0.00
2044	-360.97	0.00	-371.28	0.00	-3.10	0.00	-8.83	0.00
2045	-366.45	0.00	-395.23	0.00	-3.17	0.00	-9.20	0.00
2046	-372.57	0.00	-422.62	0.00	-3.26	0.00	-9.63	0.00
2047	-378.82	0.00	-450.82	0.00	-3.34	0.00	-10.08	0.00
2048	-384.62	0.00	-476.72	0.00	-3.42	0.00	-10.47	0.00
2049	-388.34	0.00	-491.54	0.00	-3.45	0.00	-10.66	0.00
2050	-392.09	0.00	-506.55	0.00	-3.49	0.00	-10.86	0.00

Chapter 4 has a full discussion of MOVES emissions modeling, fuel effects from recent literature, and ERG's projections of criteria pollutant reductions for the combined NMVES and CTFP policies and the CTFP policy itself.

1.3 Avoided Health Damages

Even though GHG emissions and FSE credits contribute a larger proportion of the benefits in this rule, improved air quality and health outcomes from emission reductions should be acknowledged. Based on the projected reductions to criteria air pollutants in tailpipe exhaust from onroad vehicles and nonroad equipment, ERG was able to model health benefits with the U.S. Environmental Protection Agency's (EPA's) Co-Benefits Risk Assessment (COBRA) tool as avoided health damages. These damages include acute respiratory symptoms and respiratory disease that lead to hospitalizations and lost productivity, as shown in Table 1-4.

Table 1-4. Cumulative avoided incidence for CTFP-only and CTFP and NMVES scenarios

Health Outcome Category	Cumulative Avoided Incidence for CTFP-Only Scenario	Cumulative Avoided Incidence for CTFP and NMVES Scenario
Total mortality (low estimate)	0.6	2.0
Total mortality (high estimate)	1.2	2.8
Total asthma symptoms	336.7	1,462.8
Total asthma onset	1.9	8.9
Total emergency room visits	0.7	3.0

Health Outcome Category	Cumulative Avoided Incidence for CTFP-Only Scenario	Cumulative Avoided Incidence for CTFP and NMVES Scenario
Total hospital admittance	0.4	0.6
Total onset	12.6	59.4
Minor restricted activity days	353.0	466.4
Work loss days	59.9	79.0
School loss days	58.6	712.9

In addition to these avoided health incidence values, COBRA monetizes damages to calculate health benefits. As in ERG's emissions analysis, Table 1-5 compares health benefits over time for the combined NMVES and CTFP policies and the CTFP alone. In early CTFP years, the CTFP constitutes a majority of health benefits, but the NMVES contribute more benefits cumulatively to the combined policies, especially after 2030.

Table 1-5. Annual health benefits by policy scenario through 2040 (in million 2024 USD)

Calendar Year	$ Total CTFP-Only Health Benefits (lower-upper bound)	$ Total Combined NMVES + CTFP Health Benefits (lower-upper bound)
2026	$1.1–$2.1	$1.1-$2.1
2027	$1.2–$2.3	$1.7-$2.9
2028	$1.4–$2.5	$2.0-$3.3
2029	$1.8–$3.4	$2.5-$4.2
2030	$1.6–$3.1	$2.5-$4.0
2031	$1.5–$2.7	$2.6-$4.0
2032	$1.3–$2.4	$2.8-$4.0
2033	$0.8–$1.4	$2.6-$3.5
2034	$0.4–$0.7	$2.5-$3.1
2035	$0.1–$0.2	$2.7-$3.1
2036	—	$2.7-$3.1
2037	—	$2.9-$3.2
2038	—	$3.1-$3.4
2039	—	$3.2-$3.6
2040	—	$3.5-$3.9
Cumulative	**$11.0–$20.8**	**$38.2-$51.5**

For further information on health effects, please refer to Chapter 5, which describes ERG's COBRA modeling for both policy scenarios in greater detail and elaborates on COBRA's derivation of health outcomes and their monetization.

1.4 Macroeconomic Impacts

Beyond emission reductions and health benefits, New Mexico's CTFP is expected to impact fuel markets in the state and regionally. To model the program's macroeconomic impacts, ERG employed the Impact Analysis for Planning (IMPLAN) model for input-output (I-O) analysis. Within this I-O analysis, ERG evaluated two cases: one case assuming 0 percent passthrough, where industry absorbs any increased cost of fuel production due to the CTFP, and another case assuming 100 percent passthrough, where consumers bear any fuel price increases related to the program. These represent edge cases, and they have been averaged to create a 50 percent passthrough for the final CTFP benefit-cost analysis (BCA).

IMPLAN accounts for various economic effects to fuel producers and adjacent industries: direct, indirect, and induced. There are a number of direct CTFP effects each year, particularly fuel credits and deficits generated, FSE credits and renewable energy credit (REC) retirements, banking impacts of reduced fossil fuel activities, import costs for biofuels (renewable diesel and biodiesel blends especially), and health and productivity effects. Based on these IMPLAN inputs for direct program effects, the model can estimate any indirect and induced effects. All aforementioned model inputs—including jobs stemming from FSE credits—have been supplied through BRG's separate market analysis, aside from the health effects as previously discussed.

ERG summarized annual direct, indirect, and induced costs related to credit and deficit generation in New Mexico's clean fuels market in Table 1-6Table and Table 1-7, respectively.

Table 1-6. Direct and secondary impacts annually for 0 percent passthrough (in 2024 USD)

Year	Direct	Indirect	Induced
2026	-$8,993,861	-$5,485,195	$124,823
2027	-$17,326,704	-$9,790,960	-$214,940
2028	-$30,092,303	-$16,500,201	-$682,904
2029	-$71,471,707	-$38,608,656	-$3,274,056
2030	-$155,628,931	-$81,800,091	-$10,969,552
2031	-$112,096,241	-$59,197,574	-$7,112,908
2032	-$76,949,450	-$40,904,457	-$4,104,839
2033	-$53,221,357	-$28,498,766	-$2,215,072
2034	-$45,057,933	-$24,351,255	-$1,206,016
2035	-$38,389,883	-$20,974,485	-$348,094

Table 1-7. Direct and secondary impacts annually for 100 percent passthrough (in 2024 USD)

Year	Direct	Indirect	Induced
2026	-$11,585,837	-$4,090,019	-$3,143,083
2027	-$25,335,412	-$10,107,821	-$7,319,490
2028	-$46,187,213	-$19,087,533	-$13,596,993
2029	-$106,126,311	-$41,538,844	-$30,352,982
2030	-$191,666,349	-$73,203,716	-$54,121,634
2031	-$135,586,427	-$54,802,606	-$39,443,278
2032	-$90,561,617	-$39,631,864	-$27,506,225
2033	-$60,628,172	-$29,092,864	-$19,396,445

Year	Direct	Indirect	Induced
2034	-$55,156,721	-$28,054,230	-$18,293,829
2035	-$39,763,688	-$24,453,206	-$14,781,475

Similarly, ERG summarized CTFP benefits modeled through IMPLAN, namely from direct jobs from FSE credits and improved health outcomes, in Table 1-8 and Table 1-9, respectively.

Table 1-8. Annual CTFP results from job creation through FSE credits (in 2024 USD)

Year	Direct	Indirect	Induced
2027	$12,436,042	$2,757,102	$2,587,195
2028	$17,729,622	$3,959,808	$3,702,316
2029	$21,338,555	$4,800,605	$4,472,471
2030	$8,005,849	$1,892,714	$1,721,567
2031	$12,144,437	$2,825,715	$2,589,915
2032	$12,398,228	$2,906,704	$2,654,473
2033	$12,649,566	$2,987,056	$2,718,477
2034	$12,898,514	$3,066,782	$2,781,938
2035	$9,996,850	$2,447,912	$2,189,898
2036–2040	$2,949,311	$902,421	$731,797

Table 1-9. Annual direct and secondary CTFP health impacts (in 2024 USD)

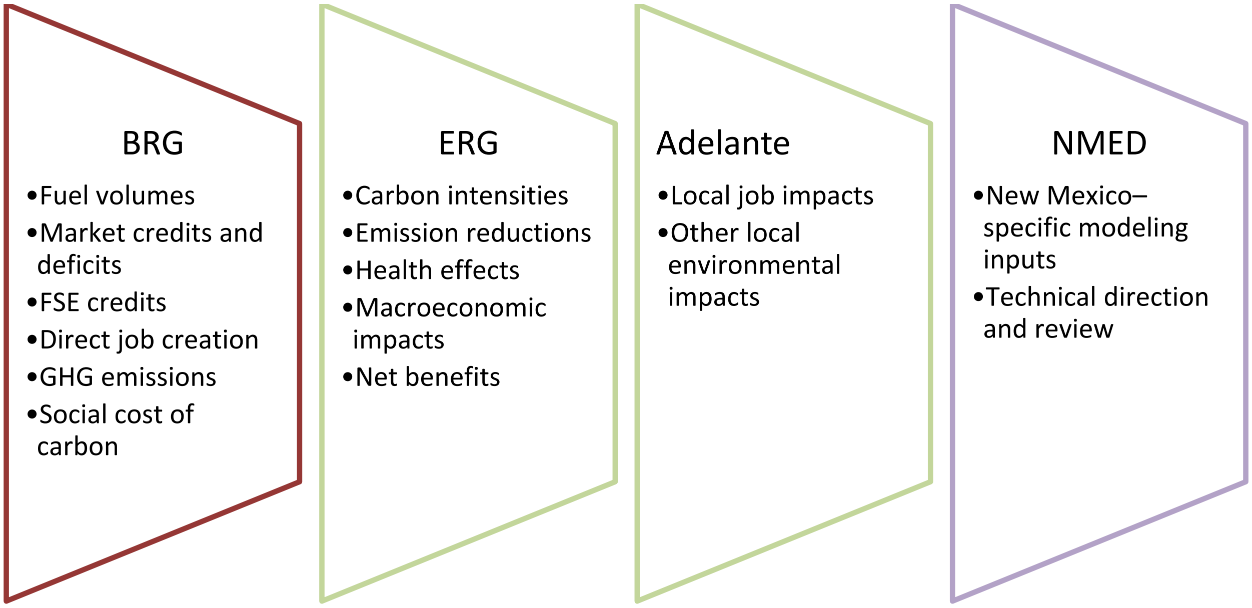
Year	Direct	Indirect	Induced
2026	-$16,070	-$4,940	-$4,057
2027	-$19,859	-$6,105	-$5,391
2028	-$24,795	-$7,622	-$7,069
2029	-$33,474	-$10,290	-$9,621
2030	-$30,702	-$9,438	-$8,854
2031	-$27,176	-$8,354	-$7,830
2032	-$23,399	-$7,193	-$6,732
2033	-$13,216	-$4,063	-$3,719
2034	-$5,614	-$1,726	-$1,485
2035	-$1,048	-$322	-$157

Importantly, the only BCA component that ERG did not model explicitly was GHG benefits, which BRG supplied from its calculation of GHG emissions and the social cost of carbon. Most of the rule's net benefits come from these GHG reductions. Please refer to Chapter 5 for a detailed discussion of IMPLAN I-O modeling and the CTFP's macroeconomic impacts.

To better visualize the full delegation of CTFP analysis responsibilities between BRG, ERG, and the New Mexico Environment Department (NMED), see

Figure 1-1 below.

Figure 1-1. Delegation of CTFP analysis responsibilities between BRG, ERG, and NMED



The first chapter in this report provides the regulatory context for New Mexico’s clean fuels program, introductions to similar programs in other states, and an overview of ERG’s CTFP modeling and analysis across the four focus areas highlighted in this executive summary.

2. Introduction

2.1 Overview of New Mexico's Clean Transportation Fuel Program

In 2024, the passage of the New Mexico Clean Transportation Fuel Standard (CTFS) codified the creation of its Clean Transportation Fuel Program (CTFP) under New Mexico Statutes Annotated (NMSA) 1978, Sections 74-1-3, 7(A)(15), 8(A)(16), and 18.[3] The CTFP as proposed would curtail greenhouse gas (GHG) emissions from the transportation sector, which is currently the state's second-largest GHG source, behind only the oil and gas industry.[4] The CTFP will lower the overall carbon intensity (CI) of the state's transportation fuel supply by setting a target CI each year for gasoline and gasoline substitutes, diesel and diesel substitutes, and alternative jet fuel. These annual targets establish the schedule for annually decreasing CI for transportation fuel produced, imported, or dispensed in New Mexico, and constitute the CTFS also referred to as "the standard." The CTFP establishes rules, measures, and procedures to enforce and achieve the CI reduction targets of 20 percent and 30 percent below a 2018 baseline by 2030 and 2040, respectively. These targets are statutorily mandated under Section 75-1-18(C)(1) NMSA 1978. The CTFP will also stimulate economic growth, improve health outcomes, create jobs, and promote more fueling options within the state.[5]

The CTFP establishes methods to determine the CI of each transportation fuel on a "well-to-wheel" (WTW) basis using lifecycle analysis (LCA) methods detailed in Chapter 3. Each transportation fuel's "well to wheel" CI represents emissions produced through the full path of a transportation fuel, including the production and processing of the fuel and its feedstocks, as well as fuel and feedstock transportation, storage, and consumption or use. The CTFP objectively determines CIs for each transportation fuel pathway solely from its lifecycle GHG emissions per energy unit, based on observable data, with no inherent preference given to one transportation fuel over another. In this way, New Mexico's CTFP implementation mechanisms are technologically neutral (i.e., fuel agnostic), as required under Section 75-1-18(C)NMSA 1978. Under the CTFP, regulated parties that produce, import, or dispense transportation fuel for use in New Mexico receive credits and deficits based on each fuel pathway's CI compared to the annual standard. Regulated parties will receive credits or deficits for transportation fuel pathways with CIs that are, respectively, below or above the standard each year. Regulated parties may buy and sell CTFP credits each year to ensure that they meet their "compliance obligation" of fully offsetting all deficits with credits each compliance period.

New Mexico would be the fourth U.S. state to adopt a clean fuels program. Similar policies exist in three West Coast states: California, Oregon, and Washington. California became the first state to enact a clean fuel program, approving its Low Carbon Fuel Standard in 2009 and opening its credit

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[3] "New Mexico Statutes Annotated (NMSA) 1978," § 74-1-3, 7(A)(15), 8(A)(16), 18 (1978), https://nmonesource.com/nmos/nmsa/en/item/4415/index.do#a1.

[4] New Mexico Environment Department, "NMED Releases Draft Rule for Clean Fuel Program," News Release, December 19, 2024, https://www.env.nm.gov/wp-content/uploads/2024/12/2024-11-19-COMMS-NMED-releases-draft-rule-for-clean-fuel-program-FINAL.pdf.

[5] New Mexico Environment Department, "Clean Transportation Fuel Program," accessed July 3, 2025, https://www.env.nm.gov/climate-change-bureau/clean-fuel-program/.

market in 2011.[6] Oregon's legislature also authorized its Clean Transportation Fuel Program in 2009 but did not fully implement its regulation until 2016.[7] Most recently, Washington adopted legislation to create its own Clean Fuel Standard in 2021 and began implementation in 2023.[8]

In developing the proposed rule, the New Mexico Environment Department (NMED) contracted Eastern Research Group, Inc. (ERG) to develop CI values for different fuels and pathways. As highlighted in

Figure 1-1, NMED assisted ERG with state-specific CI assumptions, as well as technical direction and review. With guidance and input from NMED, ERG calculated fuel pathway CI values using a custom version of Argonne National Laboratory's Greenhouse gases, Regulated Emissions, and Energy use in Technologies (GREET) for research and development (R&D). In model development, ERG adjusted parameters and methods within the default GREET R&D's use for evaluating transportation fuels in New Mexico's CTFP—this customized model will subsequently be referred to as NM-GREET. In particular, NM-GREET incorporates fuel parameter adjustments to better reflect local conditions, and methodological adjustments to align calculations with New Mexico's more conservative approach to determining certain fuel pathway CIs relative to defaults.

New Mexico engaged many experts in crafting the CTFP, including its own staff, staff from other states, and contractors across multiple disciplines: LCA, clean fuels, emissions, and economics.

2.2 Overview of Report Contents

This report discusses how the ERG team developed transportation fuel CIs, emission reductions, avoided health damages, and macroeconomic impacts for New Mexico's CTFP. Each CTFP analysis area is addressed in a subsequent chapter of the report, laying out the ERG team's application of the latest research and modeling tools for this rule. An overview of chapters and analysis methods can be found below.

2.2.1 Fuel Carbon Intensities

To determine the CI of transportation fuels produced and imported into the state, ERG defined parameters for a New Mexico–specific version of GREET for the CTFP, which included crude oil adjustments from the Oil Production Greenhouse gas Emissions Estimator (OPGEE), and performed a lifecycle analyses. This NM-GREET tool assesses the environmental impacts of New Mexico transportation fuels on a WTW basis.[9] The CI values from NM-GREET were incorporated into a key lookup table in the rule.

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[6] California Air Resources Board, "Low Carbon Fuel Standard 2023 Amendments: Standardized Regulatory Impact Assessment (SRIA)," September 8, 2023, https://ww2.arb.ca.gov/sites/default/files/2023-09/lcfs_sria_2023_0.pdf.

[7] U.S. Department of Energy, "Clean Transportation Fuel Standards," Alternative Fuels Data Center, accessed May 20, 2025, https://afdc.energy.gov/laws/6606.

[8] Clean Fuels Alliance America, "Washington Clean Fuel Standard Achieves Impressive First Quarter Results," October 4, 2023, https://cleanfuels.org/washington-clean-fuel-standard-achieves-impressive-first-quarter-results/.

[9] U.S. Department of Energy, "GREET," accessed May 20, 2025, https://www.energy.gov/eere/greet.

2.2.2 Projected Emission Reductions

ERG performed mobile source emission modeling to quantify the CTFP's impact on harmful criteria air pollutants from onroad vehicles and nonroad equipment. To estimate onroad and nonroad emissions, ERG ran the Motor Vehicle Emission Simulator (MOVES), the regulatory emissions inventory model developed by the U.S. Environmental Protection Agency.[10] For the CTFP, ERG utilized MOVES results to derive New Mexico–specific emission factors (EFs). Both EFs and fuel volume projections (estimated instead by BRG) were paired to calculate onroad and nonroad emission reductions for following criteria air pollutants known to contribute to adverse human health impacts:

- Volatile organic compounds (VOCs)
- Nitrogen oxides (NO_x)
- Particulate matter (PM)
- Sulfur dioxide (SO_2)

Projected emission reductions from switching to lower-carbon fuels were then employed to determine avoided health damages and monetized to estimate benefits. Modified versions of the MOVES outputs helped inform CTFP vehicle population, vehicle miles traveled (VMT), and fuel economy data being developed by BRG for its fuel projections.

2.2.3 Avoided Health Damages

Avoided health damages modeling was performed to estimate the health outcomes and monetized benefits associated with criteria air pollutants and precursor emission reductions from New Mexico's CTFP. The earlier projected emission reductions were input into the U.S. Environmental Protection Agency's (EPA's) CO-Benefits Risk Assessment (COBRA) screening model to estimate the change in ambient pollutant concentrations from various fuels on statewide human health impacts.[11] COBRA provides estimations for the monetary value of a wide range of health outcomes. Some COBRA inputs, such as projected human populations, were tailored to New Mexico.

2.2.4 Macroeconomic Impacts

Both direct and second-order economic effects from New Mexico's CTFP were calculated using the Impact Analysis for Planning (IMPLAN) economic analysis platform for input-output (I-O) modeling.[12] To determine the macroeconomic effects of this program, ERG ran a series of economic impact analyses (EIAs) in IMPLAN. The credit market and direct job projections from BRG, along with avoided health damages from COBRA, were used as inputs to the I-O model to calculate statewide impacts for the benefit-cost analysis of New Mexico's program.

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[10] U.S. Environmental Protection Agency, "MOVES and Mobile Source Emissions Research," accessed May 20, 2025, https://www.epa.gov/moves.

[11] U.S. Environmental Protection Agency, "What Is COBRA?," accessed May 20, 2025, https://www.epa.gov/cobra/what-cobra.

[12] IMPLAN, "IMPLAN," accessed May 20, 2025, https://implan.com/.

3. Fuel Carbon Intensities

This chapter details how the NM-GREET v1.0 model was derived from R&D GREET version 2023-rev1 in order to best reflect the expected characteristics, supply chains, and resulting CIs of transportation fuels sold in the state of New Mexico.

3.1 Background

The CTFP—much like programs in other jurisdictions—relies on WTW LCA modeling of transportation fuels to calculate their lifecycle CIs. For each fuel pathway, GHG species emitted during each stage of the fuel's lifecycle are normalized to their carbon dioxide equivalent (CO_2e) mass via IPCC AR5 GWP100[13] factors, summed together, and then divided by the fuel's energy content given in megajoules (MJ).[14] The fuel's energy content is defined in two ways: as the lower-heating-value (LHV) heat of combustion for liquid and gaseous fuel and as the delivered quantity of energy at a given outlet (charging station, home outlet, etc.) for electricity. A fuel's CI is thereby quantified in the composite units of grams CO_2e per megajoule (g CO_2e/MJ).

To calculate WTW fuel-pathway CI scores, the CTFP relies on the **G**reenhouse gases, **R**egulated **E**missions and **E**nergy use in **T**ransportation (GREET) model, published by the Systems Assessment Center of the U.S. Department of Energy's Argonne National Laboratory (ANL).[15] GREET is widely recognized and applied in regulatory settings for its comprehensiveness and flexibility, as well as the continual support and refinement it receives from both ANL and its global user base. At New Mexico's request, ERG developed NM-GREET v1.0 (i.e., the NM-GREET_v1.0.xlsm workbook) from the latest available release of R&D GREET as of fall 2024 when the development cycle began: R&D GREET 2023-rev1.[16] The "R&D" version of GREET is the main development version from which other federal and state regulatory versions, like 45V GREET and the California-modified GREET model (CA-GREET), are typically adapted.

Fuel pathways developed in NM-GREET by ERG and detailed in this report are included in either the rule's Lookup Table or Temporary Pathway Table. A pathway in GREET can be defined as a sequence of material and energy commodities exchanged by unit processes—i.e., extractive operations, processing facilities, transportation modes, storage structures, dispensing stations, highway and nonroad vehicle use—and specific technologies therein, all terminating in the production of one unit of an energy commodity of interest, or in the operation of a vehicle over some distance or trip with defined cargo (either people or goods).

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[13] IPCC AR5 GWP100 factors are global warming potential values for a 100-year time horizon, taken from the Intergovernmental Panel on Climate Change's Fifth Assessment Report.

[14] Gunnar Mhyre et al., "Anthropogenic and Natural Radiative Forcing," in *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, ed. Thomas F. Stocker et al. (Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press, 2013), https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf.

[15] U.S. Department of Energy, "GREET," accessed May 20, 2025, https://www.energy.gov/eere/greet.

[16] Michael Wang et al., "Development of R&D GREET 2023 Rev1 to Estimate Greenhouse Gas Emissions of Sustainable Aviation Fuels for 40B Provision of the Inflation Reduction Act" (Argonne National Laboratory, April 1, 2024), https://doi.org/10.2172/2348933.

3.2 Modeling Approach

This chapter serves as the technical documentation for the data sources and methods by which NM-GREET v1.0 was adapted from the GREET1 Excel workbook of the 2023-rev1 release of R&D GREET. NM-GREET's development and core components share many similarities with the approaches leveraged by other jurisdictions in their own adaptations of state-specific GREET models, derived from CA-GREET and/or R&D GREET. Because GREET generally reflects U.S. conditions, values for key GREET and external-model parameters were chosen and implemented to best reflect the typical lifecycle CIs and associated upstream supply chain activities of CTFP fuels sold in New Mexico (both produced in-state and imported).

This chapter summarizes both global parameter settings (i.e., those that affect all pathways) and common design patterns used to develop stagewise GHG emissions across pathways. Taken together, these summaries, the external data sources detailed later in Section 3.2.3, and the pathway-specific parameters discussed in their respective sections collectively serve as a recipe for recreating NM-GREET v1.0 from scratch. Wherever possible, ERG prioritized transparency, readability, and reproducibility. Not only do these principles benefit interested stakeholders during the initial cycles of model development and public comment: they also help to minimize technical debt and streamline model updates in the years to come.

From GREET1 2023-rev1's "release-default" state (i.e., a freshly downloaded copy from ANL),[17] the modifications ERG made to construct NM-GREET fall into two categories: adding new tabs and parameterization (i.e., altering the contents of cells on release-default GREET1 tabs). ERG stored the details of each parameter on a new tab named *Parameters_NM*. Two more new tabs are present in NM-GREET—*Results_NM* and *CI_Table*—on which formulas to quantify the stagewise emissions of GHG species by pathway are developed and subsequently aggregated into WTW CI totals. For each of the lookup and temporary fuelpathways detailed here, any external model and/or data source used to parameterize NM-GREET and refine its CI score has been referenced accordingly.

3.2.1 Parameters

GREET is a parametric LCA model, in which the magnitudes of material and energy flows within and between unit processes are defined by formulas and input parameters rather than static scalar estimates. For each parameter, GREET contains a release-default value—typically chosen to best reflect a U.S.-national-average representation of said parameter. In composing statewide-average estimates of the typical CIs and upstream supply chain activities of transportation fuels sold in New Mexico (both produced in state and imported), New Mexico–specific parameters were included when possible; the national-average default selections were used when New Mexico–specific parameters were unavailable.

In NM-GREET, parameter alterations can be broken down into three categories based on which pathways' CI values they affect. A parameter affects either (1) every pathway, (2) a subset of pathways with some shared attribute (e.g., any fuel derived from animal waste [AW] biomethane), or (3) just a single pathway. A parameter is defined here as "significantly affecting" a pathway if changing it from GREET1's release-default value to the NM-GREET value causes the CI of said pathway to change by at least ± 0.1 g CO_2e/MJ. To delineate which NM-GREET parameter alterations

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[17] Argonne National Laboratory, "GREET1 2023r1," April 30, 2024, https://greet.anl.gov/files/greet-2023rev1.

affect which pathways and how, the full table of said alterations on the *Parameters_NM* tab is reorganized into many separate tables within this report.

These separated parameters tables are embedded at different hierarchical levels of this chapter's sections to reflect which pathway or group thereof is significantly affected by a given parameter. If a parameter significantly affects only a single pathway, it is described in a parameter table within that pathway's subsection. If a parameter significantly affects multiple pathways, it is described in a table within a parent section containing each of those pathways. If a parameter significantly affects every pathway (i.e., is a "global" parameter), it is listed below in Table 3-1Table 3-1 or detailed in a subsection of Section 3.2.3. Putting these rules together, a single-pathway section without a parameter table is therefore only significantly affected by global parameters and those listed in tables of its parent section(s), if present.

Table 3-1. NM-GREET parameters affecting all pathways

Parameter	Value		GREET Label	Description
	Default	NM		
Year	2022	2022	Target Year for Simulation	Per NMED's Climate Change Bureau
GWP_of_ GHG_Ref	AR6/ GWP	AR5/ GWP	AR Edition/Type	Global warming potential of GHGs (g CO_2e)

All of this report's parameter tables, like the one above, share formatting and field conventions with NM-GREET's *Parameters_NM* table. The "Parameter" column contains the address—and thereby also the identity—of a parameter, given as either a <sheet>!<A1-cell> style reference or a named range identifier (e.g., the "Year" named range sets the GREET model year). The "Default" and "NM" value columns contain the release-default and altered, New Mexico–specific parameter values. The "GREET Label" column provides context for how GREET defines the parameter. Lastly, the "Description" column adds context and/or justification for how the "NM" value was chosen.

Note that in addition to the NM-GREET_v1.0.xlsm workbook, ERG derived a "baseline" version (the NM-GREET_v1.0_baseline.xlsm workbook) with one difference: the "Year" parameter is set to 2018 instead of 2022. This difference affects GREET's collections of time-series parameter estimates (i.e., on tabs named with the _TS suffix), formatted as arrays of both historical and projected values across 1990–2050. Crucially, GREET's "Year" (i.e., "Target Year for Simulation") model-year parameter indexes the selection of each and every one of its time-series parameters, making it by far the most influential parameter choice in the entire model. At the request of NMED's Climate Change Bureau, ERG kept the "Year" parameter of NM-GREET v1.0 set to GREET1 2023-rev1's release-default value of 2022, representing the most current non-projected data in the model. Note that the majority of tables on GREET's **_TS* tabs contain only base-five year indices, such that setting "Year" to 2022 causes GREET to round down to the nearest base-five year—2020—when values are chosen from those tables.

IPCC AR5 100-year global warming potential (GWP) values were chosen via the "GWP_of_GHG_Ref" parameter to convert masses of emitted GHG into CO_2e masses. By default, GREET assumes carbon monoxide (CO) and VOCs will oxidize into CO_2 in the atmosphere, which is why it incorporates the "CO_2 (w/ C in VOC & CO)" indicator rather than solely "CO_2" into its calculation of total GHG emissions. For both CO and VOCs, GREET multiplies the emitted mass of each species by its carbon mass fraction (i.e., g carbon/g species, labeled as "Carbon ratio of [species]"), then divides by the mass of carbon in CO_2 in order to derive said species' CO_2e GWP mass:

$$GWP_{species}\left[\frac{g\ CO_2e}{g\ species}\right] = m_{C,species}\left[\frac{g\ C}{g\ species}\right] / m_{C,CO_2}\left[\frac{g\ C}{g\ CO_2}\right] \quad \textbf{Equation 3-1}$$

GREET repeatedly performs this same calculation within each "CO_2 (w/ C in VOC & CO)" result cell, but ERG avoids this redundancy on the *Results_NM* tab by pre-calculating the resulting GWP factors for both VOCs—which GREET uniformly approximates as being 85 percent carbon by mass—and CO. The resulting, composite set of IPCC-sourced and GREET-specific GWP factors is presented in Table 3-2.

Table 3-2. NM-GREET GWP factors (from AR5)

GWP100 Factors (g CO_2e/g species)	
Species	**Value**
CO_2	1
CH_4	30
N_2O	265
VOCs	3.12
CO	1.57

Finally, while GREET is predominantly an attributional LCA (ALCA) model, it also includes consequential LCA (CLCA) elements, as outlined in the recent National Academies report on LCA and low carbon fuel standard programs.[18] Some CLCA elements can be controlled via GREET's parameters, such as whether co-products are accounted for via system expansion (i.e., exporting a co-product directly to another firm or into a marketplace leading to an assumed one-to-one reduction in production elsewhere). Other CLCA elements—namely counterfactual scenario emissions credits—are not yet controllable via parameters, instead requiring GREET users to rewrite formulas if they wish to exclude or disaggregate the effect of those elements.

In tailoring R&D GREET into NM-GREET, ERG avoided system expansion wherever possible, since one-to-one substitution (also known as "displacement" in LCA) is not empirically supported by economic modeling or data. Instead, market-based allocation—wherein the burdens of a process are distributed across its co-products according to their relative economic value—is given preference, in part to stay "consistent with the aims of market-based [public programs] to reducing emissions" like the CTFP.[19] Additionally, GREET's instances of mass-based allocation often do not account for significant differences in the composition (e.g., protein content) and utility of co-products, and its energy-based allocation does not consider the energy commodities' entropic states (i.e., heat is far less useful than electricity) or their logistical constraints (e.g., transporting and storing electricity poses different challenges than a liquid fuel does).

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[18] National Academies of Sciences, Engineering, and Medicine, *Current Methods for Life-Cycle Analyses of Low-Carbon Transportation Fuels in the United States* (Washington, DC: The National Academies Press, 2022), https://doi.org/10.17226/26402.

[19] U.S. Department of Energy, "Clean Transportation Fuel Standards," Alternative Fuels Data Center, accessed May 20, 2025, https://afdc.energy.gov/laws/6606.

3.2.2 *Results*

The *Results_NM* tab contains the definitions of NM-GREET pathways and stages of activity therein, including metadata mappings between GREET1 (i.e., tab, section header, and stage header) and the New Mexico pathway (i.e., ID, name, stage, stage category) as well as formulas to estimate the emitted quantities of GHG species within each pathway-stage. In each column of *Results_NM*, the set of "Source," "GREET Tab," "GREET Section," and "GREET Stage" fields together serve as a pointer to the location—within or external to GREET1—on which the subsequent GHG-emissions formulas primarily rely. For example, column D of *Results_NM* estimates the GHG emissions from onroad combustion of clear gasoline. ERG developed these formulas by combining elements from the per-distance and per-energy "Vehicle Operation" formulas of the *Results* tab. However, since both the *Results_NM* column D and *Results* vehicle operation formulas both primarily rely on values from the *Vehicles* tab, the "GREET Tab" field points to *Vehicles* rather than *Results*.

To define the scope of fuel pathways, ERG adhered to GREET's nomenclature and definitions of lifecycle stages: "Feedstock" production, "Fuel" processing, and "On-Road" vehicle emissions. These three core stages are reused across all pathways in NM-GREET and this report, but the specific supply-chain activities within each stage vary by pathway. Furthermore, pathways with agricultural crop feedstocks also include a separate "ILUC" stage for indirect land use change, as detailed below in Section 3.2.3. For all biological-feedstock fuel pathways, ERG disaggregated and lists "Biogenic CO_2 Uptake" as a separate stage in this report, but on the *Results_NM* tab these emissions are incorporated into the On-Road stage. Finally, once the stagewise CIs defined on *Results_NM* are calculated, those results are aggregated on the *CI_Table* tab into well-to-pump and pump-to-wheel subtotals and finally a WTW total CI for each pathway. The well-to-pump subtotal is defined as the sum of stagewise CIs from feedstock, fuel, and ILUC; pump-to-wheel is the sum of on-road and, wherever present, biogenic CO_2 uptake.

Two key patterns are reused across formulas developed on *Results_NM*:

- **Using loss factors to normalize GHG emissions to the energy content of fuel delivered to a vehicle.** As on GREET1's *Results* tab, GHG emissions formulas on *Results_NM* incorporate stagewise loss factors—themselves often calculated as composites of loss factors for specific activities within a stage. Scaling emissions by these factors ensures that results can be added across stages. For example, absent this scaling, emissions from fossil clear gasoline's Feedstock stage would have units of g CO_2e/MJ of crude oil at refinery rather than MJ of gasoline at pump, and thus could not be aggregated into a WTW CI.
- **Accounting for biogenic CO_2 uptake and reemission via the -1/+1 method.** For biogenic CO_2 emissions, ERG followed the GREET convention of applying the -1/+1 method, given that all of NM-GREET's biofuel pathway feedstock crops have short growth cycles (i.e., no woody biomass feedstocks are modeled). This method represents CO_2 sequestration during plant growth as a negative emission, followed by positive emissions wherever the biogenic carbon atoms are re-released to the atmosphere as CO_2—primarily upon fuel combustion. However, the sequestered and re-released CO_2 quantities are not always identical: the -1/+1 method also considers the different impacts of biogenic carbon embedded in non-CO_2 emissions such as CH_4. Emissions of biogenic CH_4 are treated identically to fossil CH_4 in GREET.

3.2.3 *Key Assumptions*

Results from select external models are incorporated into NM-GREET in order to best represent the fuel sold within New Mexico, as well as to mitigate limitations in R&D GREET's model scope and data resolution. These results fall into three categories: ILUC, crude oil supplied to Petroleum Administration for Defense District 3 (PADD3), and national-average manure methane emissions.

3.2.3.1 Indirect Land Use Change

In order to estimate the GHG emissions resulting from ILUC arising from additional demand for biological-crop-derived fuels in NM-GREET, ERG adopts and reuses the ILUC factors developed by the California Air Resources Board (CARB) for CA-GREET.[20]

Table 3-3. ILUC CIs

Fuel Pathway	ILUC Value ($g\ CO_2e/MJ$)
Corn ethanol	19.8
Sorghum ethanol	19.4
Sugarcane ethanol	11.8
Soybean biodiesel or renewable diesel	29.1
Canola biodiesel or renewable diesel	14.5
Palm biodiesel or renewable diesel	71.4

3.2.3.2 OPGEE Well-to-Refinery Crude Oil Modeling

ERG modified NM-GREET to substitute GREET1's default modeling of crude oil's well-to-refinery-gate (WTRG) CI with an estimate from the OPGEE v2.0c model.[21] Unlike GREET, OPGEE allows users to model GHG emissions from the extraction, processing, and transportation of crude oil by defined origin mixtures as consumed within a certain Petroleum Administration for Defense Districts (PADD) region.[22] ERG parameterized OPGEE with crude oil production and foreign import data from the U.S. Energy Information Administration, as detailed in the Fuel Carbon Intensities appendix. The resulting 2018 weighted-average PADD3 CI is calculated to be 11.7 g CO_2e/MJ refinery input. Integrating this WTRG CI into NM-GREET's *Petroleum* tab causes a ~4.5 g/MJ increase in the pathway CI scores of crude-oil-derived transport fuels (i.e., gasoline, diesel, and liquefied petroleum gas) and only modest ≤0.2 g/MJ increases in other pathways.[23]

In order to ensure that all fuel pathways incorporate this Feedstock-stage CI into the crude-oil-derived fuels they consume in their supply chains as process fuel and/or transportation fuel, ERG first compared GREET's release-default WTRG CI of 7,911 g CO_2e per million British thermal units (mmBtu) (see cell "Petroleum!B281" in GREET1_2023_Rev1.xlsm) to the OPGEE PADD3 value of 12,334 g $CO_2e/mmBtu$ (i.e., 11.7 g/MJ after converting MJ to mmBtu). To make up the difference between these values, ERG added 4,343 g $CO_2e/mmBtu$ (i.e., 12,334 minus 7,911) to the WTRG CO_2 emissions of unrefined crude oil (located in "Petroleum!B279"), which has a release-default

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[20] California Air Resources Board, "Detailed Analysis for Indirect Land Use Change," 2015, ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/iluc_assessment/iluc_analysis.pdf.

[21] U.S. Department of Energy, "GREET," accessed May 20, 2025, https://www.energy.gov/eere/greet.

[22] U.S. Environmental Protection Agency, "MOVES and Mobile Source Emissions Research," accessed May 20, 2025, https://www.epa.gov/moves.

[23] U.S. Environmental Protection Agency, "What Is COBRA?," accessed May 20, 2025, https://www.epa.gov/cobra/what-cobra.

value of 5,129 g/mmBtu. Therefore, ERG inserted a condensed version of these calculations as the following formula into the *Petroleum*-tab WTRG CO_2 emissions cell, where "MJ2mmBtu" references GREET's named range for converting MJ to mmBtu:

$$= (11.7/MJ2mmBtu - 7{,}911.2) + 5{,}128.8$$ **Equation 3-2**

3.2.3.3 45V Manure Biomethane Counterfactual and Fuel Processing

Avoided emissions credits are constructed from pairs of counterfactual scenarios: a baseline or "status quo" scenario (which is avoided) and a "counterfactual" alternative (which may be enacted via public policy, private investment, and/or any other set of decision points). NM-GREET relies on 45V-GREET's generic counterfactual methodology for avoided GHG emissions for manure-derived biomethane, which estimates the national-average counterfactual.[24] This methodology avoids reliance on a single representative type of manure management or digester technology, making its results broadly applicable and easier to integrate across temporary pathways' CI scores.

Reproducing the calculations outlined in the 45V report's "Estimated Emissions Per Unit Biomethane" section yields an avoided emission factor of -90.3 g CO_2e/MJ CH_4 in biomethane, only slightly higher than GREET's default factor of -110.3 g CO_2e/MJ. In the following formulas, "manure" denotes manure mass as excreted including moisture, CO_2e values are calculated via AR5 GWP100 factors, and the LHV of CH_4 is obtained from GREET (i.e., at conditions of 32°F and 1 atmosphere):

$$\frac{81{,}696{,}000\ \frac{MT\ CO_2e}{year}}{1{,}460{,}542{,}191\ \frac{MT\ manure}{year}} * \frac{1\ MT\ manure}{10^3\ kg\ manure} * \frac{10^6 g\ CO_2e}{1\ MT\ CO_2e} = 55.9\frac{g\ CO_2e}{kg\ manure}$$ **Equation 3-3**

$$55.9\frac{g\ CO_2e}{kg\ manure} * \frac{1\ kg\ manure}{0.61\ scf\ CH_4 in\ biogas} = 91.7\frac{g\ CO_2e}{scf\ CH_4 in\ biogas}$$ **Equation 3-4**

$$\frac{91.7\ g\ CO_2e}{scf\ CH_4 in\ biogas} * \frac{1\ scf\ CH_4 in\ biogas}{962.2\ Btu\ (LHV, CH_4)} * \frac{1000\ Btu}{1.05587\ MJ} = 90.3\frac{g\ CO_2e}{MJ\ CH_4 in\ biogas}$$ **Equation 3-5**

Finally, since these emissions are considered avoided, a negative sign is prepended to the emission factor. Note that, while the per-MJ value of -90.3 equals the "-90 g CO_2e/MJ" value after rounding on page 11 of the 45V generic counterfactual report, the -91.7 g CO_2e/standard cubic foot (scf) CH_4 in biogas value differs from the "-90 g CO_2e/scf biomethane in biogas" on page 10. Based on the calculations above and subsequent differences in per-scf and per-MJ emission factors in the report, ERG concluded that the -90.3 per-MJ value is correct, whereas the per-scf value should be -91.7.

ERG also integrated the 45V report's estimates of emissions intensities for both digester (i.e., across a "manure-weighted average of the three primary digester technologies"—covered lagoon, mixed plug flow, and complete mix) and upgrader operations. The former emits 39 g CO_2e/MJ by way of its consumption of grid electricity and natural gas (NG), and the latter emits 19.4 g CO_2e/MJ

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[24] U.S. Department of Energy, "A Generic Counterfactual Greenhouse Gas Emission Factor for Life-Cycle Assessment of Manure-Derived Biogas and Renewable Natural Gas," January 2025, https://www.energy.gov/sites/default/files/2025-01/generic-counterfactual-greenhouse-gas-emission-factor-for-life-cycle-assessment-of-manure-derived-biogas-and-renewable-natural-gas_010225.pdf.

via fugitive biogas plus upstream emissions of consumed grid electricity. For each pathway that includes AW biomethane as a fuel or feedstock, ERG opted to use the sum of these values, 58.4 g CO_2e/MJ, to represent biogas production activities within the Fuel-processing stage.

3.3 Gasoline Pathways

3.3.1 Fossil Clear Gasoline

The Fossil Clear Gasoline pathway approximates a weighted average of crude-oil-derived gasoline supplied to New Mexico, as delivered in "clear" state before any potential blending with other fuels, such as ethanol. As detailed in Section 3.2.3.2 of this report, the Feedstock stage is composed of PADD3-weighted average crude oil extraction activities, followed by transport to a refinery. The Fuel processing stage includes the refining of crude oil into gasoline followed by transportation and distribution to refueling stations. Finally, the On-Road stage models gasoline combustion within a light-duty, passenger internal combustion engine vehicle (ICEV).

Table 3-4, below, summarizes the cumulative CI and the CI values by stage. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *Petroleum* sheet Section 5.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-4. Summary of fossil gasoline's stagewise CIs

Stage	Total CI* (g CO_2e/MJ)
Feedstock	10.1
Fuel	13.7
On-Road	73.0
Total, WTW	**96.9**

** Values may not always sum to equal the total due to rounding.*

3.3.2 Corn Ethanol (E100)

The Corn Ethanol (E100) pathway estimates the typical WTW CI of corn-based ethanol supplied to New Mexico, as delivered before any potential blending with other fuels. The Feedstock lifecycle stage is composed of corn farming and transport to an ethanol production plant. The Fuel processing stage includes an industry-weighted average of ethanol production plant types—using dry and wet milling, with and without the extraction of a corn oil co-product—followed by transportation and distribution to refueling stations. The On-Road stage models fuel combustion within a light-duty passenger ICEV. Finally, the ILUC and Biogenic CO_2 Uptake stages are incorporated to account for the effects of feedstock crop growth.

Certain parameters listed in Table 3-5 are altered from GREET's release-default state to ensure that this model pathway is representative of fuel commercially available in New Mexico. ERG increased the value of "Vehicles_EtOHDediVehi_EtOHShare" from 85 percent to 100 percent in order to model tailpipe emissions from combusting E100 on the *Vehicles* tab rather than E85. Since CARB ILUC**Error! Reference source not found.** factors are applied, GREET's internal estimation of ILUC is disabled via the "EtOH_CornEtOH_LandChange_Option" parameter. Finally, as described in Section 3.2.1, market-based allocation is given preference over other available modes; for this reason, ERG altered the three enumerated allocation-selector parameters from their default values to "3 - Market-Based Allocation."

Table 3-5. Parameters relevant to the Corn Ethanol (E100) pathway

Parameter	Value		GREET Label	Description
	Default	NM		
Vehicles_ EtOHDediVehi_ EtOHShare	85.0%	100.0%	Ethanol in dedicated vehicle fuel	Set to 100% so *Results_NM* formulas for EtOH can reuse calculations from *Vehicles* tab
EtOH_CornEtOH_ LandChange_ Option	2	0	Inclusion of GHG Emissions from Land Use Change; Corn	Remove GREET's ILUC value for corn ethanol; use CARB value instead
Ethanol_Farming_ Corn_Allocation	1	4	Allocation of corn farming energy between corn grain and stover	Preference market allocation
EtOH_CornEtOH_ CoProductMethod	1	3	Allocation of Corn ethanol w/o corn oil extraction	
Inputs!F503	6	3	Allocation of Corn ethanol w/ corn oil extraction	

The pathway's total WTW CI and those of its stages are provided below in Table 3-6. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *EtOH* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-6. Summary of corn ethanol's stagewise CIs

Stage	**Total CI*** (g CO_2e/MJ)
Biogenic CO_2 Uptake	-68.9
Feedstock	23.6
Fuel	23.7
On-Road	71.4
ILUC	19.8
Total, WTW	**69.6**

** Values may not always sum to equal the total due to rounding.*

3.4 Diesel Pathways

3.4.1 Fossil Clear Diesel

The Fossil Clear Diesel pathway approximates a weighted average of crude-oil-derived diesel supplied to New Mexico, as delivered in "clear" state before any potential blending with other non-fossil-diesel fuels. As detailed in Section 3.2.3.2, the Feedstock stage is composed of PADD3-weighted average crude oil extraction activities, followed by transport to a refinery. The Fuel processing stage includes the refining of crude oil into diesel followed by transportation and distribution to refueling stations. Finally, the On-Road stage models diesel combustion within a light-duty passenger vehicle with a compression-ignition direct-injection (CIDI) engine.

The pathway's total WTW CI and those of its stages are provided below in Table 3-7. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *Petroleum* sheet Section 5.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-7. Summary of Fossil Clear Diesel's stagewise CIs

Stage	**Total CI*** (g CO_2e/MJ)
Feedstock	11.7
Fuel	7.9
On-Road	75.7
Total, WTW	**95.3**

** Values may not always sum to equal the total due to rounding.*

3.4.2 Biodiesel (B100)

The Biodiesel (B100)**Error! Reference source not found.** pathways approximate categorical averages of crop- and waste-oil-derived biodiesel (BD) fuels supplied to New Mexico, as delivered in their pure state before any potential blending with fossil diesel fuels. For both BD temporary pathways, ERG made the following parameter alterations from GREET's release-default state in order to disaggregate overlapping GREET pathway formulas and ensure that modeled fuels are broadly representative of those sold in New Mexico:

Table 3-8. Parameters relevant to all Biodiesel (B100) pathways

Parameter	Value		GREET Label	Description
	Default	NM		
Vehicles_ BDCIDI_ BDShare	20%	100%	Biodiesel in CIDI fuel	Causes *Vehicles*-tab results to reflect pure BD, on which *Results_NM* formulas depend

3.4.2.1 Virgin Non-Palm Plant Oil

The Virgin Non-Palm Plant Oil**Error! Reference source not found.** pathway estimates the typical WTW CI of soy-derived BD supplied to New Mexico, as delivered before any potential blending with other diesel fuels. The Feedstock lifecycle stage is composed of soy farming and transport to a refinery. The Fuel processing stage includes soy oil extraction, transesterification, and transportation plus distribution to refueling stations. The On-Road stage models BD100 combustion within a light-duty passenger CIDI vehicle. Finally, ILUC and Biogenic CO_2 Uptake stages are incorporated to account for the effects of feedstock crop growth.

Certain parameters listed in Table 3-9 are altered to GREET's release-default state to ensure that this model pathway is representative of fuel commercially available in New Mexico. Since CARB ILUC**Error! Reference source not found.** factors are applied, GREET's internal estimation of ILUC is disabled via the "Soybean_LUC_Selector" parameter. Also, as described in Section 3.2.1, market-based allocation is given preference over other available modes. For this reason, ERG altered the enumerated "BD_SoybeanOilExtraction_Allocation" selector from "4 - Mass-Based Allocation" to "3 - Market-Based Allocation."

Table 3-9. Parameters relevant to the Virgin Non-Palm Plant Oil Biodiesel (B100) pathway

Parameter	Value		GREET Label	Description
	Default	NM		
Soybean_ LUC_ Selector	2	0	Inclusion of GHG Emissions from Induced Land Use Change	Exclude GREET estimate; replace with CARB estimate on *Results_NM*
BD_Soybean OilExtraction_ Allocation	4	3	Process level allocation for all biooil-based fuels: Oil Extraction Process for Soybean	Preference market allocation

The pathway's total WTW CI and those of its stages are provided below in Table 3-10. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *BioOil* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-10. Summary of Virgin Non-Palm Plant Oil Error! Reference source not found.**'s stagewise CIs**

Stage	Total CI* (g CO_2e/MJ)
Biogenic CO_2 Uptake	-71.2
Feedstock	13.2
Fuel	9.7
On-Road	75.9
ILUC	29.1
Total, WTW	**56.6**

** Values may not always sum to equal the total due to rounding.*

3.4.2.2 Waste Animal Fat or Cooking Oil

The Waste Animal Fat or Cooking Oil**Error! Reference source not found.** pathway estimates the typical WTW CI of tallow-derived BD supplied to New Mexico, as delivered before any potential blending with other diesel fuels. The estimated WTW CI of tallow BD is sufficiently close to that of BD derived from used cooking oil that ERG solely relied on the modeling of tallow BD to represent this composite category of temporary pathways. The Feedstock lifecycle stage is devoid of activity and emissions, since GREET treats waste animal fat as being obtained burden-free at the point of disposal. The Fuel processing stage includes rendering fat to tallow, tallow transport to a refinery, transesterification of tallow to BD, and transportation plus distribution to refueling stations. The On-Road stage models BD100 combustion within a light-duty passenger CIDI vehicle. Finally, a Biogenic CO_2 Uptake stage is incorporated to account for the biosphere origin of carbon embedded in the final fuel product.

The pathway's total WTW CI and those of its stages are provided below in Table 3-11. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *BioOil* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-11. Summary of Waste Animal Fat or Cooking Oil Error! Reference source not found.**'s stagewise CIs**

Stage	Total CI* (g CO_2e/MJ)
Biogenic CO_2 Uptake	-71.4
Feedstock	0.0
Fuel	15.2
On-Road	75.9
Total, WTW	**19.7**

** Values may not always sum to equal the total due to rounding.*

3.4.3 Renewable Diesel (R100)

The production of renewable diesel (RD) at biorefineries typically also yields renewable naphtha and renewable jet fuel as co-products. In allocating the cumulative GHG emissions from feedstock origin to exiting the biorefinery across these co-products, GREET relies on the fuels' LHV energy contents, such that each Joule of each fuel is attributed the same proportion of the total emissions. This energy-based allocation plus the near-total negation of combustion emissions by initial biogenic CO_2 uptake mean that renewable diesel, naphtha, and jet fuel co-products should have roughly equivalent WTW CIs—an assumption ERG uses to extend the following RD temporary pathway CIs to renewable naphtha as well.

3.4.3.1 Virgin Non-Palm Plant Oil

The Virgin Non-Palm Plant Oil Renewable Diesel (R100) pathway estimates the typical WTW CI of soy-derived RD supplied to New Mexico, as delivered before any potential blending with other fuels. The Feedstock lifecycle stage is composed of soy farming and transport to a refinery. The Fuel processing stage includes soy oil extraction, RD production, and transportation plus distribution to refueling stations. The On-Road stage models RD100 combustion within a light-duty passenger CIDI vehicle. Finally, ILUC and Biogenic CO_2 Uptake stages are incorporated to account for the effects of feedstock crop growth.

Certain parameters listed in Table 3-12 are altered to GREET's release-default state to ensure that this model pathway is representative of fuel commercially available in New Mexico. Since CARB ILUC**Error! Reference source not found.** factors are applied, GREET's internal estimation of ILUC is disabled via the "Soybean_LUC_Selector" parameter. Also, as described in Section 3.2.1, market-based allocation is given preference over other available modes. For this reason, ERG altered the enumerated "BD_SoybeanOilExtraction_Allocation" selector from "4 - Mass-Based Allocation" to "3 - Market-Based Allocation."

Table 3-12. Parameters relevant to the Virgin Non-Palm Plant Oil Renewable Diesel (R100) pathway

Parameter	Value		GREET Label	Description
	Default	NM		
Soybean_ LUC_Selector	2	0	Inclusion of GHG Emissions from Induced Land Use Change	Exclude GREET estimate; replace with CARBestimate on *Results_NM*
BD_Soybean	4	3	Process level allocation	Preference market

OilExtraction_ Allocation			for all biooil-based fuels: Oil Extraction Process for Soybean	allocation

The pathway's total WTW CI and those of its stages are provided below in Table 3-13. Summary of Virgin Non-Palm Plant Oil
Renewable Diesel (R100)'s stagewise CIs. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *BioOil* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-13. Summary of Virgin Non-Palm Plant Oil Renewable Diesel (R100)'s stagewise CIs

Stage	Total CI* (g CO_2e/MJ)
Biogenic CO_2 Uptake	-72.6
Feedstock	13.3
Fuel	15.9
On-Road	73.3
ILUC	29.1
Total, WTW	**59.1**

** Values may not always sum to equal the total due to rounding.*

3.4.3.2 Waste Animal Fat or Cooking Oil

The Waste Animal Fat or Cooking Oil Renewable Diesel (R100) pathway estimates the typical WTW CI of tallow-derived RD supplied to New Mexico, as delivered before any potential blending with other fossil-diesel fuels. The estimated WTW CI of tallow RD is sufficiently close to that of RD derived from used cooking oil that ERG solely relies on the modeling of tallow RD to represent this composite category of temporary pathways. The Feedstock lifecycle stage is devoid of activity and emissions, since GREET treats waste animal fat as being obtained burden-free at the point of disposal. The Fuel processing stage includes rendering fat to tallow, tallow transport to a refinery, RD production, and transportation plus distribution to refueling stations. The On-Road stage models RD100 combustion within a light-duty passenger CIDI vehicle. Finally, a Biogenic CO_2 Uptake stage is incorporated to account for the biosphere origin of carbon embedded in the final fuel product.

The pathway's total WTW CI and those of its stages are provided below in Table 3-14. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *BioOil* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-14. Summary of Waste Animal Fat or Cooking Oil Renewable Diesel (R100)'s stagewise CIs

Stage	Total CI* (g CO_2e/MJ)
Biogenic CO_2 Uptake	-72.6
Feedstock	0.0
Fuel	17.6
On-Road	73.3

Total, WTW	**18.3**

** Values may not always sum to equal the total due to rounding.*

3.5 Propane Pathways

3.5.1 Fossil Liquefied Petroleum Gas

The Fossil Liquefied Petroleum Gas (LPG)**Error! Reference source not found.** pathway estimates the typical WTW CI of LPG supplied to New Mexico. By default, GREET defines LPG as being produced with national-average production shares of 86.6% from NG and 13.4% from crude oil. For the fraction of LPG derived from NG, the Feedstock stage is composed of NG recovery (i.e., extraction of conventional and shale gas), processing, and pipeline transmission to an LPG plant. The Fuel processing stage includes LPG production, followed by transportation and distribution to refueling stations. For the fraction of LPG derived from crude oil, the Feedstock stage is composed of a PADD3-weighted average of crude oil extraction activities (as detailed in Section 3.2.3.2), followed by transport to a refinery. The Fuel processing stage includes the refining of crude oil into LPG, followed by transportation and distribution to refueling stations. Finally, the On-Road stage models fuel combustion within a light-duty passenger vehicle with a light-duty passenger ICEV.

The pathway's total WTW CI and those of its stages are provided below in Table 3-15. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *Petroleum* sheet Section 5.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-15. Summary of Fossil LPG's stagewise CIs

Stage	**Total CI*** (g CO_2e/MJ)
Feedstock	10.3
Fuel	11.8
On-Road	64.8
Total, WTW	**87.0**

** Values may not always sum to equal the total due to rounding.*

3.6 Natural Gas Pathways

3.6.1 Fossil Natural Gas

The Fossil Natural Gas**Error! Reference source not found. Error! Reference source not found.**pathways in NM-GREET—including both compressed (CNG) and liquified (LNG) gases—are composed of national-average mixes of shale and conventional NG produced domestically. Leaks of NG to the atmosphere are characterized for each activity within the Fuel and Feedstock stages. Since GREET does not contain parameters to differentiate fugitive emissions during NG recovery by basin, regions therein, or consumption mix in a given state, ERG instead relied on GREET's release-default national-average WTW estimates of 0.94 percent (i.e., Inputs!G136 and Inputs!H136) for both shale and conventional NG. Furthermore, the U.S. NG pipeline network is heavily interconnected, such that in order to compose a New-Mexico-consumption-weighted-average fugitive emissions rate for NG ERG would first need high-resolution data and modeling of NG supply chain activities, fugitive emissions, and inter-state distribution rates.

3.6.1.1 Fossil CNG

The Fossil CNG**Error! Reference source not found.** pathway estimates the typical WTW CI of fossil CNG supplied to New Mexico. The Feedstock lifecycle stage is composed of NG recovery (i.e., extraction of conventional and shale gas), processing, and pipeline transmission to refueling stations. The Fuel processing stage includes NG compression. Finally, the On-Road stage models fuel combustion within a light-duty passenger ICEV.

The pathway's total WTW CI and those of its stages are provided below in Table 3-16. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *NG* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-16. Summary of Fossil CNG Error! Reference source not found.**'s stagewise CIs**

Stage	Total CI* (g CO_2e/MJ)
Feedstock	13.7
Fuel	3.0
On-Road	57.6
Total, WTW	**74.3**

** Values may not always sum to equal the total due to rounding.*

3.6.1.2 Fossil LNG

The Fossil LNG**Error! Reference source not found.** pathway estimates the typical WTW CI of fossil CNG supplied to New Mexico. The Feedstock lifecycle stage is composed of NG recovery (i.e., extraction of conventional and shale gas), processing, and pipeline transmission to a liquefaction plant. The Fuel processing stage includes liquefaction, truck transportation and distribution to refueling stations, and storage. Finally, the On-Road stage models fuel combustion within a light-duty passenger ICEV.

The parameter listed in Table 3-17**Error! Reference source not found.** is altered to GREET's release-default state to ensure that this model pathway is representative of fuel commercially available in New Mexico. An in-state liquefaction efficiency of 80 percent is chosen to reflect local conditions and align with parameter estimates from similar programs.

Table 3-17. Parameters relevant to the Fossil LNG Error! Reference source not found. **pathway**

Parameter	Value		GREET Label	Description
	Default	NM		
NG_LNG_ Liq_Eff_ NANG_TS	=AL58	80%	NA NG Liquefaction Efficiency	Alignment with similar programs in other jurisdictions

The pathway's total WTW CI and those of its stages are provided below in Table 3-18**Error! Reference source not found.**. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *NG* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-18. Summary of Fossil LNG Error! Reference source not found.**'s stagewise CIs**

Stage	Total CI* (g CO_2e/MJ)
Feedstock	8.6
Fuel	20.9
On-Road	57.6
Total, WTW	**87.1**

** Values may not always sum to equal the total due to rounding.*

3.6.2 Animal Waste Biomethane

The Animal Waste Biomethane or Renewable Natural Gas (AW RNG) Temporary Pathway Table pathways—including both compressed (AW CNG) and liquified (AW LNG) gases—in NM-GREET are composed of national-average mixes of livestock manure and anaerobic digester (AD) technologies used to convert manure into biomethane. Details on how these feedstock and AD national averages are defined can be found in Section 3.2.3.3.

3.6.2.1 AW CNG

The AW CNG**Error! Reference source not found.** pathway estimates the typical WTW CI of AW CNG supplied to New Mexico. The Feedstock lifecycle stage is devoid of activity and emissions, since GREET treats AW as being obtained burden-free at the point of generation. The Fuel processing stage includes manure hauling via truck to a local AD installation, AD and biogas upgrader operation, pipeline transmission to refueling stations, and compression to CNG. The On-Road stage models fuel combustion within a light-duty passenger ICEV. Finally, a Biogenic CO_2 Uptake stage is incorporated to account for the biosphere origin of carbon embedded in the final fuel product.

The pathway's total WTW CI and those of its stages are provided below in Table 3-19**Error! Reference source not found.**. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *RNG* sheet Section 3, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-19. Summary of AW CNG Error! Reference source not found.**'s stagewise CIs**

Stage	Total CI* (g CO_2e/MJ)
Biogenic CO_2 Uptake	-56.3
Feedstock	0.0
Fuel	61.4
On-Road	57.6
Total, WTW	62.7
Total, WTW, with credit	**-27.3**

Counterfactual Additionality Credit

As outlined, fuel producers that meet the additionality criteria for AD installations may apply the counterfactual avoided emissions credit of -90.0 g CO_2e/MJ to this Temporary Pathway Table pathway, bringing its total CI down to -27.3 g CO_2e/MJ.

3.6.2.2 AW LNG

The AW LNG**Error! Reference source not found.** pathway estimates the typical WTW CI of AW LNG supplied to New Mexico. The Feedstock lifecycle stage is devoid of activity and emissions, since GREET treats AW as being obtained burden-free at the point of generation. The Fuel processing stage includes manure hauling via truck to a local AD installation, AD and biogas upgrader operation, pipeline transmission to a liquefaction plant, liquefaction, transportation and distribution to refueling stations, and storage. The On-Road stage models fuel combustion within a light-duty passenger ICEV. Finally, a Biogenic CO_2 Uptake stage is incorporated to account for the biosphere origin of carbon embedded in the final fuel product.

The parameter listed in Table 3-20 is altered to GREET's release-default state to ensure that this model pathway is representative of fuel commercially available in New Mexico. An in-state liquefaction efficiency of 80 percent is chosen to reflect local conditions and align with parameter estimates from similar.

Table 3-20. Parameters relevant to the AW LNG pathway

Parameter	Value		GREET Label	Description
	Default	NM		
LFG_LNG_ Liq_Eff	89%	80%	NG Small Scale Liquefaction Efficiency (powered by RNG)	Alignment with similar programs in other jurisdictions

The pathway's total WTW CI and those of its stages are provided below in Table 3-21. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *RNG* sheet Section 3, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-21. Summary of AW LNG's stagewise CIs

Stage	Total CI* (g CO_2e/MJ)
Biogenic CO_2 Uptake	-56.3
Feedstock	0.0
Fuel	70.5
On-Road	57.6
Total, WTW	71.8
Total, WTW, with credit	**-18.2**

** Values may not always sum to equal the total due to rounding.*

Counterfactual Additionality Credit

As outlined, fuel producers that meet the additionality criteria for AD installations may apply the counterfactual avoided emissions credit of -90.0 g CO_2e/MJ to this Temporary Pathway Table pathway—bringing its total CI down to -18.2 g CO_2e/MJ.

3.6.3 Landfill Biomethane

The Landfill Biomethane (LF RNG) Temporary Pathway Table pathways—including both compressed (LF CNG) and liquified (LF LNG) gases—in NM-GREET are composed of biomethane derived from landfill gas (LFG) as is generated by landfills containing a U.S.-average composition of non-recycled municipal solid waste.

3.6.3.1 LF CNG

The LF CNG pathway estimates the typical WTW CI of LF CNG supplied to New Mexico. The Feedstock lifecycle stage is devoid of activity and emissions, since GREET treats LFG as being obtained burden-free at the point of generation. The Fuel processing stage includes LFG upgrading, pipeline transmission to refueling stations, and compression to CNG. The On-Road stage models fuel combustion within a light-duty passenger ICEV. Finally, a Biogenic CO_2 Uptake stage is incorporated to account for the biosphere origin of carbon embedded in the final fuel product.

The pathway's total WTW CI and those of its stages are provided below in Table 3-22. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *RNG* sheet Section 3, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-22. Summary of LF CNG's stagewise CIs

Stage	Total CI* (g CO_2e/MJ)
Biogenic CO_2 Uptake	-56.3
Feedstock	0.0
Fuel	21.1
On-Road	57.6
Total, WTW	**21.4**

** Values may not always sum to equal the total due to rounding.*

3.6.3.2 LF LNG

The LF LNG pathway estimates the typical WTW CI of LF LNG supplied to New Mexico. The Feedstock lifecycle stage is devoid of activity and emissions, since GREET treats LFG as being obtained burden-free at the point of generation. The Fuel processing stage includes LFG upgrading, pipeline transmission to a liquefaction plant, liquefaction, transportation and distribution to refueling stations, and storage. The On-Road stage models fuel combustion within a light-duty passenger ICEV. Finally, a Biogenic CO_2 Uptake stage is incorporated to account for the biosphere origin of carbon embedded in the final fuel product.

The parameter listed in Table 3-23 is altered to GREET's release-default state to ensure that this model pathway is representative of fuel commercially available in New Mexico. An in-state liquefaction efficiency of 80 percent is chosen to reflect local conditions and align with parameter estimates from similar.

Table 3-23. Parameters relevant to the LF LNG pathway

Parameter	Value		GREET Label	Description
	Default	NM		
LFG_LNG_ Liq_Eff	89%	80%	NG Small Scale Liquefaction Efficiency (powered by RNG)	Alignment with similar programs in other jurisdictions

The pathway's total WTW CI and those of its stages are provided below in Table 3-24. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *RNG* sheet Section 3, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-24. Summary of LF LNG's stagewise CIs

Stage	Total CI* (g CO_2e/MJ)
Biogenic CO_2 Uptake	-56.3
Feedstock	0.0
Fuel	29.8
On-Road	57.6
Total, WTW	**31.0**

** Values may not always sum to equal the total due to rounding.*

3.7 Hydrogen Pathways

Of the hydrogen (H_2) fuels summarized in this section, six are defined as Lookup Table**Error! Reference source not found.** pathways and four as Temporary Pathway Table pathways. The compressed gaseous hydrogen (C.H_2) and liquid hydrogen (L.H_2) fuels derived from steam methane reforming (SMR) of fossil methane, proton exchange membrane (PEM) electrolysis of water using certified zero-carbon, and PEM electrolysis with North-American-average-grid electricity are all Lookup Table**Error! Reference source not found.** pathways. In turn, G.H_2 and L.H_2 produced via SMR of AW or LF biomethane are defined as four Temporary Pathway Table pathways. Additionally, the AW-biomethane-SMR temporary pathways can also claim a counterfactual avoided emissions credit by meeting the criteria outlined in Section 3.2.3.3.

Certain parameters, listed in Table 3-25, are altered to GREET's release-default state in order to ensure that the modeled fuels are broadly representative of those sold in New Mexico. As described in Section 3.2.1, market-based allocation is given preference over other available modes. For this reason, ERG altered the two enumerated allocation-selector parameters from their default values of "1 -- Displacement method" to "3 -- Market-Based Allocation". Furthermore, ERG updated the price of process-heat steam generated via fossil NG from its default value of $0 per Btu (as embedded in "MeOH_FTD!L59") to $1.02E-05 per Btu, derived from a recent national-average NG price of $10 per thousand scf as reported by the U.S. Energy Information Administration.[25]

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[25] U.S. Energy Information Administration, "Natural Gas Prices," accessed June 19, 2025, https://www.eia.gov/dnav/ng/NG_PRI_SUM_A_EPG0_PCS_DMCF_M.htm.

Table 3-25. Parameters relevant to all Hydrogen pathways

Parameter	Value		GREET Label	Description
	Default	NM		
Inputs! F267	1	3	Central Plant G.H2; NG/RNG; 6.8) Selection of Method for Estimating Credits of Co-Products for NG Based Fuel Pathways (Co-products are defined in Section 6.7)	Preference market allocation, as detailed in Section 3.2.1
Inputs! F269	1	3	Central Plant L.H2; NG/RNG; 6.8) Selection of Method for Estimating Credits of Co-Products for NG Based Fuel Pathways (Co-products are defined in Section 6.7)	
Hydrogen! K37	=MeOH_FTD!L59	=10/(NG_LHV*10^3)	$/Btu, Steam, Market value-based allocation	Use national-average NG price ($/thousand scf)[26] and NG LHV to update GREET's per-Btu steam price

3.7.1 H_2 via SMR of Fossil Methane

3.7.1.1 Fossil C.H_2

The Fossil C.H_2 pathway estimates the typical WTW CI of fossil C.H_2 supplied to New Mexico. The Feedstock lifecycle stage is composed of the set of activities defined in Section 3.6.1.1's Feedstock stage, followed by NG pipeline transmission to a central SMR plant. The Fuel processing stage includes H_2 production via SMR, transportation and distribution of gaseous H_2 to refueling stations, compression and precooling, and storage and dispensing with associated losses. Finally, the On-Road stage models fuel consumption within a light-duty passenger fuel cell electric vehicle (FCEV).

The pathway's total WTW CI and those of its stages are provided below in Table 3-26. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *Hydrogen* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-26. Summary of fossil C.H_2's stagewise CIs

Stage	Total CI* (g CO_2e/MJ)
Feedstock	10.2
Fuel	84.2
On-Road	0.0
Total, WTW	**94.5**

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[26] U.S. Energy Information Administration, "Natural Gas Prices," accessed June 19, 2025, https://www.eia.gov/dnav/ng/NG_PRI_SUM_A_EPG0_PCS_DMCF_M.htm.

** Values may not always sum to equal the total due to rounding.*

3.7.1.2 Fossil $L.H_2$

The Fossil $L.H_2$ pathway estimates the typical WTW CI of $L.H_2$ produced by SMR of fossil CNG supplied to New Mexico. The Feedstock lifecycle stage is composed of the set of activities defined in Section 3.6.1.1’s Feedstock stage, followed by NG pipeline transmission to a central SMR plant. The Fuel processing stage includes H_2 production via SMR, liquefaction and bulk storage, transportation and distribution to refueling stations, and storage and dispensing with associated losses. Finally, the On-Road stage models fuel consumption within a light-duty passenger FCEV.

The pathway’s total WTW CI and those of its stages are provided below in Table 3-27. Formulas defining this pathway’s stagewise emissions on *Results_NM* primarily refer to and derive from GREET1’s *Hydrogen* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-27. Summary of fossil $L.H_2$’s stagewise CIs

Stage	**Total CI*** ($g\ CO_2e/MJ$)
Feedstock	13.3
Fuel	122.4
On-Road	0.0
Total, WTW	**135.7**

** Values may not always sum to equal the total due to rounding.*

3.7.2 H_2 via SMR of AW Biomethane

3.7.2.1 AW $C.H_2$

The AW $C.H_2$ pathway estimates the expected WTW CI of AW $C.H_2$ supplied to New Mexico. The Feedstock lifecycle stage is composed of the set of activities defined in Section 3.6.2.1’s Feedstock and Fuel stages, except that biomethane is transmitted via pipeline to a central SMR plant rather than a refueling station and is not initially compressed. The fuel processing stage includes H_2 production via SMR with process heat derived from fossil NG (i.e., not biomethane), transportation and distribution of gaseous H_2 to refueling stations, compression and precooling, and storage and dispensing with associated losses. The On-Road stage models fuel combustion within a light-duty passenger FCEV. Finally, a Biogenic CO_2 Uptake stage is incorporated to account for the biosphere origin of the carbon emitted during SMR of biomethane.

The pathway’s total WTW CI and those of its stages are provided below in Table 3-28. Formulas defining this pathway’s stagewise emissions on *Results_NM* primarily refer to and derive from GREET1’s *Hydrogen* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-28. Summary of AW C.H_2's stagewise CIs

Stage	Total CI* (g CO_2e/MJ)
Biogenic CO_2 Uptake	-56.3
Feedstock	60.3
Fuel	84.2
On-Road	0.0
Total, WTW	**88.2**
Total, WTW, with credit	**-1.8**

** Values may not always sum to equal the total due to rounding.*

Counterfactual Additionality Credit

As outlined in Section 3.2.3.3, biomethane producers that meet the additionality criteria for AD installations may apply a counterfactual avoided emissions credit of -90.0 g CO_2e/MJ to the feedstock AW NG for this AW C.H_2 Temporary Pathway Table pathway. Once applied, this credit brings the pathway's WTW CI down to -1.8 g CO_2e/MJ.

3.7.2.2 AW L.H_2

The AW L.H_2 pathway estimates the expected WTW CI of AW L.H_2 supplied to New Mexico. The Feedstock lifecycle stage is composed of the set of activities defined in Section 3.6.2.1's Feedstock and Fuel stages, except that biomethane is transmitted via pipeline to a central SMR plant rather than a refueling station and is not initially compressed. The Fuel processing stage includes H_2 production via SMR with process heat derived from fossil NG (i.e., not biomethane), liquefaction and bulk storage, transportation and distribution to refueling stations, and storage and dispensing with associated losses. The On-Road stage models fuel combustion within a light-duty passenger FCEV. Finally, a Biogenic CO_2 Uptake stage is incorporated to account for the biosphere origin of the carbon emitted during SMR of biomethane.

The pathway's total WTW CI and those of its stages are provided below in Table 3-29. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *Hydrogen* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-29. Summary of AW L.H_2's stagewise CIs

Stage	Total CI* (g CO_2e/MJ)
Biogenic CO_2 Uptake	-56.3
Feedstock	60.9
Fuel	122.4
On-Road	0.0
Total, WTW	**127.0**
Total, WTW, with credit	**37.0**

** Values may not always sum to equal the total due to rounding.*

Counterfactual Additionality Credit

As outlined in Section 3.2.3.3, biomethane producers that meet the additionality criteria for AD installations may apply a counterfactual avoided emissions credit of -90.0 g CO_2e/MJ to the feedstock AW NG for this AW L.H_2 Temporary Pathway Table pathway. Once applied, this credit brings the pathway's WTW CI down to 37.0 g CO_2e/MJ.

3.7.3 H_2 via SMR of LF Biomethane

3.7.3.1 LF C.H_2

The LF C.H_2 pathway estimates the expected WTW CI of LF C.H_2 supplied to New Mexico. The Feedstock lifecycle stage is composed of the set of activities defined in Section 3.6.3.1's Feedstock and Fuel stages, except that biomethane is transmitted via pipeline to a central SMR plant rather than a refueling station and is not initially compressed. The Fuel processing stage includes H_2 production via SMR with process heat derived from fossil NG (i.e., not biomethane), transportation and distribution of gaseous H_2 to refueling stations, compression and precooling, and storage and dispensing with associated losses. The On-Road stage models fuel combustion within a light-duty passenger FCEV. Finally, a Biogenic CO_2 Uptake stage is incorporated to account for the biosphere origin of the carbon emitted during SMR of biomethane.

The pathway's total WTW CI and those of its stages are provided below in Table 3-30. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *Hydrogen* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-30. Summary of LF C.H_2's stagewise CIs

Stage	Total CI* (g CO_2e/MJ)
Biogenic CO_2 Uptake	-56.3
Feedstock	18.2
Fuel	84.2
On-Road	0.0
Total, WTW	**46.1**

** Values may not always sum to equal the total due to rounding.*

3.7.3.2 LF L.H_2

The LF L.H_2 pathway estimates the expected WTW CI of LF L.H_2 supplied to New Mexico. The Feedstock lifecycle stage is composed of the set of activities defined in Section 3.6.3.1's Feedstock and Fuel stages, except that biomethane is transmitted via pipeline to a central SMR plant rather than a refueling station and is not initially compressed. The Fuel processing stage includes H_2 production via SMR with process heat derived from fossil NG (i.e., not biomethane), liquefaction and bulk storage, transportation and distribution to refueling stations, and storage and dispensing with associated losses. The On-Road stage models fuel combustion within a light-duty passenger FCEV. Finally, a Biogenic CO_2 Uptake stage is incorporated to account for the biosphere origin of the carbon emitted during SMR of biomethane.

The pathway's total WTW CI and those of its stages are provided below in Table 3-31. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *Hydrogen* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-31. Summary of LF L.H_2's stagewise CIs

Stage	Total CI* (g CO_2e/MJ)
Biogenic CO_2 Uptake	-56.3
Feedstock	23.7
Fuel	122.4
On-Road	0.0
Total, WTW	**89.8**

** Values may not always sum to equal the total due to rounding.*

3.7.4 H2 via PEM Electrolysis

3.7.4.1 C.H_2 from North-American-Average Grid Electricity

The C.H_2 from North-American-Average Grid Electricity pathway estimates the expected WTW CI of average-grid C.H_2 supplied to New Mexico. The Feedstock lifecycle stage is composed of electricity generation across a national-average collection of electricity generating units, followed by transmission to an electrolyzer. The Fuel processing stage includes H_2 production via PEM electrolysis, transportation and distribution of gaseous H_2 to refueling stations, and storage and dispensing with associated losses. Finally, the On-Road stage models fuel consumption within a light-duty passenger FCEV.

The pathway's total WTW CI and those of its stages are provided below in Table 3-32. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *Hydrogen* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-32. Summary of C.H_2 from North-American-Average Grid Electricity's stagewise CIs

Stage	Total CI* (g CO_2e/MJ)
Feedstock	203.5
Fuel	14.3
On-Road	0.0
Total, WTW	**217.8**

** Values may not always sum to equal the total due to rounding.*

3.7.4.2 L.H_2 from North-American-Average Grid Electricity

The L.H_2 from North-American-Average Grid Electricity pathway estimates the expected WTW CI of average-grid L.H_2 supplied to New Mexico. The Feedstock lifecycle stage is composed of electricity generation across a national-average collection of electricity generating units, followed by transmission to an electrolyzer. The Fuel processing stage includes H_2 production via PEM electrolysis, liquefaction and bulk storage, transportation and distribution to refueling stations, and storage and dispensing with associated losses. Finally, the On-Road stage models fuel consumption within a light-duty passenger FCEV.

The pathway's total WTW CI and those of its stages are provided below in Table 3-33. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *Hydrogen* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-33. Summary of L.H2 from North-American-Average Grid Electricity's stagewise CIs

Stage	Total CI* (g CO_2e/MJ)
Feedstock	219.8
Fuel	1.9
On-Road	0.0
Total, WTW	**221.7**

** Values may not always sum to equal the total due to rounding.*

3.7.4.3 C.H_2 from Zero-Carbon Electricity Sources

The C.H_2 from Zero-Carbon Electricity Sources pathway estimates the expected WTW CI of zero-feedstock-carbon C.H_2 supplied to New Mexico. The Feedstock lifecycle stage is composed of zero-carbon electricity generation, as defined in the Zero-Carbon Electricity pathway, followed by transmission to an electrolyzer. The Fuel processing stage includes H_2 production via PEM electrolysis, transportation and distribution of gaseous H_2 to refueling stations, and storage and dispensing with associated losses. Finally, the On-Road stage models fuel consumption within a light-duty passenger FCEV.

The pathway's total WTW CI and those of its stages are provided below in Table 3-34. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *Hydrogen* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-34. Summary of C.H_2 from Zero-Carbon Electricity Sources' stagewise Cis

Stage	Total CI* (g CO_2e/MJ)
Feedstock	0.0
Fuel	14.3
On-Road	0.0
Total, WTW	**14.3**

** Values may not always sum to equal the total due to rounding.*

3.7.4.4 L.H_2 from Zero-Carbon Electricity Sources

The L.H_2 from Zero-Carbon Electricity Sources pathway estimates the expected WTW CI of zero-feedstock-carbon L.H_2 supplied to New Mexico. The Feedstock lifecycle stage is composed of zero-carbon electricity generation, as defined in the Zero-Carbon Electricity pathway, followed by transmission to an electrolyzer. The Fuel processing stage includes H_2 production via PEM electrolysis, liquefaction and bulk storage, transportation and distribution to refueling stations, and storage and dispensing with associated losses. Finally, the On-Road stage models fuel consumption within a light-duty passenger FCEV.

The pathway's total WTW CI and those of its stages are provided below in Table 3-35. Formulas defining this pathway's stagewise emissions on *Results_NM* primarily refer to and derive from GREET1's *Hydrogen* sheet Section 4.1, *Vehicles* sheet Section 3, and *Results* tab Section 2.

Table 3-35. Summary of L.H_2 from Zero-Carbon Electricity Sources' stagewise CIs

Stage	Total CI* (g CO_2e/MJ)
Feedstock	0.0
Fuel	1.9
On-Road	0.0
Total, WTW	**1.9**

** Values may not always sum to equal the total due to rounding.*

3.8 Data Sharing

In the broader CTFP analysis, ERG has supplied iterations of the CI table to NMED for feedback and BRG as inputs for their economic optimization model. These New Mexico–specific CIs go on to inform the rule's credit and deficit generation over time, as well as statewide fuel projections by policy scenario.

4. Projected Emission Reductions

4.1 Background

New Mexico's program is expected to generate emission reductions from changes to the amount of transportation fuels produced, imported, or dispensed for use within the state, particularly switching from fossil diesel to renewable diesel and to a lesser extent biodiesel. To estimate emissions, ERG has calculated state-specific emission factors for both onroad vehicles and nonroad equipment and then coupled the EFs with BRG projections of diesel fuel volume deltas by policy scenario. The product of the EFs and fuel volume deltas yields separate estimates for onroad and nonroad emission reductions for several key criteria air pollutants and precursors, namely nitrogen oxides (NOx), primary particulate exhaust (PM2.5), sulfur dioxide (SO2), and volatile organic compounds (VOC). All EFs have been developed using county-scale runs of EPA's latest Motor Vehicle Emission Simulator release (MOVES5) and then aggregated over the state's 33 counties. The two distinct policy scenarios analyzed are described in detail below.

The first scenario considers the CTFP in combination with New Mexico's New Motor Vehicle Emission Standards,[27] labeled as "NMVES + CTFP" suite. Under this scenario, ERG considered the effect of the CTFP both as a standalone policy *and* combined with the NMVES as a supporting policy. This scenario provides an upper-bound estimate of the CTFP's impact on emission reductions. To make this determination, ERG took the difference of New Mexico transportation sector emissions with both the NMVES and CTFP in place (Line 3 in Figure 4-1) from those with neither the NMVES nor the CTFP in place (represented by Line 1 in Figure 4-1). In the latter case, the assumed effective policy is the latest EPA national standard: the 2024 Multi-Pollutant Rule for light-duty vehicles (LDVs) and the 2024 Phase 3 Rule for medium and heavy-duty vehicles (MHDVs).[28] This scenario provides an upper-bound estimate of the CTFP's effect because it attributes the combined emission reductions from the complementary CTFP and NMVES policies under the umbrella of the current program.

The second scenario is "CTFP-only." Instead of looking at the policy's combined effect as a standalone and supporting policy, this scenario only considers the CTFP as a standalone policy. The CTFP-only scenario gauges the policy's impact by subtracting New Mexico transportation sector emissions with both the NMVES and the CTFP in place (Line 3 in Figure 4-1) from a baseline that includes the NMVES (Line 2 in Figure 4-1). This provides a lower-bound estimate of the CTFP's effect because it considers this program as a standalone policy with no emissions reduction attributed to its role in supporting the NMVES.

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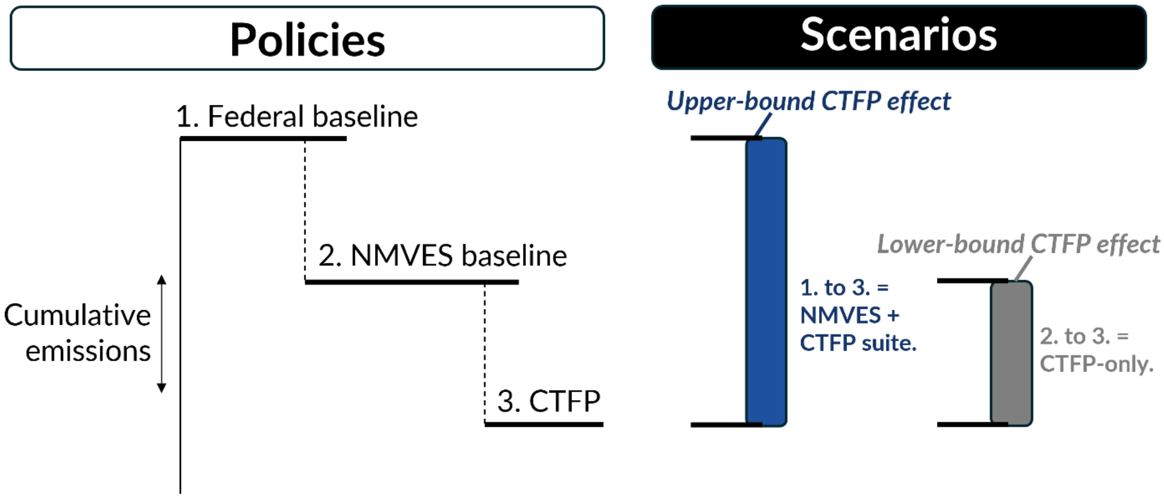
[27] New Mexico Environment Department, "New Motor Vehicle Emissions Standards (Advanced Clean Cars II/Advanced Clean Trucks)," accessed May 29, 2025, https://www.env.nm.gov/climate-change-bureau/transportation/.

[28] U.S. Environmental Protection Agency, "Final Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles," accessed May 29, 2025, https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-multi-pollutant-emissions-standards-model.

Figure 4-1. Illustrative diagram of the policies and scenarios analyzed for cumulative emissions over a projection period



1. MOVES5 runs with federal Phase-3 Multi-Pollutant Rule
2. MOVES5 runs with NMVES ZEV requirements
3. Fuel markets model applied to NMVES fleet + VMT

Note: Illustrative depiction, does not represent actual quantities.

The CTFP's actual effect on New Mexico transportation sector emissions is likely somewhere between the upper-bound ("CTFP + NMVES") and lower-bound ("CTFP-only") scenarios. It is clear that the CTFP will play an important role in bolstering NMVES benefits through an initial bank of credits to build out fueling supply equipment (FSE) for zero-emission vehicles (ZEVs) along with a more continuous stream of credits to maintain FSE infrastructure. Therefore, the lower-bound "CTFP-only" estimate thus likely understates the policy's true effect on transportation emissions.

At the same time, the NMVES would certainly generate New Mexico transportation sector emission reductions even without the CTFP, so the upper-bound "CTFP + NMVES" estimate likely overstates the CTFP's true effect on emission reductions. It is difficult to ascertain exactly where the CTFP's effect would lie between these two bookend scenarios, but they both have been analyzed to cover the greatest range of possible outcomes.

4.1.1 Emissions Analysis

For this analysis, ERG received transportation fuel projections from BRG's fuel and credit markets model (FCMM) for both the "CTFP-only" and the "NMVES + CTFP" scenarios described later in Section 4.2.3 and detailed in Appendix B of BRG's BCA Report. In practice, BRG's fuel projections for the CTFP scenario only included volumetric changes to certain diesel blends. This report refers to these as projected fuel volumes, which then serve as inputs to calculate changes to transportation emissions for each scenario. To calculate the expected CTFP emission reductions, ERG coupled New Mexico-specific EFs for both onroad vehicles and nonroad equipment with corresponding fuel volume changes from BRG. The product of the EFs and transportation fuel volumes yields separate estimates for onroad and nonroad reductions in criteria air pollutant (CAP) emissions. Criteria pollutants include ozone (O_3) precursors like NO_x and VOCs, as well as particulate matter 2.5 micrometers or less in diameter ($PM_{2.5}$) and SO_2.

ERG developed all EFs for the "CTFP-only" and "NMVES + CTFP" scenarios using county-scale runs of EPA's latest Motor Vehicle Emission Simulator release (MOVES5) that ERG then aggregated over the entire state.[29] The MOVES5 model incorporates recent emission research and test results, as well as any current federal regulations, including EPA's Multi-Pollutant and Phase 3 Rules mentioned above for LDVs and MHDVs, respectively. Although MOVES includes emissions data for the most prevalent fuels, the model does not have data for all the eligible fuels in New Mexico's program. This fuel data gap pertains particularly to biomass-based diesels (BBDs), including both onroad and nonroad use of RD and nonroad use of BD. For BBDs, ERG applied published RD and BD fuel effects to base MOVES EFs. These fuel effects become important because under the "CTFP-only" scenario; the incremental impact of the CTFP on CAP emissions results entirely from increased blending of BBDs into the pool of diesel fuel produced, imported, or dispensed for use in New Mexico.

For the benchmarking and calibration of transportation fuel volume estimates forecast by BRG, ERG provided state fuel consumption by transportation mode, including for onroad (highway), nonroad, aviation, and rail. Ultimately, BRG only incorporated the onroad and nonroad benchmarks in FCMM transportation fuel projections. The following section details these MOVES-derived benchmarks.

4.1.2 Benchmarking

4.1.2.1 Nonroad Benchmarks

To inform BRG's FCMM fuel projections, ERG provided aggregate MOVES5 nonroad energy consumption by fuel converted into gallons of gasoline equivalent (GGE) for comparability. These nonroad runs yielded intuitive results that BRG incorporated into the FCMM. Figure 4-2 shows MOVES nonroad fuel estimates for the years explicitly modeled (2020, 2030, 2035, 2040, and 2050). BRG directly applied these nonroad fuel estimates to the FCMM.

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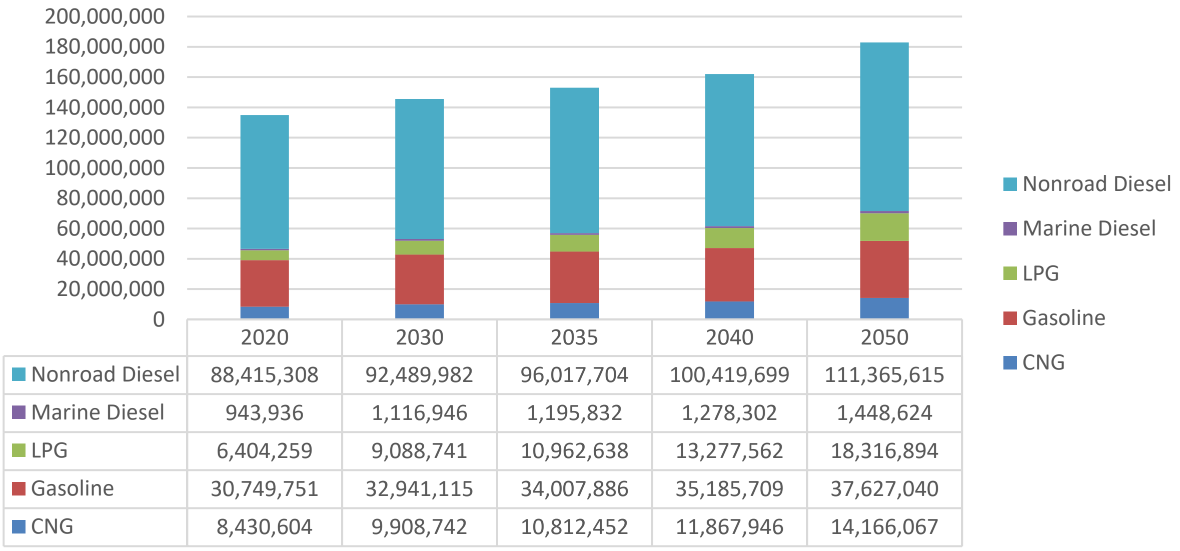
[29] U.S. Environmental Protection Agency, "MOVES and Mobile Source Emissions Research," accessed May 20, 2025, https://www.epa.gov/moves.

Figure 4-2. Estimated MOVES nonroad fuel use over time for New Mexico (LPG, CNG, and gasoline blends in GGE and diesel blends in DGE)



	2020	2030	2035	2040	2050
Nonroad Diesel	88,415,308	92,489,982	96,017,704	100,419,699	111,365,615
Marine Diesel	943,936	1,116,946	1,195,832	1,278,302	1,448,624
LPG	6,404,259	9,088,741	10,962,638	13,277,562	18,316,894
Gasoline	30,749,751	32,941,115	34,007,886	35,185,709	37,627,040
CNG	8,430,604	9,908,742	10,812,452	11,867,946	14,166,067

4.1.2.2 Onroad Benchmarks

By contrast, BRG did not directly apply MOVES5 projected onroad fuel use to its transportation FCMM. Instead, BRG's FCMM calculated onroad fuel use with MOVES5 annual vehicle populations, VMT, and fuel economy, adjusting their output to more closely align with ZEV adoption with the NMVES policy in place. ERG has documented initial New Mexico vehicle populations and VMT from MOVES prior to any adjustment in Section 4.2.2 of this report. BRG further describes their method for making these adjustments to fleet and VMT estimates in Appendix A of their BCA Report.

4.2 Modeling Approach

4.2.1 Motor Vehicle Emission Simulator (MOVES)

Since its first official public release in 2010, MOVES has served as the regulatory onroad emission inventory model for highway vehicles, including cars, trucks, and buses. Beginning with MOVES2014, EPA also incorporated modeling capabilities for nonroad equipment, such as equipment used in construction and agriculture, based on NONROAD2008, EPA's predecessor model.[30] In November 2024, EPA released MOVES5, which accounted for the federal GHG rules released earlier in the year. All emissions modeling for the CTFP uses MOVES5 with input data specific to New Mexico and other regulatory programs.

ERG pulled New Mexico county inputs (often called MOVES county databases, or CDBs) from the most recent 2020 National Emissions Inventory (NEI), which EPA publishes every three years. These state-specific CDBs were coupled with custom fuel penetrations by vehicle type over time (referred to as the alternative vehicle fuel and technology, or AVFT, table in MOVES).[31] This CTFP

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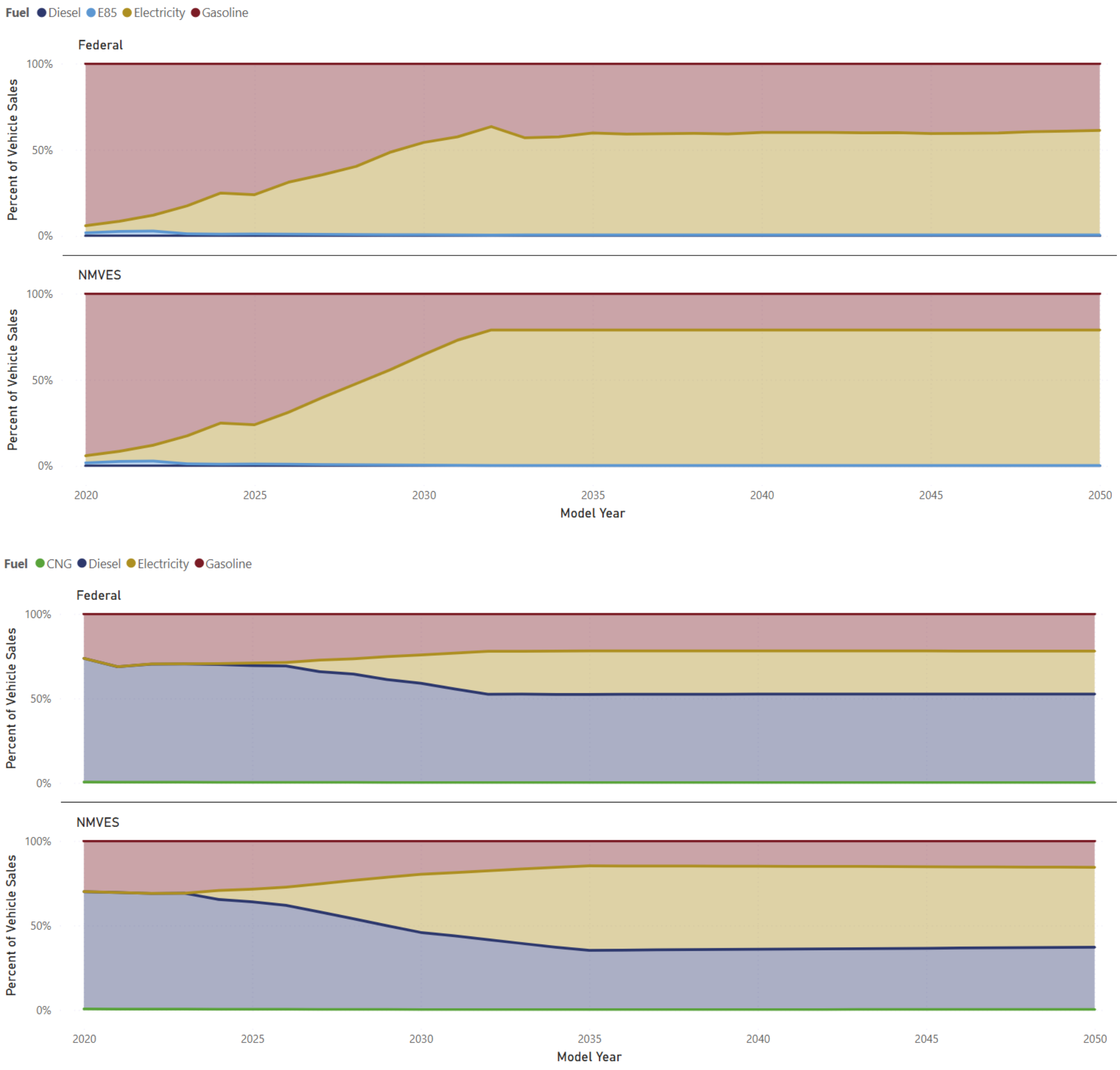
[30] U.S. Environmental Protection Agency, "MOVES2014 Update Log," accessed May 29, 2025, https://www.epa.gov/moves/moves2014-update-log.

[31] U.S. Environmental Protection Agency, "Population and Activity of Onroad Vehicles in MOVES5," November 2024, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P101CUN7.pdf.

emission analysis required two custom AVFT tables: one to reflect the NMVES (i.e., ACC II and ACT), and another to reflect the latest federal programs (i.e., Multi-Pollutant and Phase 3). Full MOVES run specifications (runspecs) are outlined in Appendix B.

Figure 4-3. Comparison plots of alternative fuel vehicle penetrations under the federal and NMVES programs for passenger cars (top two) and short-haul single unit trucks (bottom two)



Importantly, this approach relates MOVES EFs directly to fuel volumes affected by New Mexico's CTFP. Any changes to baseline fleet and VMT forecasts should have a negligible impact on the projected emission reductions. ERG monetized the health impacts from these emission reductions by pollutant (NO_x, VOCs, $PM_{2.5}$, and SO_2), as described in Chapter 5.

4.2.2 Annual Fleet, Activity, and Fuel Economy Estimates

This analysis compiled VMT and vehicle population estimates from county-level projections from the 2020 NEI, the most recent available at the time of analysis.[32] EPA publishes MOVES CDBs for each U.S. county as part of the NEI process, drawing vehicle population from state registration data and VMT from U.S. Department of Transportation (DOT) Federal Highway Administration (FHWA) data compiled from state transportation departments. ERG converted 2020 NEI CDBs for New Mexico's 33 counties to MOVES5 format with EPA scripts. These CDBs served as the basis for the other CTFP analysis years (2030, 2035, 2040, 2050). This analysis used FHWA VMT growth projections to estimate VMT and population for the analysis years and applied growth rates differently to account for pandemic shutdown effects on 2020 VMT.[33]

Although the 2020 CDBs provide county-specific data on vehicle population and activity, this analysis adjusted 2020 VMT to a pre-pandemic baseline using VMT from the last NEI published prior to the pandemic: 2017. The 2017 NEI provided a consistent basis for adjustment because, like the 2020 NEI, it used data on VMT by MOVES source type and county compiled by FHWA from the New Mexico Department of Transportation (NMDOT).[34] Table 4-1 shows the NEI VMT ratios between 2017 and 2020 VMT as factors to adjust 2020 values back to a pre-pandemic baseline. These adjustments were warranted because 2020 VMT shows marked decreases for passenger vehicles, as well as for some commercial vehicles (light commercial truck, refuse truck, transit bus), but a large increase in short-haul truck activity from higher demand for e-commerce deliveries.

Table 4-1. Pre-pandemic VMT adjustment factors by MOVES vehicle source type

MOVES Source Type	**2017 NEI VMT** (million miles)	**2020 NEI VMT** (million miles)	**Base Year VMT Adjustment Ratios** (2017/2020)
Combination long-haul truck	1,652	1,611	1.03
Combination short-haul truck	846	1,418	0.60
Intercity bus	44	11	4.05
Light commercial truck	1,404	941	1.49
Motor home	21	42	0.49
Motorcycle	394	258	1.52
Passenger car	9,953	6,946	1.43
Passenger truck	13,032	10,969	1.31
Refuse truck	14	9	1.59
School bus	56	114	0.49
Single unit long-haul truck	723	254	2.84

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[32] U.S. Environmental Protection Agency, "2020 National Emissions Inventory (NEI) Data," accessed May 29, 2025, https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data.

[33] Federal Highway Administration, "2024 FHWA Forecasts of Vehicle Miles Traveled (VMT)," June 2024, https://www.fhwa.dot.gov/policyinformation/tables/vmt/vmt_forecast_sum.cfm.

[34] U.S. Environmental Protection Agency, "2017 National Emissions Inventory (NEI) Data," January 2021, https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data.

MOVES Source Type	2017 NEI VMT (million miles)	2020 NEI VMT (million miles)	Base Year VMT Adjustment Ratios (2017/2020)
Single unit short-haul truck	483	1,429	0.34
Transit bus	39	25	1.53

Table 4-2 shows annual VMT growth projections published by FHWA for a baseline case. FHWA also publishes pessimistic and optimistic growth projections. This analysis chose baseline projections to reflect VMT moderate growth. FHWA developed these projections from a pre-pandemic baseline (2019), with one set of growth rates applied for 2040 (also applied to 2030 and 2035) and a lower set of rates applied for 2050.

Table 4-2. Published FHWA VMT growth projections (baseline scenario)

Vehicle Class	Annual Growth	
	2019–2040	2019–2050
Light-duty vehicles	0.5%	0.4%
Single-unit trucks	2.1%	1.9%
Combination trucks	1.3%	1.1%

Equation 4-1 delineates county-level VMT for a future year y as a projection based on its 2020 CDB activity, a defined pandemic adjustment factor α from Table 4-1, and an FHWA growth rate g from Table 4-3. Equation 4-2 describes statewide VMT as simply the summation of all county-level VMT for each year, such that

$$VMT_{y,s,c} = VMT_{2020,s,c} \cdot \alpha_s \cdot (1 - g_s)^{y-2019}$$ **Equation 4-1**

$$VMT_{y,s} = \sum_{c \in C} VMT_{y,s,c}$$ **Equation 4-2**

where $c \in C$ is each county c in the full set of 33 New Mexico counties C for a chosen future analysis year y and MOVES source type s.

This analysis projected county-level vehicle populations in the same manner using the FHWA growth estimates. However, as pandemic effects were attributed only to vehicle activity, this analysis did not apply the base year adjustment to vehicle population, only to VMT. For the 2020s, this analysis applied growth rates to 2020 vehicle population. Table 4-3 shows the aggregate VMT and vehicle population adjustments to 2020 CDBs.

Table 4-3. Computed VMT and vehicle population growth rates by MOVES source type from base year 2020

VMT Growth Rates From 2020	2020–2030	2020–2035	2020–2040	2020–2050
Combination long-haul trucks	1.18	1.26	1.35	1.44

VMT Growth Rates From 2020	2020–2030	2020–2035	2020–2040	2020–2050
Combination short-haul trucks	0.69	0.73	0.78	0.84
Intercity buses	5.08	5.64	6.26	7.25
Light commercial trucks	1.58	1.62	1.66	1.69
Motor homes	0.62	0.69	0.76	0.89
Motorcycles	1.61	1.65	1.69	1.72
Passenger cars	1.51	1.55	1.59	1.62
Passenger trucks	1.39	1.42	1.46	1.48
Refuse trucks	2.00	2.22	2.46	2.85
School buses	0.61	0.68	0.76	0.88
Single unit long-haul trucks	3.57	3.96	4.40	5.09
Single unit short-haul trucks	0.43	0.47	0.52	0.61
Transit buses	1.93	2.14	2.37	2.75
Vehicle Population Growth Factors From 2020	**2020–2030**	**2020–2035**	**2020–2040**	**2020–2050**
Combination long-haul trucks	1.14	1.21	1.29	1.39
Combination short-haul trucks	1.14	1.21	1.29	1.39
Intercity buses	1.23	1.37	1.52	1.76
Light commercial trucks	1.05	1.08	1.10	1.13
Motor homes	1.23	1.37	1.52	1.76
Motorcycles	1.05	1.08	1.10	1.13
Passenger cars	1.05	1.08	1.10	1.13
Refuse trucks	1.23	1.37	1.52	1.76
School buses	1.23	1.37	1.52	1.76
Single-unit long-haul trucks	1.23	1.37	1.52	1.76
Single unit short-haul trucks	1.23	1.37	1.52	1.76
Transit buses	1.23	1.37	1.52	1.76

The resulting MOVES vehicle populations and VMT, particularly for light-duty ZEVs, only offered a starting point for additional adjustment that would match New Mexico's current NMVES policy. BRG documents adjustments to the MOVES fleet and activity in Appendix A of their BCA Report.

4.2.3 Use of BRG-Derived Transportation Fuel Volumes in Emission Calculations

BRG used statewide MOVES estimates for vehicle populations and VMT to project annual onroad and nonroad transportation fuel use, including electricity. BRG forecasts that most fuel volumes will not change between New Mexico's NMVES and CTFP policies—such that differences only arise in volumes of R100 and a modest biodiesel blend (B5) displacing finished fossil diesel (B0). Changes to these finished diesel blends under the "CTFP-only" scenario produce all emission reductions from that scenario, as shown in Figure 4-4 and Table 4-4.

Figure 4-4. Annual onroad transportation fuel volume forecast of B0, B5, and R100 under New Mexico's CTFP (in gallons of fuel), from BRG

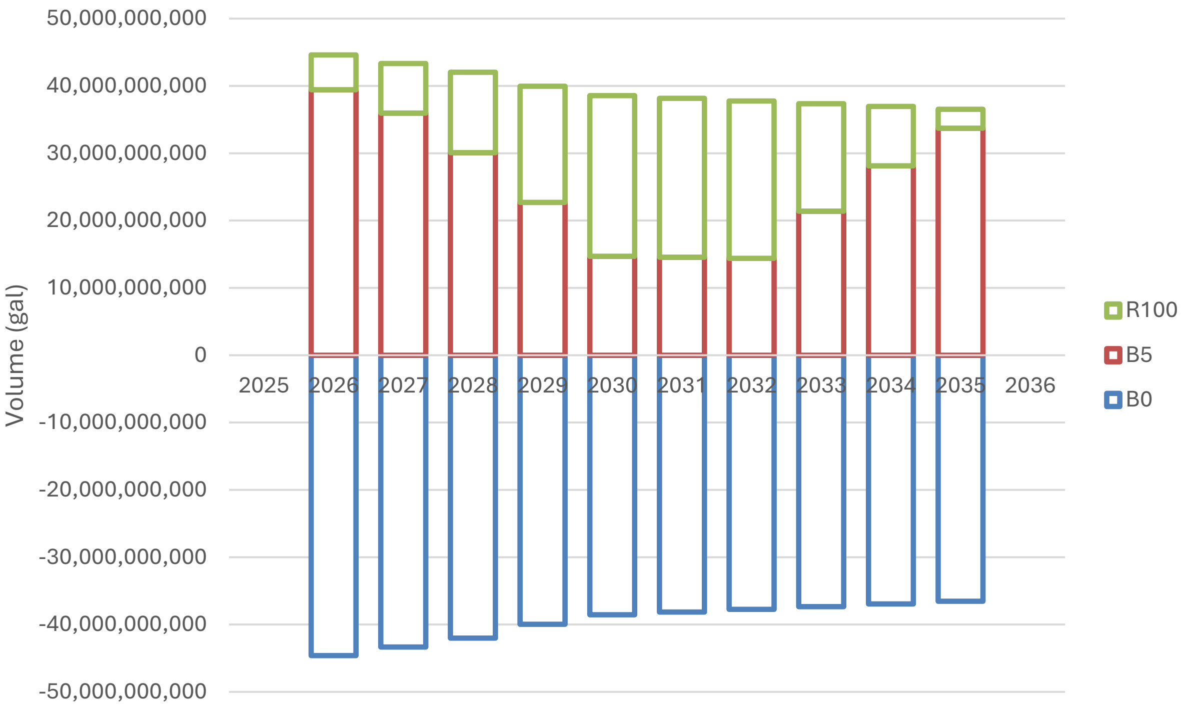

Table 4-4. Table of forecast CTFP onroad transportation fuel volumes by fuel type and year (in gallons of fuel), provided by BRG

Year	B0	B5	R100
2026	-44,604,453,652	39,428,561,069	5,175,157,305
2027	-43,340,739,532	35,977,408,866	7,362,659,746
2028	-42,024,772,428	30,084,855,735	11,939,355,660
2029	-39,954,709,707	22,709,564,060	17,244,722,150
2030	-38,557,134,136	14,709,951,142	23,846,908,677
2031	-38,155,426,875	14,556,695,608	23,598,459,808
2032	-37,753,510,253	14,403,360,201	23,349,881,453
2033	-37,351,398,544	21,398,475,921	15,952,523,577
2034	-36,949,000,991	28,134,169,605	8,814,306,729
2035	-36,546,133,234	33,714,052,868	2,831,451,654
Cumulative Total	**-32,936,439,946**	**21,259,757,923**	**11,676,285,563**

For completeness, ERG calculated EFs for all onroad and nonroad fuels produced, imported, or dispensed for use in New Mexico. However, only changes to finished diesel blends affected criteria pollutant emission differences under the "CTFP-only" scenario. The following sections discuss how ERG modeled diesel fuel effects, including blends not available in the default MOVES5 database.

4.2.4 Development of New Mexico-Specific Emission Factors

There are 33 counties in New Mexico, and each county has unique MOVES inputs for onroad vehicle populations and miles traveled from the state's 2020 NEI submission. This analysis used the state's 2020 NEI submission to create CDBs for four future evaluation years (2030, 2035, 2040, and 2050) according to the growth rates described above in Section 4.2.2. This analysis did not explicitly model the uptake of alternative fuels, which came from BRG's transportation fuel markets model as detailed in Section 4.2.3. However, this analysis applies policy-specific alternative fuel vehicle adoption using the MOVES AVFT table for the NMVES (consistent with California's clean car and truck programs) and federal baseline policies, described above in Section 4.2.1.

Other MOVES county-scale inputs from the 2020 NEI, such as vehicle age distributions and fuel properties, were used but not changed over time or by policy. These inputs equated to 165 annual MOVES county-scale runs (33 counties over five years) for the NMVES baseline policy and another 165 runs for the federal baseline policy. These 330 total MOVES runs form the basis of the NMVES EFs developed to estimate statewide CTFP benefits.

ERG developed statewide onroad emission factors EF dependent on MOVES fuel type f, pollutant p, and year y by aggregating county emission inventories EI per energy consumption estimates ε for each calendar year, as laid out in Equation 4-3 below, such that:

$$EF_{f,p,y} = \sum\nolimits_{c \in C} EI_{f,p,y,c} / \varepsilon_{f,p,y,c}. \qquad \textbf{Equation 4-3}$$

where $c \in C$ is each county c across the set of all 33 New Mexico counties C. This analysis then pairs these statewide EFs per energy unit with CTFP fuel volume projections and energy density conversions by fuel, as shown below in Table 4-5. Here, ERG calculated volume-weighted averages of energy density values from the proposed Table 7 in the draft discussion rule.[35]

Table 4-5. Summary of energy densities by fuel blend (based on published CTFP values)

Fuel	Energy Density (MJ/gallon)
B0	134.48
B5	134.06
R100	129.95

For ease of implementation, ERG did not differentiate EFs by MOVES vehicle (regulatory) class. Rather, ERG summed emission inventories and energy over all classes. This leads to a set of

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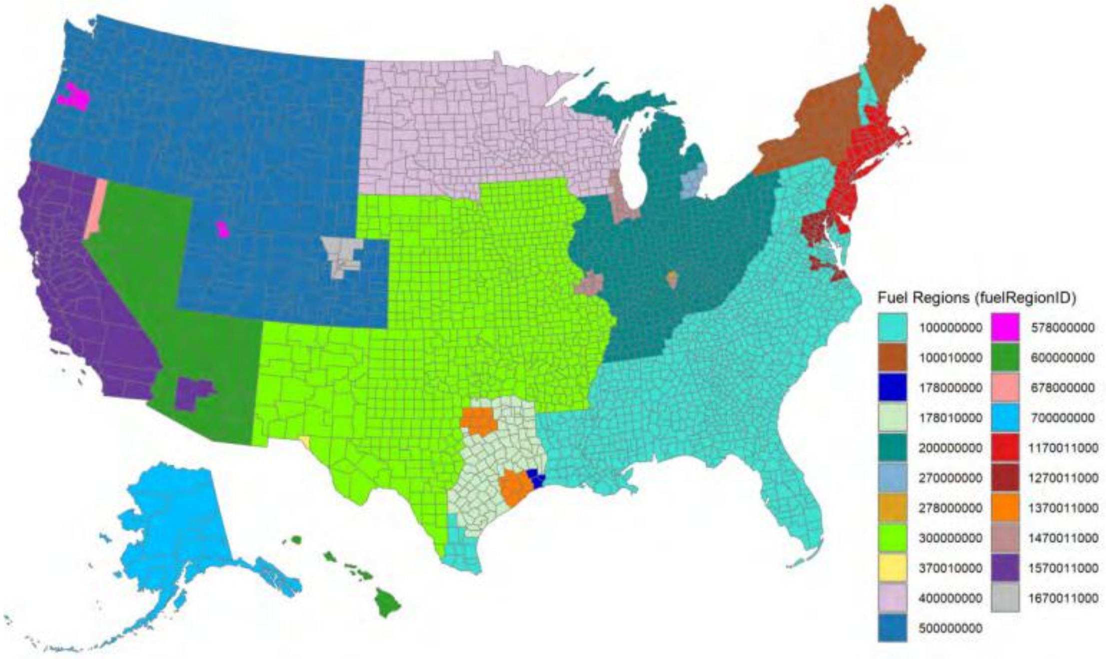
[35] See Table 7 of Subsection (G) of Title 20, Chapter 2, Part 92, Section 701 of the New Mexico Administrative Code (20.2.92.701 NMAC).

onroad transportation fuel volumes and EFs to calculate onroad emission reductions and another set of nonroad transportation fuel volumes and EFs to calculate nonroad reductions.

Although most criteria pollutants can be modeled on a yearly basis to expedite runtime, certain pollutants must be run on an hourly basis to account for diurnal and seasonal effects. This applies to VOC evaporative emissions from fuel tank permeation, leaks, and vapor venting as the vehicle soaks (with its engine off). Evaporative emissions depend more on ambient temperature than on start or running tailpipe exhaust, so MOVES requires users to specify a month and hour of the day for modeling evaporative VOC. ERG chose to run representative 24-hour days in January and July to derive average VOC evaporative EFs by county and then added these to the tailpipe VOC EFs ERG had formulated from MOVES annual county runs.

In addition to the default exhaust and VOC evaporative runs, ERG performed some other targeted MOVES runs to derive EFs for non-default blends of gasoline and diesel; namely, E15, B0, and B5. MOVES contains different fuel regions, and New Mexico's fuel region (which also covers parts of Texas, Oklahoma, and some other states in the Central Plains) assumes that the default gasoline blend contains roughly 10 percent ethanol and the default diesel blend contains 3.75 percent biofuel, as shown in Figure 4-5 below.

Figure 4-5. MOVES fuel region map for 2024 (screenshot from EPA's MOVES5 Regional Fuels Report)



To model E15, B0, and B5 in New Mexico, ERG modified the default blends using the MOVES Fuel Wizard and ran them in Bernalillo County (Albuquerque and its suburbs, which is the state's largest metropolitan area) as a representative county. As with the statewide EFs, ERG computed E15, B0, and B5 exhaust and evaporative EFs using emission inventories and energy consumption by fuel and pollutant. In total, ERG performed 330 statewide exhaust runs, along with 330 statewide evaporative runs and another 30 representative special blend runs for developing New Mexico-specific onroad EFs.

ERG developed New Mexico nonroad EFs in much the same fashion, running nonroad emission inventories according to a 24-hour day for both weekdays and weekends. ERG then found a daily average for each month and multiplied that by the number of days per month to calculate annual nonroad emissions. As with onroad EFs, ERG formulated nonroad EFs using county emission inventories by fuel and pollutant, along with brake-specific fuel consumption (BSFC, in grams) and MOVES default fuel densities (in grams per gallon of fuel) instead of energy consumption.[36]

As discussed, MOVES does not explicitly model all years. This analysis also needed to provide New Mexico EFs for interim years between every five-year increment from 2020 to 2050. ERG accomplished this through linear piecewise interpolations by fuel and pollutant. Since ERG generated transportation fuel volumes for each year in this period, having explicit annual EFs by fuel facilitated the calculation of CTFP emission reductions.

Despite a robust database, MOVES does not model certain diesel blends, such as B5 for nonroad applications and R100 for both onroad and nonroad applications. ERG applied B5 and R100 fuel effects from external sources, as detailed in Section 4.3.

4.3 Fuel Effects

Fossil diesel (B0, or "clear diesel") is well studied and available for modeling in MOVES for onroad and nonroad applications. As discussed in Section 4.2.4, ERG has developed B0 EFs for the previously noted criteria pollutants (NO_x, VOCs, $PM_{2.5}$, and SO_2) using the MOVES Fuel Wizard for Bernalillo County. ERG performed a similar onroad analysis of B5, which is one of the most common BD blends available commercially in the United States today. However, MOVES does not have any information on nonroad fuel effects for B5, so ERG had to rely on external data sources for developing nonroad B5 EFs. Likewise, MOVES does not have default data on RD (R100) for onroad or nonroad applications, so ERG also developed R100 EFs from external sources. This section describes how ERG derived CAP emissions from onroad and nonroad R100 use, in addition to nonroad B5 use.

This analysis projects BD and RD volumes for onroad and nonroad applications under the CTFP. However, because directly applicable MOVES data were not available, this analysis developed emission adjustments to reflect two recent studies of BD and RD fuel effects on diesel engine emissions: a meta-analysis of BD effects on modern diesel engines published by the International Council on Clean Transportation (ICCT),[37] and a study of RD emissions research and testing published by the University of California Riverside College of Engineering-Center for Environmental Research and Technology (UCR CE-CERT).[38]

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[36] U.S. Environmental Protection Agency, "Exhaust and Crankcase Emission Factors for Nonroad Compression-Ignition Engines in MOVES3.0.2," September 2021, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1013KWQ.pdf.

[37] Jane O'Malley and Stephanie Searle, "Air Quality Impacts of Biodiesel in the United States" (International Council on Clean Transportation, March 2021), https://theicct.org/wp-content/uploads/2021/06/US-biodiesel-impacts-mar2021.pdf.

[38] Thomas Durbin et al., "Low Emission Diesel (LED) Study: Biodiesel and Renewable Diesel Emissions in Legacy and New Technology Diesel Engines," November 2021,

4.3.1 Source of Biodiesel Effects

BD effects for onroad vehicles operating on a B20 blend from MOVES5 were the basis for adjustments used in the CTFP analysis, as shown in Table 4-6 below. These effects were aggregated from a meta-analysis of several published studies conducted on legacy onroad engines without exhaust aftertreatment (pre-2007 model year). In MOVES, modern (2007 or later) engines are assumed to have equivalent emissions whether they run on B0 or B20. A similar meta-analysis published in 2021 by the ICCT found comparable results.[39]

Table 4-6. B20 emission effects from MOVES and ICCT meta-analyses relative to B0 (summary table replicated from ERG's 2022 white paper for the City of Portland)[40]

	ICCT 2021			MOVES5	
	Pre-2004	2004 EGR/CR	2007+ DPF/SCR	Pre-2007	2007+ DPF/SCR
NO_x	↑2%	↑4%	Not reported	↑2%	No effect applied
PM	↓6%	—		↓16%	
HC	↓4%	↑7%		↓14%	
CO	—	↑10%		↓13%	

Although ERG generated specific B5 onroad emissions using the MOVES built-in Fuel Wizard, ERG could not make those same fuel adjustments for nonroad modeling. Lacking specific B20 fuel effects for nonroad use in ERG's CTFP MOVES runs, ERG scaled the MOVES onroad effects from Table 4-6 for B5 nonroad emissions in the CTFP. Note the slight NO_x disbenefit for legacy BD engines. The same effects, however, do not carry over to modern BD engines with the latest aftertreatment—namely, selective catalytic reduction (SCR) and diesel particulate filter (DPF).

4.3.2 Source of Renewable Diesel Effects

This analysis synthesized RD effects from the 2021 UCR study, which tested three engines of different vintages and use cases. The study includes one legacy (EPA Tier 3) nonroad engine, one modern (EPA Tier 4) nonroad engine, and one recent (model year 2007+) onroad engine for varying RD and BD blends, as shown in Table 4-7 below. The CTFP analysis focused on R100 fuel effects.

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https://ww2.arb.ca.gov/resources/documents/low-emission-diesel-led-study-biodiesel-and-renewable-diesel-emissions-legacy.

[39] Jane O'Malley and Stephanie Searle, "Air Quality Impacts of Biodiesel in the United States" (International Council on Clean Transportation, March 2021), https://theicct.org/wp-content/uploads/2021/06/US-biodiesel-impacts-mar2021.pdf.

[40] American Lung Association, "Who Is Most Affected by Outdoor Air Pollution?," accessed June 3, 2025, https://www.lung.org/clean-air/outdoors/who-is-at-risk.

Table 4-7. Renewable diesel emission effects from UCR study relative to B0 (table also replicated from ERG’s 2022 Portland white paper)

	Onroad	**Nonroad**	
	Modern (model year 2007+)	**Legacy** (Tier 3)	**Modern** (Tier 4)
R100			
NO_x	—	↓ 5%	—
PM	—	↓ 27%–38%	—
HC	—	↓ 35%–45%	—
CO	↓ 5%	↓ 14%–22%	↓ 44%

Without UCR test data for legacy onroad engines, ERG decided to apply legacy R100 effects from nonroad testing for onroad applications as well. Considering that most legacy effects were presented as ranges, ERG selected and applied the midpoint effect for each pollutant to the base MOVES fossil diesel (B0) EFs.

4.3.3 Simulate B5 Emissions (Nonroad Only)

As noted above, ERG was able to model onroad B5 emissions using built-in MOVES5 fuel functionality. For nonroad B5 emissions, ERG needed to apply fuel effects by vehicle vintage externally. To determine vintage depending on evaluation year (2020, 2030, 2035, 2040, and 2050), ERG calculated the legacy-modern splits (pre-2007 or 2007+) for Bernalillo County. In practice, this means that B5 effects will be greater in earlier years. Besides NO_x (which modestly increases legacy engine CAP emissions), all other CAPs have dampening reductions from 2020 to 2050 compared to B0 as affected legacy engines leave the fleet, as shown in Table 4-8 below.

Table 4-8. Vintage-weighted CTFP B5 fuel effects from 2020 to 2050

Fuel	Pollutant	Year	Adjustment Factor
B5	THC	2020	0.974
B5	THC	2030	0.985
B5	THC	2035	0.0991
B5	THC	2040	0.995
B5	THC	2050	0.999
B5	CO	2020	0.974
B5	CO	2030	0.981
B5	CO	2035	0.87
B5	CO	2040	0.992
B5	CO	2050	0.998
B5	NO_x	2020	1.003
B5	NO_x	2030	1.001
B5	NO_x	2035	1.000
B5	NO_x	2035	1.000
B5	NO_x	2040	1.000
B5	NO_x	2050	1.000

Fuel	Pollutant	Year	Adjustment Factor
B5	$PM_{2.5}$	2020	0.968
B5	$PM_{2.5}$	2030	0.976
B5	$PM_{2.5}$	2035	0.983
B5	$PM_{2.5}$	2040	0.989
B5	$PM_{2.5}$	2050	0.998
B5	VOC	2020	0.974
B5	VOC	2030	0.985
B5	VOC	2030	0.985
B5	VOC	2035	0.991
B5	VOC	2040	0.995
B5	VOC	2050	0.999

4.3.4 Simulate R100 Emissions (Onroad and Nonroad)

Given that it is not possible to model renewable diesel effects in MOVES currently, ERG needed to apply R100 effects externally for both onroad and nonroad use by vehicle vintage. To apply the following R100 fuel effects appropriately, ERG used the same Bernalillo legacy-modern splits, as described in the previous subsection on B5 emissions. Likewise, ERG also saw a similar trend of R100 effects converging towards fossil diesel (R0) emissions over time for all pollutants except CO, which has significantly lower emissions than R0 for modern nonroad engines, as shown in Table 4-9. As a result, RD loses benefits over time due fleet turnover and fossil diesel emission improvements rather than lost efficacy.

Table 4-9. Vintage-weighted onroad and nonroad CTFP R100 fuel effects from 2020 to 2050

Fuel	Pollutant	Year	Nonroad Adjustment Factor	Onroad Adjustment Factor
R100	THC	2020	0.701	0.777
R100	THC	2030	0.826	0.925
R100	THC	2035	0.898	0.967
R100	THC	2040	0.948	0.980
R100	THC	2050	0.993	1.000
R100	CO	2020	0.764	0.904
R100	CO	2030	0.710	0.941
R100	CO	2035	0.666	0.947
R100	CO	2040	0.625	0.948
R100	CO	2050	0.572	0.950
R100	NO_x	2020	0.972	0.979
R100	NO_x	2030	0.990	0.994
R100	NO_x	2035	0.995	0.997
R100	NO_x	2040	0.998	0.998
R100	NO_x	2050	1.000	1.000
R100	$PM_{2.5}$	2020	0.741	0.725

Fuel	Pollutant	Year	Nonroad Adjustment Factor	Onroad Adjustment Factor
R100	$PM_{2.5}$	2030	0.809	0.799
R100	$PM_{2.5}$	2035	0.861	0.849
R100	$PM_{2.5}$	2040	0.913	0.885
R100	$PM_{2.5}$	2050	0.982	1.000
R100	VOC	2020	0.701	0.777
R100	VOC	2030	0.826	0.925
R100	VOC	2035	0.898	0.967
R100	VOC	2040	0.948	0.980
R100	VOC	2050	0.993	1.000

4.4 Baseline Emission Adjustments

In contrast to the CTFP scenario, the NMVES and federal baseline are not directly tied to changes in fuel volumes and instead rely on ERG's initial MOVES modeling. However, BRG has continued to modify MOVES fleet and activity estimates, as well as fuel projections—particularly for the NMVES and federal baseline scenarios—over this rulemaking to ensure that New Mexico's current electrification and other fuel switching targets can reasonably be achieved. While the CTFP emission benefits could quickly be recalculated with the latest volumes and corresponding EFs, this was not the case for two static baseline scenarios.

To account for changes to the NMVES and federal baseline fuel projections and their effects on emissions, ERG derived separate annual emission adjustments by scenario using the initial (unmodified) MOVES-based volumes and the BRG-modified volumes for the final rule. In Equation 4-4, ERG summarized an adjusted baseline emission inventory E' between the NMVES and the federal baseline as the initial (MOVES) emission inventory E multiplied by the ratio of the final volume over the initial volume for each fuel f, scenario s, and year y, such that

$$E_{f,s,y}{}' = E_{f,s,y} \cdot \left(V_{f,s,y,final}/V_{f,s,y,initial}\right). \qquad \textbf{Equation 4-4}$$

Lacking differential impacts by criteria pollutant, ERG decided to apply the same adjustment ratios to each pollutant, which still yields to some differences over time. Table 4-10 and Table 4-11 supply specific emission adjustment ratios for the NMVES and federal baseline scenario, respectively. Emission results for the final rule include adjustments to both baseline scenarios. As noted before, emission adjustments to the CTFP scenario were simply recalculated using updated fuel volumes.

Table 4-10. Adjustment ratios for NMVES scenario for BRG-supplied fuel projections, based on differences between MOVES raw fuel projections and after BRG modification

Year	Gasoline	Ethanol	Diesel	BD	RD	Electricity	H_2	CNG	RNG	Propane
2025	1.167	1.167	1.041	1.041	1.000	0.082	0.000	1.125	1.000	1.000
2026	1.172	1.172	1.041	1.041	1.000	0.094	0.000	1.137	1.000	1.000
2027	1.162	1.162	1.037	1.037	1.000	0.195	0.000	1.148	1.000	1.000
2028	1.143	1.143	1.031	1.031	1.000	0.321	0.000	1.158	1.000	1.000
2029	1.121	1.121	1.024	1.024	1.000	0.445	0.000	1.168	1.000	1.000

Year	Gasoline	Ethanol	Diesel	BD	RD	Electricity	H_2	CNG	RNG	Propane
2030	1.097	1.097	1.015	1.015	1.000	0.554	0.000	1.176	1.000	1.000
2031	1.115	1.115	1.026	1.026	1.000	0.595	0.282	1.184	1.000	1.000
2032	1.131	1.131	1.039	1.039	1.000	0.634	0.314	1.191	1.000	1.000
2033	1.144	1.144	1.051	1.051	1.000	0.669	0.328	1.199	1.000	1.000
2034	1.160	1.160	1.063	1.063	1.000	0.691	0.336	1.206	1.000	1.000
2035	1.191	1.191	1.076	1.076	1.000	0.693	0.342	1.212	1.000	1.000
2036	1.199	1.199	1.082	1.082	1.000	0.718	0.363	1.205	1.000	1.000
2037	1.207	1.207	1.088	1.088	1.000	0.740	0.381	1.198	1.000	1.000
2038	1.218	1.218	1.094	1.094	1.000	0.756	0.397	1.191	1.000	1.000
2039	1.235	1.235	1.100	1.100	1.000	0.766	0.411	1.185	1.000	1.000
2040	1.271	1.271	1.105	1.105	1.000	0.761	0.423	1.178	1.000	1.000
2041	1.293	1.293	1.099	1.099	1.000	0.766	0.449	1.170	1.000	1.000
2042	1.307	1.307	1.093	1.093	1.000	0.775	0.473	1.163	1.000	1.000
2043	1.313	1.312	1.087	1.087	1.000	0.790	0.496	1.155	1.000	1.000
2044	1.309	1.309	1.081	1.081	1.000	0.810	0.518	1.148	1.000	1.000
2045	1.298	1.298	1.074	1.074	1.000	0.832	0.539	1.141	1.000	1.000
2046	1.280	1.280	1.068	1.068	1.000	0.856	0.559	1.135	1.000	1.000
2047	1.260	1.260	1.061	1.061	1.000	0.878	0.578	1.128	1.000	1.000
2048	1.242	1.242	1.055	1.055	1.000	0.897	0.596	1.122	1.000	1.000
2049	1.242	1.242	1.048	1.048	1.000	0.907	0.614	1.116	1.000	1.000
2050	1.251	1.251	1.041	1.041	1.000	0.913	0.631	1.111	1.000	1.000

Table 4-11. Adjustment ratios for federal baseline scenario for BRG-supplied fuel projections, based on differences between MOVES raw fuel projections and after BRG modification

Year	Gasoline	Ethanol	Diesel	BD	RD	Electricity	H_2	CNG	RNG	Propane
2025	1.012	1.012	1.005	0.987	1.000	5.663	1.000	1.001	1.000	1.000
2026	1.027	1.027	1.006	0.987	1.000	1.508	1.000	1.001	1.000	1.000
2027	1.038	1.038	1.007	0.989	1.000	1.263	1.000	1.001	1.000	1.000
2028	1.054	1.054	1.009	0.991	1.000	1.045	1.000	1.000	1.000	1.000
2029	1.076	1.076	0.997	0.979	1.000	0.889	1.000	1.000	1.000	1.000
2030	1.024	1.024	1.000	0.982	1.000	0.743	1.000	1.000	1.000	1.000
2031	1.010	1.010	1.000	0.982	1.000	0.856	1.000	1.000	1.000	1.000
2032	0.993	0.993	1.000	0.982	1.000	0.955	1.000	1.000	1.000	1.000
2033	0.994	0.994	1.000	0.982	1.000	0.948	1.000	1.000	1.000	1.000
2034	1.009	1.009	1.000	0.982	1.000	0.901	1.000	1.000	1.000	1.000
2035	1.012	1.012	1.000	0.982	1.000	0.900	1.000	1.000	1.000	1.000
2036	1.009	1.009	1.000	0.982	1.000	0.916	1.000	1.000	1.000	1.000
2037	1.008	1.007	1.000	0.982	1.000	0.925	1.000	1.000	1.000	1.000
2038	1.005	1.005	1.000	0.982	1.000	0.933	1.000	1.000	1.000	1.000
2039	1.004	1.004	1.000	0.982	1.000	0.935	1.000	1.000	1.000	1.000
2040	1.010	1.010	1.000	0.982	1.000	0.924	1.000	1.000	1.000	1.000

Year	Gasoline	Ethanol	Diesel	BD	RD	Electricity	H_2	CNG	RNG	Propane
2041	1.013	1.013	1.000	0.982	1.000	0.921	1.000	1.000	1.000	1.000
2042	1.012	1.012	1.000	0.982	1.000	0.923	1.000	1.000	1.000	1.000
2043	1.013	1.013	1.000	0.982	1.000	0.922	1.000	1.000	1.000	1.000
2044	1.014	1.014	1.000	0.982	1.000	0.923	1.000	1.000	1.000	1.000
2045	1.012	1.012	1.000	0.982	1.000	0.926	1.000	1.000	1.000	1.000
2046	1.008	1.008	1.000	0.982	1.000	0.931	1.000	1.000	1.000	1.000
2047	1.003	1.003	1.000	0.982	1.000	0.937	1.000	1.000	1.000	1.000
2048	0.996	0.996	1.000	0.982	1.000	0.943	1.000	1.000	1.000	1.000
2049	0.989	0.989	1.000	0.982	1.000	0.949	1.000	1.000	1.000	1.000
2050	0.989	0.989	1.000	0.982	1.000	0.948	1.000	1.000	1.000	1.000

Generally, ERG found that these adjustments dampen NMVES emission reductions through less aggressive electrification curves, while still achieving the state's GHG targets, which allows for more reductions to be met via CTFP and other fuels (see Appendix B for more adjustment details). The next section presents emission results through 2050 for all monetized pollutants considered.

4.5 Results

4.5.1 Annual Emission Reductions by Pollutant

Annual emission reductions by criteria pollutant and analysis year have been calculated as the summation of three elements: (1) MOVES-generated emission factor EF by fuel f, pollutant p, and year y, (2) fuel volume delta V between the CTFP and NMVES policies by fuel and year, and (3) energy density ρ of the given fuel, as shown in Equation 4-5, such that

$$e_{p,y} = \sum_{f \in F} EF_{f,p,y} \cdot V_{f,y} \cdot \rho_f, \qquad \textbf{Equation 4-5}$$

where $f \in F$ is the given fuel f within the full set of possible fuels F (namely B0, B5, and R100) for the specified pollutant p and chosen year y. ERG used specific energy densities by blend, provided earlier in Table 4-5. Cumulative reductions CR are simply the annual emissions summed over the span of active CTFP years Y (that is, $y \in Y$ will be 2026 through 2035) as shown in Equation 4-6, such that

$$CR_p = \sum_{y \in Y} e_{p,y}. \qquad \textbf{Equation 4-6}$$

For the final CTFP rule, ERG has prepared annual emission reductions expected for the combined suite of CTFP and NMVES policies over their entire time horizon (2026 to 2050). Given that BRG has provided onroad and nonroad CTFP fuel forecasts separately, ERG also presents individual onroad and nonroad emission results. For more complete context, all CTFP reductions are referenced against the NMVES policy and all NMVES benefits are referenced against the federal baseline. Figure 4-6 through Figure 4-9 summarize emission reductions by policy scenario for NO_x, VOC, PM, and SO_2, respectively.

Figure 4-6. Annual NO_x reductions for NMVES and CTFP scenarios by mode (in tons)

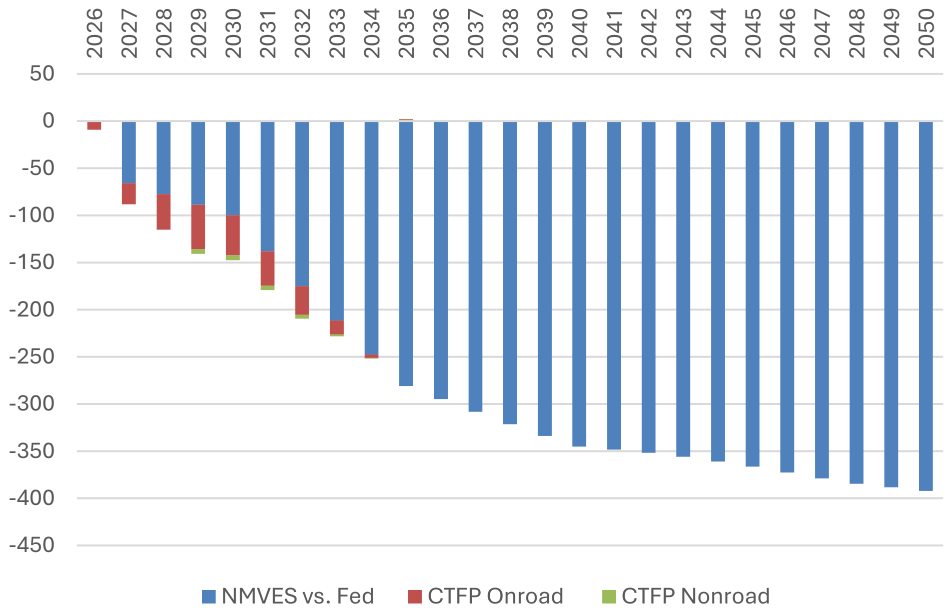


Figure 4-7. Annual VOC reductions for NMVES and CTFP scenarios by mode (in tons)

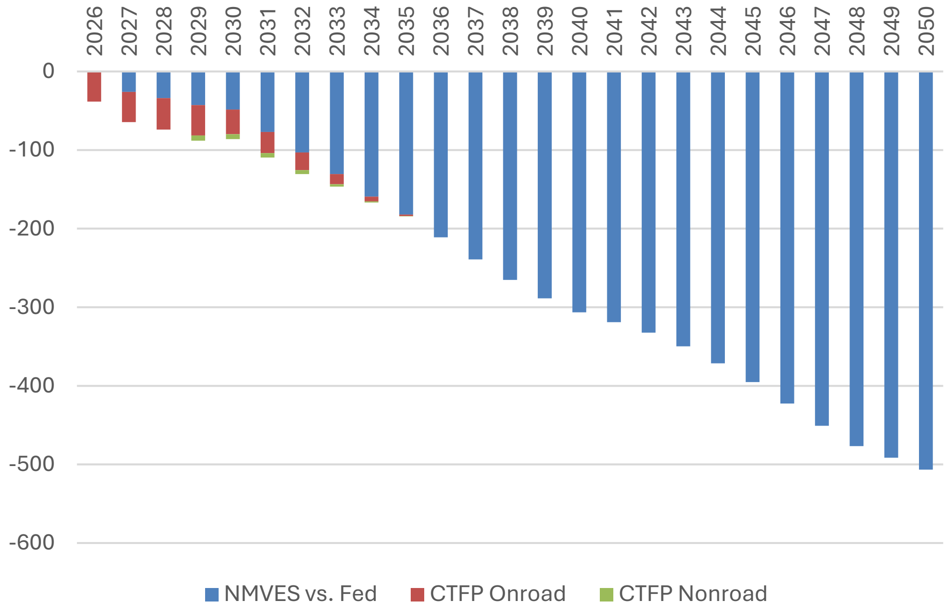


Figure 4-8. Annual $PM_{2.5}$ reductions for NMVES and CTFP scenarios by mode (in tons)

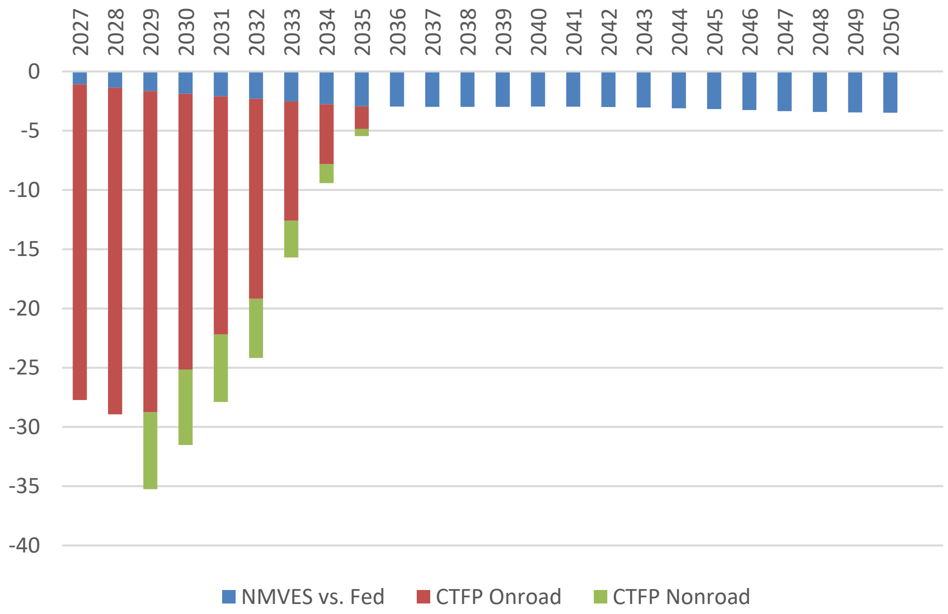
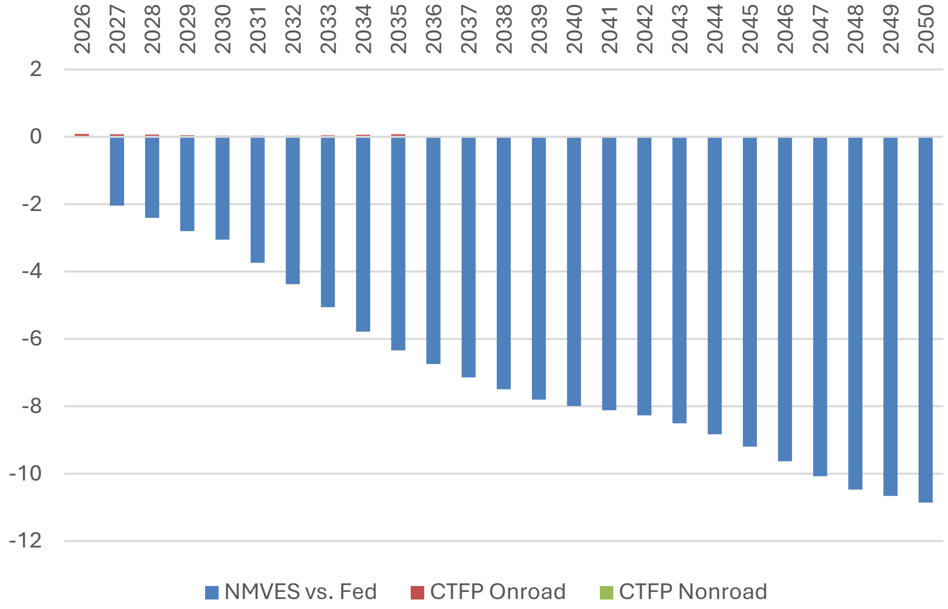


Figure 4-9. Annual SO_2 reductions for NMVES and CTFP scenarios by mode (in tons)



In general, ERG found that emission reductions for most pollutants are driven by the NMVES, although the CTFP is dominant as a driver of reductions in $PM_{2.5}$, at least for the early years. There are modest initial CTFP emission increases for SO_2 (probably from the prevalence of low-sulfur fuel use in New Mexico); otherwise, emissions appear to decrease monotonically over time.

4.5.2 Emissions Reduced for Combined Program and CTFP-Only Policy

It is often helpful to consider the combined impacts of both the CTFP and the NMVES to understand the magnitude of benefits from the individual policies. On the following pages, ERG provides emission results for the suite of policies in two different formats.

Table 4-12 is an aggregation of Table 4-13, which shows annual emission reductions independently for the three policy scenarios ERG explicitly modeled: (1) NMVES (as compared to the federal baseline), (2) CTFP onroad, and (3) CTFP nonroad.

Table 4-12 presents annual results for the CTFP-only policy (which adds the CTFP onroad and nonroad results from Table 4-13 for each year together by pollutant), along with the combined NMVES and CTFP policy suite (which adds all three columns from Table 4-13 together by pollutant) for the best comparability between these two policy scenarios.

4.6 Data Sharing

These summaries of emission reductions have been shared with ERG’s Economics team for use in COBRA (health effects) and IMPLAN (macroeconomic) modeling that is documented carefully in subsequent sections of this report. Emission results have also been thoroughly reviewed and validated by NMED and BRG prior to inclusion in the CTFP final rule.

Table 4-12. Annual emission reductions through 2050 by pollutant for the combined NMVES and CTFP policy suite, as well as the CTFP alone (negative values equate to reductions in tons)

	NO_x		VOC		$PM_{2.5}$		SO_2	
Year	**Combined**	**CTFP-Only**	**Combined**	**CTFP-Only**	**Combined**	**CTFP-Only**	**Combined**	**CTFP-Only**
2026	-9.12	-9.12	-38.39	-38.39	-26.76	-26.76	0.09	0.09
2027	-88.30	-22.54	-64.53	-38.56	-27.73	-26.65	-1.97	0.08
2028	-115.16	-37.73	-73.92	-40.01	-28.93	-27.56	-2.34	0.06
2029	-140.75	-52.08	-88.02	-45.30	-35.26	-33.59	-2.75	0.05
2030	-147.49	-47.73	-86.10	-37.70	-31.52	-29.64	-3.02	0.03
2031	-179.24	-41.20	-109.55	-32.55	-27.89	-25.79	-3.71	0.03
2032	-209.47	-34.48	-130.46	-27.32	-24.17	-21.87	-4.34	0.03
2033	-228.22	-16.78	-146.48	-15.95	-15.70	-13.17	-5.01	0.05
2034	-251.79	-4.43	-166.81	-7.54	-9.43	-6.66	-5.72	0.06
2035	-278.77	2.26	-184.36	-2.29	-5.46	-2.51	-6.26	0.08
2036	-294.77	0.00	-211.00	0.00	-2.96	0.00	-6.75	0.00
2037	-308.30	0.00	-239.11	0.00	-2.98	0.00	-7.14	0.00
2038	-321.36	0.00	-265.15	0.00	-2.99	0.00	-7.50	0.00
2039	-333.89	0.00	-288.71	0.00	-2.99	0.00	-7.80	0.00
2040	-345.19	0.00	-306.37	0.00	-2.96	0.00	-7.99	0.00
2041	-348.39	0.00	-319.06	0.00	-2.97	0.00	-8.12	0.00
2042	-351.75	0.00	-332.32	0.00	-3.00	0.00	-8.27	0.00
2043	-355.95	0.00	-349.74	0.00	-3.04	0.00	-8.51	0.00
2044	-360.97	0.00	-371.28	0.00	-3.10	0.00	-8.83	0.00
2045	-366.45	0.00	-395.23	0.00	-3.17	0.00	-9.20	0.00
2046	-372.57	0.00	-422.62	0.00	-3.26	0.00	-9.63	0.00
2047	-378.82	0.00	-450.82	0.00	-3.34	0.00	-10.08	0.00
2048	-384.62	0.00	-476.72	0.00	-3.42	0.00	-10.47	0.00
2049	-388.34	0.00	-491.54	0.00	-3.45	0.00	-10.66	0.00
2050	-392.09	0.00	-506.55	0.00	-3.49	0.00	-10.86	0.00
2026-2030	**-500.81**	**-169.21**	**-350.96**	**-199.96**	**-150.2**	**-144.21**	**-9.99**	**0.31**
2031-2040	**-2751.02**	**-94.63**	**-2048.00**	**-85.65**	**-97.51**	**-69.99**	**-62.22**	**0.25**
2041-2050	**-3699.95**	**0.00**	**-4115.87**	**0.00**	**-32.23**	**0.00**	**-94.63**	**0.00**

Table 4-13. Annual emission reductions for (1) NMVES compared to federal baseline, (2) CTFP onroad, and (3) CTFP nonroad through 2050

	NO_x			VOC			$PM_{2.5}$			SO_2		
Year	***NMVES***	***CTFP Onroad***	***CTFP Nonroad***	***NMVES vs. Fed***	***CTFP Onroad***	***CTFP Nonroad***	***NMVES vs. Fed***	***CTFP Onroad***	***CTFP Nonroad***	***NMVES vs. Fed***	***CTFP Onroad***	***CTFP Nonroad***
2026		-9.120			-38.390			-26.763			0.085	
2027	-65.762	-22.537		-25.970	-38.564		-1.079	-26.650		-2.043	0.077	
2028	-77.422	-37.734		-33.910	-40.007		-1.366	-27.565		-2.407	0.065	
2029	-88.664	-47.054	-5.029	-42.717	-38.726	-6.576	-1.663	-27.102	-6.490	-2.798	0.048	0.000
2030	-99.758	-42.517	-5.217	-48.403	-31.403	-6.294	-1.885	-23.263	-6.372	-3.050	0.032	0.000
2031	-138.046	-36.555	-4.641	-77.000	-26.943	-5.604	-2.102	-20.087	-5.700	-3.742	0.032	0.000
2032	-174.991	-30.460	-4.023	-103.147	-22.442	-4.875	-2.302	-16.879	-4.989	-4.373	0.032	0.000
2033	-211.446	-14.727	-2.051	-130.532	-13.008	-2.937	-2.527	-10.075	-3.094	-5.058	0.049	0.000
2034	-247.362	-3.843	-0.587	-159.271	-6.101	-1.442	-2.766	-5.051	-1.610	-5.784	0.064	0.000
2035	-281.033	1.968	0.291	-182.067	-1.835	-0.460	-2.949	-1.899	-0.608	-6.341	0.077	0.000
2036	-294.771			-210.997			-2.964			-6.748		
2037	-308.303			-239.111			-2.979			-7.143		
2038	-321.364			-265.149			-2.986			-7.496		
2039	-333.887			-288.710			-2.985			-7.803		
2040	-345.190			-306.366			-2.959			-7.991		
2041	-348.389			-319.056			-2.974			-8.120		
2042	-351.748			-332.323			-2.995			-8.268		
2043	-355.955			-349.745			-3.038			-8.507		
2044	-360.971			-371.278			-3.100			-8.830		
2045	-366.448			-395.232			-3.172			-9.199		
2046	-372.568			-422.617			-3.256			-9.632		
2047	-378.821			-450.818			-3.342			-10.076		
2048	-384.620			-476.718			-3.417			-10.473		
2049	-388.337			-491.539			-3.452			-10.662		
2050	-392.094			-506.546			-3.488			-10.858		
Total	**-6687.950**	**-242.580**	**-21.258**	**-6229.226**	**-257.421**	**-28.188**	**-65.747**	**-185.333**	**-28.864**	**-167.402**	**-6687.950**	**-242.580**

5. Avoided Health Damages

5.1 Background

5.1.1 Adverse Health Effects on Vehicle Emissions

New Mexico's CTFP, if enacted, will help reduce statewide transportation emissions by lowering the overall CI of the transportation fuel supply through a clean fuel credit market. The reduction of vehicle tailpipe emissions will mitigate CAPs and precursors that exacerbate respiratory symptoms, thereby improving health outcomes. These improvements include mitigating asthma onset and aggravation, cardiovascular disease, reduced lung function, and premature death. Adverse health impacts are especially harmful to vulnerable populations, including older adults, children, and pregnant individuals.[41]

Asthma is one of the most common chronic diseases in New Mexico, with an estimated 9.7 percent of adults afflicted by the disease.[42] Asthma can require hospitalization, routine checkups, medications, and missed work days, which can be costly to the individual and New Mexico's economy.[43] Criteria and precursor pollutant reductions can yield health benefits that are economically quantifiable in monetary (dollar) units. For example, a study in California between 1993 and 2014 found that fine PM and NO_x reductions could reduce the risk of incident asthma in children by up to 20 percent.[44]

5.1.2 Monetization of Health Benefits and/or Damages

ERG input emissions changes, as shown in

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[41] New Mexico Environmental Public Health Tracking, "Asthma," accessed June 3, 2025, https://nmtracking.doh.nm.gov/health/breathing/Asthma.html.

[42] New Mexico Environmental Public Health Tracking, "Asthma," accessed June 3, 2025, https://nmtracking.doh.nm.gov/health/breathing/Asthma.html.

[43] Health Equity Epidemiology Program, Center for Health Protection, New Mexico Department of Health, "NM-IBIS Summary Health Indicator Report: Asthma Prevalence Among Adults," accessed May 23, 2025, https://ibis.doh.nm.gov/indicator/summary/AsthmaPrevAdult.html.

[44] Erika Garcia et al., "Association of Changes in Air Quality With Incident Asthma in Children in California, 1993–2014," *JAMA* 321, no. 19 (May 21, 2019): 1906–15, https://doi.org/10.1001/jama.2019.5357.

Table 4-12 from Chapter 4, into EPA's COBRA Health Impacts Screening and Mapping Tool to assess the CTFP's statewide health impacts.[45] Once a COBRA user inputs potential emission increases or decreases, COBRA conducts multiple modeling steps to monetize health benefits and/or damages. COBRA uses the Source Receptor (S-R) Matrix, an air quality model, to estimate changes in total ambient concentrations of air pollutants that are known to be harmful to human health.[46] COBRA uses peer-reviewed epidemiological literature to estimate how changes in outdoor air quality affect the incidence of various health outcomes.[47] COBRA then multiplies the change in incidence by a monetary value associated with the health outcome, such as the average cost of an emergency room visit related to exacerbated asthma symptoms. Detailed descriptions of these monetization processes can be found in COBRA's User Manual.[48]

5.2 Modeling Approach

5.2.1 COBRA Description

COBRA allows users to better understand how changes in air pollution from clean energy and fuel programs can impact human health.[49] ERG analyzed the potential health impacts of the CTFP on New Mexico residents under the "CTFP-only" and "NMVES + CTFP" scenarios described in Section 4.1. Under the CTFP-only scenario, health impacts occurred from calendar year 2026 to 2035, the final year that the CTFP projected to be "binding" on New Mexico transportation fuel markets.[50] The second scenario includes combined health impacts under NMVES + CTFP, which accounts for the CTFP's impacts as a standalone policy as well as a supporting policy for the NMVES. This analysis modeled NMVES + CTFP scenario effects from calendar year 2026 to 2040 under the assumption that CTFP-supported infrastructure and other measures continue to support NMVES fleet and VMT impacts even after the CTFP ceases to bind on regulated parties after 2035.

ERG ran COBRA for each calendar year with tailored human population projections, as detailed in Section5.2.3, and analyzed the following four criteria air pollutants across New Mexico: (1) $PM_{2.5}$, (2) SO_2, (3) NO_x, and (4) VOCs. All results are presented in 2024 U.S. dollars using a discount rate of 2 percent.

ERG input the changes in pollutants and exported COBRA results for the following health outcome categories:

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[45] U.S. Environmental Protection Agency, "CO-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA)," accessed May 21, 2025, https://www.epa.gov/cobra.

[46] U.S. Environmental Protection Agency, "COBRA Questions and Answers," accessed May 23, 2025, https://www.epa.gov/cobra/cobra-questions-and-answers.

[47] U.S. Environmental Protection Agency, "User's Manual for the CO-Benefits Risk Assessment (COBRA) Screening Model," accessed May 23, 2025, https://www.epa.gov/cobra/users-manual-co-benefits-risk-assessment-cobra-screening-model.

[48] U.S. Environmental Protection Agency, "User's Manual for the CO-Benefits Risk Assessment (COBRA) Screening Model," accessed May 23, 2025, https://www.epa.gov/cobra/users-manual-co-benefits-risk-assessment-cobra-screening-model.

[49] U.S. Environmental Protection Agency, "What Is COBRA?," accessed May 20, 2025, https://www.epa.gov/cobra/what-cobra.

[50] For more information on when and why the CTFP "binds," see Subsection 5.1.3 and Appendix B.7 of the benefits-cost analysis in BRG's BCA Report.

- Mortality [low and high estimates]

- Asthma
    - Symptoms
    - Asthma onset

- Emergency room visits
    - Respiratory
    - All cardiac outcomes
    - Asthma

- Hospital admittance
    - Respiratory
    - Cardio cerebral and peripheral vascular disease
    - Alzheimer's Disease
    - Parkinson's Disease
    - Stroke incidence
    - Out-of-hospital cardiac arrest incidence

- Onset
    - Hay fever/rhinitis incidence
    - Nonfatal heart attacks
    - Lung cancer incidence

- Other impacts
    - Minor restricted activity days
    - Work loss days
    - School loss days

5.2.2 Model Updates and Enhancements

ERG used COBRA Desktop Edition version 5.1.[51] This version includes an updated source-receptor (SR) matrix and health impacts associated with ozone formation. These improvements allowed for additional health outcome categories such as school loss days, asthma symptoms, and hospital admittance for illnesses such as Alzheimer's Disease and Parkinson's Disease. These categories are in addition to those that ERG modeled in its NMVES analysis.[52]

5.2.3 Custom Population Data for New Mexico

ERG imported custom population projections into COBRA for each year from 2026 to 2040 to estimate the health benefits from future emission changes. EPA provides Environmental Benefits Mapping and Analysis Program (BenMAP) population datasets that ERG formatted for COBRA.[53] The

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[51] U.S. Environmental Protection Agency, "COBRA Revision History," accessed May 23, 2025, https://www.epa.gov/cobra/cobra-revision-history.

[52] Eastern Research Group, Inc., "New Mexico Advanced Clean Cars II, Advanced Clean Trucks and Heavy-Duty Omnibus Rules: Assessment of Economic, Health and Environmental Impacts" (New Mexico Environment Department & City of Albuquerque Environmental Health Department, 2023), https://www.env.nm.gov/opf/wp-content/uploads/sites/13/2023/10/EIB-23-56-NMED-Exhibits-45-pg-14-48.pdf.

[53] U.S. Environmental Protection Agency, "COBRA Future Input Files," accessed May 23, 2025, https://www.epa.gov/cobra/cobra-future-input-files.

BenMAP data are provided in five-year increments from 2030 to 2050. ERG used the BenMAP data because COBRA requires granular population data with projections for each age and county. However, the BenMAP data is national and the estimates for New Mexico were higher than projections from state-level sources.

ERG tailored the BenMAP data to align with the University of New Mexico's (UNM) population projections, which include projections for each county in New Mexico from 2010 to 2050 in five-year increments.[54] UNM's projections from 2025 to 2040 are displayed in Table 5-1. To estimate New Mexico's projected county-level population in years outside of those five-year increments, ERG calculated the population each year between 2025 and 2040 using a series of linear regressions for each five-year increment. ERG adjusted BenMAP's age-specific population projections to be proportional to the UNM county-level population estimates for New Mexico. Although national health benefits were not evaluated, ERG ran COBRA with national estimates for other states to allow for flexibility if other state impacts were to be assessed.

Table 5-1. UNM population projections for New Mexico for 2025, 2030, 2035, and 2040

County	Projected 2025	Projected 2030	Projected 2035	Projected 2040
Bernalillo	680,584	683,372	684,673	684,461
Catron	3,539	3,454	3,340	3,193
Chaves	64,822	64,303	63,626	62,740
Cibola	27,045	26,917	26,751	26,536
Colfax	11,859	11,156	10,275	9,170
Curry	48,474	48,504	48,524	48,532
De Baca	1,568	1,417	1,233	1,006
Dona Ana	224,218	228,058	230,554	231,449
Eddy	65,964	69,139	70,992	71,376
Grant	27,482	26,599	25,491	24,077
Guadalupe	4,326	4,179	3,996	3,762
Harding	646	624	596	560
Hidalgo	3,826	3,466	3,030	2,497
Lea	78,781	82,337	84,395	84,796
Lincoln	20,255	20,123	19,945	19,716
Los Alamos	19,857	20,439	20,791	20,883
Luna	25,500	25,593	25,658	25,687
McKinley	72,972	72,761	72,486	72,203
Mora	3,933	3,599	3,190	2,684
Otero	68,287	68,736	68,780	68,821
Quay	8,536	8,356	8,128	7,835
Rio Arriba	40,266	40,247	40,217	40,185
Roosevelt	19,095	18,986	18,712	18,421
Sandoval	157,468	164,648	169,117	170,460

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[54] University of New Mexico, "Population Projections," Geospatial and Population Studies, accessed May 23, 2025, https://gps.unm.edu/pop/population-projections.html.

San Juan	119,657	117,590	113,548	109,362
San Miguel	26,064	24,902	23,435	21,577
Santa Fe	160,347	164,745	167,424	168,148
Sierra	11,323	11,064	10,735	10,313
Socorro	16,008	15,408	14,713	13,992
Taos	35,367	35,949	36,300	36,391
Torrance	14,575	13,947	13,145	12,126
Union	3,895	3,709	3,444	3,178
Valencia	77,118	77,320	77,536	77,825
State Total	**2,143,658**	**2,161,645**	**2,164,780**	**2,153,964**

Table 5-2 presents two examples of New Mexico population data that ERG inputted into COBRA, after adjusting BenMAP's data to be proportional to UNM's total population estimates per county. While the tailored population data has estimates for each individual age, Table 5-2 provides a more condensed overview of age distributions. According to UNM, New Mexico's current population is aging, and the overall population is expected to start declining by 2035.[55] From 2026 to 2040, the largest increases in percentage terms are expected for the 85 and over age group. This is particularly relevant to health benefits because older adults are more susceptible to respiratory illness caused by criteria and precursor pollutants.[56]

Table 5-2. Customized New Mexico population for 2026 and 2040 for COBRA

Age Group	2026	2040	Percent Change
0	29,419	27,141	-8%
1 to 4	119,367	109,378	-8%
5 to 9	148,969	138,328	-7%
10 to 14	147,204	140,769	-4%
15 to 19	118,111	142,373	21%
20 to 24	132,390	137,139	4%
25 to 29	123,627	120,020	-3%
30 to 34	125,769	124,558	-1%
35 to 39	156,191	124,643	-20%
40 to 44	138,569	123,842	-11%
45 to 49	129,708	138,605	7%
50 to 54	107,758	132,058	23%
55 to 59	104,494	122,996	18%
60 to 64	111,706	107,482	-4%
65 to 69	135,993	98,038	-28%
70 to 74	122,938	94,089	-23%
75 to 79	95,055	96,255	1%

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[55] University of New Mexico, "Population Projections," Geospatial and Population Studies, accessed May 23, 2025, https://gps.unm.edu/pop/population-projections.html.

[56] American Lung Association, "Who Is Most Affected by Outdoor Air Pollution?," accessed June 3, 2025, https://www.lung.org/clean-air/outdoors/who-is-at-risk.

80 to 84	67,342	82,585	23%
85 and over	44,530	93,663	110%

5.2.4 Onroad and Nonroad Assumptions

For the CTFP scenario, ERG ran COBRA separately for the onroad and nonroad changes in emissions to appropriately assign emission categories. ERG used the "Highway Vehicles" category for the onroad CTFP emissions and for all NMVES emissions. For the nonroad component of the CTFP emissions, ERG used the "Off-Highway" category. ERG used the highest emission categories as opposed to more granular categories by fuel type because this program is designed to be fuel agnostic. Running COBRA separately for onroad and nonroad also allowed ERG to analyze the onroad and nonroad results independently.

5.3 Results

5.3.1 Quantified Health Outcomes

Emission reductions under the CTFP-only and NMVES + CTFP scenarios reduce the incidence of respiratory and other conditions compared to the baseline. The cumulative avoided incidence values from 2026 to 2035 for the CTFP-only scenario and the cumulative avoided incidence values from 2026 to 2040 for the NMVES + CTFP scenario are shown in Table 5-3 for each health outcome. These avoided incidences translate to monetary values, as detailed below.

Table 5-3. Avoided incidence for CTFP-only and NMVES + CTFP scenarios (cumulative)

Health Outcome Category	Cumulative Avoided Incidence for CTFP-Only Scenario	Cumulative Avoided Incidence for NMVES + CTFP Scenario
Total mortality (low estimate)	0.6	2.0
Total mortality (high estimate)	1.2	2.8
Total asthma symptoms	336.7	1,462.8
Total asthma onset	1.9	8.9
Total emergency room visits	0.7	3.0
Total hospital admittance	0.4	0.6
Total onset*	12.6	59.4
Minor restricted activity days	353.0	466.4
Work loss days	59.9	79.0
School loss days	58.6	712.9

** Includes onset of hay fever/rhinitis, nonfatal heart attacks, and lung cancer.*

The total monetized health benefits are presented as a lower- and upper-bound estimates because COBRA has low and high incidence estimates for mortality. The low estimate is based on an evaluation of $PM_{2.5}$ impacts on mortality by the Harvard T.H. Chan School of Public Health.[57] The high estimate represents $PM_{2.5}$ results based on a study from the journal *Environmental Health*

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[57] Xiao Wu et al., "Evaluating the Impact of Long-Term Exposure to Fine Particulate Matter on Mortality Among the Elderly," *Science Advances* 6, no. 29 (July 2020): eaba5692, https://doi.org/10.1126/sciadv.aba5692.

Perspectives.[58] Presenting a low-to-high monetary benefits range is EPA's standard practice.[59] All health outcomes other than those for mortality are calculated as point estimates, but the total is a range because it includes the range of mortality incidence values.

The total cumulative monetized health benefits in New Mexico from reduced criteria and precursor pollutants are displayed in Table 5-4. For the CTFP-only scenario (2026 to 2035), cumulative benefits range from an estimated $11.0 million to $20.8 million, whereas cumulative benefits of the combined NMVES + CTFP scenario (2026 to 2040) range from $38.2 million to $51.5 million.

Table 5-4. Cumulative statewide health benefits from reduced pollutants by scenario (in million USD, 2024)

Scenario	Timeframe	Cumulative Net Benefits (lower-upper bound)
CTFP-only	2026–2030	$7.0–$13.4
	2026-2035	$11.0–$20.8
NMVES + CTFP	2026–2030	$9.7–$16.5
	2026-2040	$38.2–$51.5

Includes health benefits from both onroad and nonroad fuel use beginning in 2029.

ERG ran COBRA separately for the onroad and nonroad CTFP cases to identify health benefits separately. As displayed in Table 5-5, the onroad cumulative health benefits range from $9.3 million to $17.5 million. The nonroad health benefits begin in 2029 due to the inclusion of dyed fuels under the CTFP pursuant to the proposed rule.[60] Cumulative nonroad health benefits range from $1.7 million to $3.3 million. Onroad contributions account for nearly 85 percent of the total CTFP benefits, and the remaining 15 percent of total benefits are attributed to nonroad.

Table 5-5. Annual statewide health benefits for the CTFP-only onroad and nonroad scenarios (in million USD, 2024)

Calendar Year	$ Onroad Total Health Benefits (lower-upper bound)	$ Nonroad Total Health Benefits (lower-upper bound)	$ Total Health Benefits (lower-upper bound)
2026	$1.1-$2.1		$1.1-$2.1
2027	$1.2-$2.3		$1.2-$2.3
2028	$1.4-$2.5		$1.4-$2.5
2029	$1.4-$2.6	$0.4-$0.7	$1.8-$3.3
2030	$1.3-$2.3	$0.4-$0.7	$1.6-$3.1
2031	$1.1-$2.1	$0.3-$0.7	$1.5-$2.7
2032	$1-$1.8	$0.3-$0.6	$1.3-$2.4
2033	$0.6-$1	$0.2-$0.4	$0.8-$1.4

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[58] C. Arden Pope III et al., "Mortality Risk and Fine Particulate Air Pollution in a Large, Representative Cohort of U.S. Adults," *Environmental Health Perspectives* 127, no. 7 (July 24, 2019): 77007, https://doi.org/10.1289/EHP4438.

[59] U.S. Environmental Protection Agency, "COBRA Questions and Answers," accessed May 23, 2025, https://www.epa.gov/cobra/cobra-questions-and-answers.

[60] See Paragraph 2 of Subsection A of Title 20, Chapter 2, Part 92, Section 102 of the New Mexico Administrative Code (20.2.92.102 NMAC).

2034	$0.3-$0.5	$0.1-$0.2	$0.4-$0.7
2035	$0.1-$0.2	$0-$0.1	$0.1-$0.2
Cumulative	$9.3-$17.5	$1.7-$3.3	$11.0-$20.8

Values in the table may not add to cumulative values due to rounding.

The cumulative total health benefits for the NMVES + CTFP scenario range from an estimated $38.2 million to $51.5 million, as shown in

Table 5-6. Within an individual year, the annual total health benefits are highest in 2040 and range from $3.5 million to $3.9 million.

Table 5-6. Annual statewide health benefits for the NMVES + CTFP scenario (in million USD, 2024)

Calendar Year	**$ Total Health Benefits** (lower-upper bound)
2026	$1.1-$2.1
2027	$1.7-$2.9
2028	$2.0-$3.3
2029	$2.5-$4.2
2030	$2.5-$4.0
2031	$2.6-$4.0
2032	$2.8-$4.0
2033	$2.6-$3.5
2034	$2.5-$3.1
2035	$2.7-$3.1
2036	$2.7-$3.1
2037	$2.9-$3.2
2038	$3.1-$3.4
2039	$3.2-$3.6
2040	$3.5-$3.9
Cumulative	**$38.2–$51.5**

5.3.2 Direct Health Damage Benefits and Costs

In addition to benefits, Table 5-7 shows marginal costs in 2035 due to increased NO_x emissions. While the CTFP onroad scenario has modest SO_2 increases for each year (2026 to 2035), these did not result in costs.

Table 5-7. Annual statewide health benefits and costs for the CTFP-only scenario (in million USD, 2024)

Calendar Year	**$ Benefits** (lower-upper bound)	**$ Costs**	**$ Net Benefits** (lower-upper bound)
2026	$1.057-$2.149	$0	$1.057-$2.149
2027	$1.176-$2.293	$0	$1.176-$2.293
2028	$1.351-$2.538	$0	$1.351-$2.538
2029	$1.800-$3.350	$0	$1.800-$3.350
2030	$1.648-$3.050	$0	$1.648-$3.050
2031	$1.469-$2.714	$0	$1.469-$2.714
2032	$1.274-$2.351	$0	$1.274-$2.351
2033	$0.755-$1.414	$0	$0.755-$1.414
2034	$0.358-$0.696	$0	$0.358-$0.696
2035	$0.109-$0.237	-$0.001	$0.108-$0.236
Cumulative	**$10.997-$20.794**	**-$0.001**	**$10.996-$20.793**

As described above, mortality is the only health impact category with lower and upper bounds. There were no health damages associated with the mortality category; therefore, the costs are reported as a point estimate. For the combined NMVES and CTFP scenario, shown in Table 5-8, there are no costs.

Table 5-8. Annual statewide health benefits and costs for the combined NMVES and CTFP scenario (in million USD, 2024)

Calendar Year	$ Benefits (lower-upper bound)	$ Costs	$ Net Benefits (lower-upper bound)
2026	$1.1-$2.1	$0	$1.1-$2.1
2027	$1.7-$2.9	$0	$1.7-$2.9
2028	$2.0-$3.3	$0	$2.0-$3.3
2029	$2.5-$4.2	$0	$2.5-$4.2
2030	$2.5-$4.0	$0	$2.5-$4.0
2031	$2.6-$4.0	$0	$2.6-$4.0
2032	$2.8-$4.0	$0	$2.8-$4.0
2033	$2.6-$3.5	$0	$2.6-$3.5
2034	$2.5-$3.1	$0	$2.5-$3.1
2035	$2.7-$3.1	$0	$2.7-$3.1
2036	$2.7-$3.1	$0	$2.7-$3.1
2037	$2.9-$3.2	$0	$2.9-$3.2
2038	$3.1-$3.4	$0	$3.1-$3.4
2039	$3.2-$3.6	$0	$3.2-$3.6
2040	$3.5-$3.9	$0	$3.5-$3.9
Cumulative	**$38.2-$51.5**	**$0**	**$38.2-$51.5**

6. Macroeconomic Impacts

6.1 Background

The CTFP is a collaborative, market-based program designed to reduce transportation sector GHG emissions by establishing decreasing statewide annual CI targets for transportation fuels produced, imported, or dispensed for use in New Mexico. Each year, regulated parties producing, importing, or dispensing fuels that have a CI above the annual target will generate deficits that they must offset by purchasing credits from regulated parties producing, importing, or dispensing fuels with a CI below the annual target. This requirement ensures attainment of statewide annual CI targets. This chapter focuses on the following aspects of the CTFP:

1. Impacts of credit revenue and deficit expenditures under the CTFP on New Mexico transportation fuel users and regulated parties.
2. Employment effects of infrastructure built with revenue supported by FSE credits equaling up to 10 percent of previous-quarter deficits.[61]
3. Health benefits from reduced CAP emissions in response to the CTFP.[62] This analysis finds that reducing CAP emissions would improve air quality and reduce the adverse effects of tailpipe exhaust on public health in New Mexico, leading to reduced hospitalizations and fewer lost workdays.

6.1.1 Discussion of Industry Impacted

This analysis finds that the CTFP affects a wide range of industries. Regulated parties generate either credits or deficits from producing, importing, or dispensing transportation fuel for use in New Mexico, depending upon each transportation fuel pathway's CI compared to annual CI targets. Under this rule, consumers include all entities that purchase transportation fuel (e.g., governments, businesses, and households).

The CTFP allows regulated parties to receive a total amount of credits equal to 10 percent of previous-quarter deficits for installing new FSE capacity.[63] Revenue from FSE credits will drive job growth in areas that support FSE, including the installation, operation, and maintenance of fuel stations for ZEVs such as hydrogen fuel cell vehicles (HFCVs), battery electric vehicles (BEVs), and vehicles using CNG.

In addition, hospitals in New Mexico would see decreases in use because of improved health outcomes as CAP emissions decrease due to the CTFP. The improved health outcomes associated with air quality improvements under the CTFP will likely result in reduced hospital revenues and emergency room visits.

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[61] Because this analysis uses an annual timestep, it assumes that credits equal 10 percent of previous-year deficits rather than the 10 percent of previous-quarter deficits specified in the CTFP.

[62] CAP emissions include O_3 precursor pollutants like NO_x and VOCs, as well as other harmful pollutants like $PM_{2.5}$ and SO_2. This analysis quantifies the health benefits from reducing these CAP emissions.

[63] Because this analysis uses an annual timestep, it assumes that credits equal 10 percent of previous-year deficits rather than the 10 percent of previous-quarter deficits specified in the CTFP.

6.1.2 Consumer Passthrough Assumptions and Sensitivity Testing

A regulated party may gain credits from selling clean transportation fuel with a CI below the CTFP's annual standard, or it may accrue deficits from selling transportation fuel with a CI above the CTFP's annual standard (e.g., fossil gasoline and diesel). Regulated parties that incur deficits must purchase and retire credits to offset their deficits and remain in compliance with the CTFP. NMED testimony for the CTFP includes a passthrough rates (PTR) analysis that considers the degree to which such program revenues and costs affect regulated party profits, and the degree to which regulated parties pass on program revenues and costs in retail fuel prices for consumers in New Mexico. This analysis considers the widest likely array of potential PTR assumptions by modeling outcomes under two scenarios:

1. A 100 percent PTR scenario, in which all revenue changes from credits and deficits are reflected in retail fuel prices.

2. A 0 percent PTR scenario, in which the industries absorb all revenue changes as a change in operating costs that, in turn, affects profit margins.

6.2 Modeling Approach

To estimate the macroeconomic impacts of New Mexico's CTFP, ERG conducted a series of EIAs using IMPLAN, an I-O model.[64] Typically, EIAs measure the economic effect of a market shock in a specified geographic area, such as a new fuel policy in New Mexico. EIAs model three core components of economic activity, shown in Figure 6-1:

- **Direct effects** are the change's immediate impacts on its own sector.

- **Indirect effects** are the change's impacts on the economic sectors that support the directly affected sector (for example, if a hydrogen FSE is built, the maintenance sector that supports hydrogen FSE will see increased revenue).

- **Induced effects** are the additional economic impacts from changes in labor income due to direct and indirect effects (for example, the staff who work at a facility that generates hydrogen and get paid then spend that money within the local economy, which boosts any industry from which they make purchases, such as grocery, restaurants, and retail).

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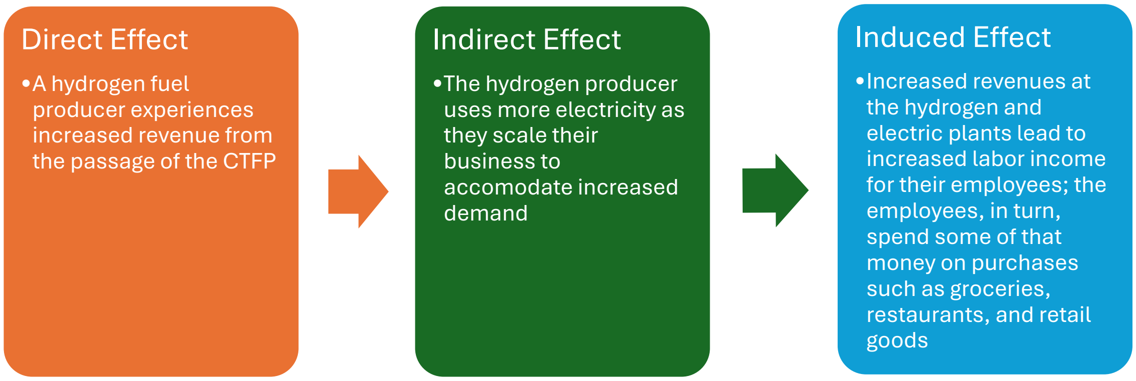
[64] IMPLAN, "IMPLAN," accessed May 20, 2025, https://implan.com/.

Figure 6-1. Example components of an EIA for hydrogen production



Direct Effect

- A hydrogen fuel producer experiences increased revenue from the passage of the CTFP

Indirect Effect

- The hydrogen producer uses more electricity as they scale their business to accomodate increased demand

Induced Effect

- Increased revenues at the hydrogen and electric plants lead to increased labor income for their employees; the employees, in turn, spend some of that money on purchases such as groceries, restaurants, and retail goods

IMPLAN estimates direct, indirect, and induced effects of market shocks on four key macroeconomic metrics:

- **Employment** refers to the number of individuals hired for a salary or for compensation to work within a sector. IMPLAN follows job definitions from the Bureau of Economic Analysis (BEA), which include full-time, part-time, and seasonal positions. Note that IMPLAN jobs are not full-time equivalent (FTE) positions.
- **Labor income** represents the total value of income from employment.
- **Value added, or gross domestic product,** is the increase in a product or service's market value at each stage of production.
- **Economic output, or revenue,** is the total value of all goods and services produced in an economy.

6.2.1 IMPLAN Assumptions

ERG modeled the macroeconomic impacts of New Mexico's CTFP through the IMPLAN platform. To complete this I-O modeling, ERG conducted a series of EIAs accounting for projected CTFP economic costs and benefits each year between 2026 and 2040. ERG bound the geographic scope of this analysis to the state of New Mexico. ERG selected 2023 as the reported dollar and analysis year; this year is also when the latest state data was published in IMPLAN. Assumptions about specific industries are documented in the sections below.

6.2.2 Direct Effects of Credit Market Establishments

6.2.2.1 Direct Effects of Credit Market Establishments

As discussed in the BCA and FCMM documentation, BRG makes annual fuel projections that meet the CTFP annual credit and deficit requirements. These projections serve as inputs to this I-O model's calculation of the effects from CTFP credit markets. Table 6-1 shows projected credits generated across major fuel types under the CTFP. Table 6-2 shows projected deficits across major fuel types. Credits and deficits are shown through 2035 since the fuel credit price drops to $0 in 2036.

Table 6-1. CTFP credits generated annually by fuel type

Year	Ethanol	Biodiesel	Renewable Biodiesel	Electricity	Hydrogen	RNG
2026	208,386	218,695	288,703	168,897	0	58,896
2027	194,483	200,496	398,166	403,175	0	59,195
2028	169,524	174,513	569,612	732,845	0	58,375
2029	130,147	159,395	860,755	1,085,450	0	128,616
2030	54,498	113,414	915,545	1,116,806	0	113,085
2031	44,005	109,889	882,513	1,602,871	10,523	111,777
2032	34,262	106,737	844,133	2,126,648	21,301	110,449
2033	25,360	119,232	537,521	2,610,150	32,331	109,099
2034	17,403	130,269	260,290	3,051,528	43,611	107,729
2035	10,385	138,435	36,240	3,441,143	55,136	106,337

Table 6-2. CTFP deficits generated annually by fuel type

Year	Gasoline Blendstock	Fossil-Derived Diesel	Propane
2026	-435,519	-198,586	0
2027	-600,715	-289,323	0
2028	-890,422	-432,350	0
2029	-1,460,609	-745,814	-3,131
2030	-2,420,342	-1,127,625	-12,468
2031	-2,401,698	-1,172,289	-14,051
2032	-2,366,714	-1,219,901	-15,719
2033	-2,318,423	-1,458,032	-17,472
2034	-2,268,366	-1,702,547	-19,309
2035	-2,233,595	-1,931,872	-21,231

6.2.2.2 Fueling Supply Equipment (FSE)

FSE credits are separate from fuel-based credits under the CTFP. FSE in New Mexico receive credits based on the CI of the fuel that they provide and their new or expanded capacity to dispense this fuel. This analysis directly attributes FSE credits to jobs in the study region, as shown in Table 6-3, and only modeled jobs that would be filled by someone in New Mexico. FSE credits are further explained in the BCA. This analysis calculated direct jobs from FSE credits on a net basis.

Table 6-3. Direct job categories created from FSE credits

Job	IMPLAN Industry
Fuel station installation	323 - All other miscellaneous electrical equipment and component manufacturing
Fuel station maintenance and repair	55 - Maintenance and repair construction of nonresidential structures
General construction labor	47 - Construction of new power and communication structures

Job	IMPLAN Industry
Planning and design	439 - Architectural, engineering, and related services
Administration and legal	437 - Legal services
Fuel station installation	323 - All other miscellaneous electrical equipment and component manufacturing
Fuel station maintenance and repair	55 - Maintenance and repair construction of nonresidential structures
General construction labor	47 - Construction of new power and communication structures

This analysis also modeled FSE credits for facilities serving BEVs, HFCVs, and CNG vehicles. Table 6-4 shows the number of jobs created within each industry.

Table 6-4. Direct jobs created annually from FSE credits

Year	Fuel Station Installation	Fuel Station Maintenance and Repair	General Construction Labor	Planning and Design	Administration and Legal
2026	0.0	0.0	0.0	0.0	0.0
2027	26.8	1.7	8.0	10.7	4.1
2028	37.5	4.2	11.2	14.9	5.8
2029	44.2	7.1	13.2	17.6	6.8
2030	14.3	8.0	4.2	5.7	2.2
2031	22.8	9.5	6.8	9.1	3.5
2032	22.7	10.9	6.8	9.0	3.5
2033	22.6	12.4	6.7	9.0	3.5
2034	22.5	13.9	6.7	9.0	3.5
2035	15.6	14.9	4.7	6.2	2.4
2036–2050	0	14.9	0	0	0

6.2.2.3 Incremental Renewable Energy Credit (REC) Requirement

In addition to fuel-based and FSE credits, the BCA forecasted credits that regulated parties could earn from incremental REC retirement. Retiring incremental RECs allows for electric distribution utilities and other entities to receive more credits per unit of electricity supplied to BEVs and plug-in hybrid electric vehicles (PHEVs) by lowering the CI score of the electricity dispensed to these vehicles. IMPLAN accounts for the cost of these REC retirements as decreased revenue for electric generators, for which these utilities and other entities receive compensation from CTFP credit revenue either directly or from another party purchasing the REC. The value of REC retirement is shown in Table 6-5.

Table 6-5. REC retirement impacts over time

Year	**Incremental REC Retirement** (MWh)	**REC Cost** (2023 USD)
2026	136,479	-$2,447,551
2027	329,318	-$5,905,818
2028	616,407	-$11,054,335
2029	963,735	-$17,283,145
2030–2040	0	$0

6.2.2.4 Banking Impacts on Fossil Fuel Industries

The BCA's FCMM additionally accounts for credits that regulated parties bank for either future sale or retirement.[65] The result is that regulated parties generate surplus credits in the early years of the CTFP that exceed total CTFP deficits. When regulated parties bank CTFP credits, their value diminishes over time. There is a non-financial "opportunity cost" to regulated parties either not selling these credits (if banked by a credit-generator) or spending money to purchase but not retire them (if banked by a deficit-generator). This analysis models this cost as an "impairment cost" that a regulated party bears from unrealized gains, as they are not using the cash on an interest-earning activity. Table 6-6 shows the value of these impairment costs by year. ERG's model considered these costs and allocated them to regulated parties producing gasoline and diesel fuels.

Table 6-6. Banking costs incurred by the fossil fuel industries (in 2023 USD)

Year	Prior Year Inventory Holding Cost	Prior Year Inventory Impairment	Total
2027	-$1,519,724	-$4,645,183	-$6,164,907
2028	-$3,139,603	-$2,373,327	-$5,512,930
2029	-$4,972,226	-$13,582,252	-$18,554,477
2030	-$5,415,110	-$15,690,267	-$21,105,377
2031	-$1,485,767	-$5,218,081	-$6,703,848

6.2.2.5 Biodiesel and Renewable Diesel Supply Costs

Under the CTFP, incremental volumes of BBDs like BD and RD help satisfy CTFP annual targets by generating credits. This is especially the case in earlier program years, when overall CI targets are

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[65] Regulated parties that generate CTFP credits may bank them for sale in later years. In addition, regulated parties that generate CTFP deficits may purchase and bank CTFP credits for retirement in a later year.

relatively less strict and these fuels are needed to serve as a "drop-in" substitute in combustion engine vehicles. The portion of New Mexico's statewide vehicle fleet made up by combustion vehicles begins its accelerated decline in later years. CTFP credit revenue helps increase the BBD volumes produced, imported, or dispensed for use in New Mexico by providing regulated parties with a greater incentive to substitute BBDs for fossil diesel in New Mexico compared to other states.[66] As detailed in the BCA's FCMM, CTFP credit prices must incentivize this substitution by covering the incremental cost of bringing BBDs into New Mexico to cover the fossil diesel that they replace. This incremental cost, detailed in Table 6-7, represents a net program cost that compensates for the cost of fuel substitution rather than providing an additional revenue source to regulated parties or New Mexico fuel consumers. This conservatively assumes that no additional biodiesel or renewable diesel refineries open in New Mexico as a result of the CTFP.

Table 6-7. Biodiesel and renewable diesel import costs (in 2023 USD)

Year	Incremental Biodiesel Supply Costs	Incremental Renewable Diesel Supply Costs
2026	-$12,283,574	-$33,966,678
2027	-$9,632,695	-$41,737,322
2028	-$7,868,423	-$60,902,558
2029	-$5,993,079	-$90,184,984
2030	-$3,540,209	-$105,196,240
2031	-$2,971,312	-$88,291,642
2032	-$2,450,123	-$71,543,981
2033	-$3,000,934	-$37,984,092
2034	-$3,982,648	-$19,023,646
2035	-$4,838,232	-$2,751,950

Fuel industries will see various costs and savings from credits, deficits, REC retirement, banking costs, and supply costs. All impacts for the 0 percent PTR scenario are shown in Figure 6-2.

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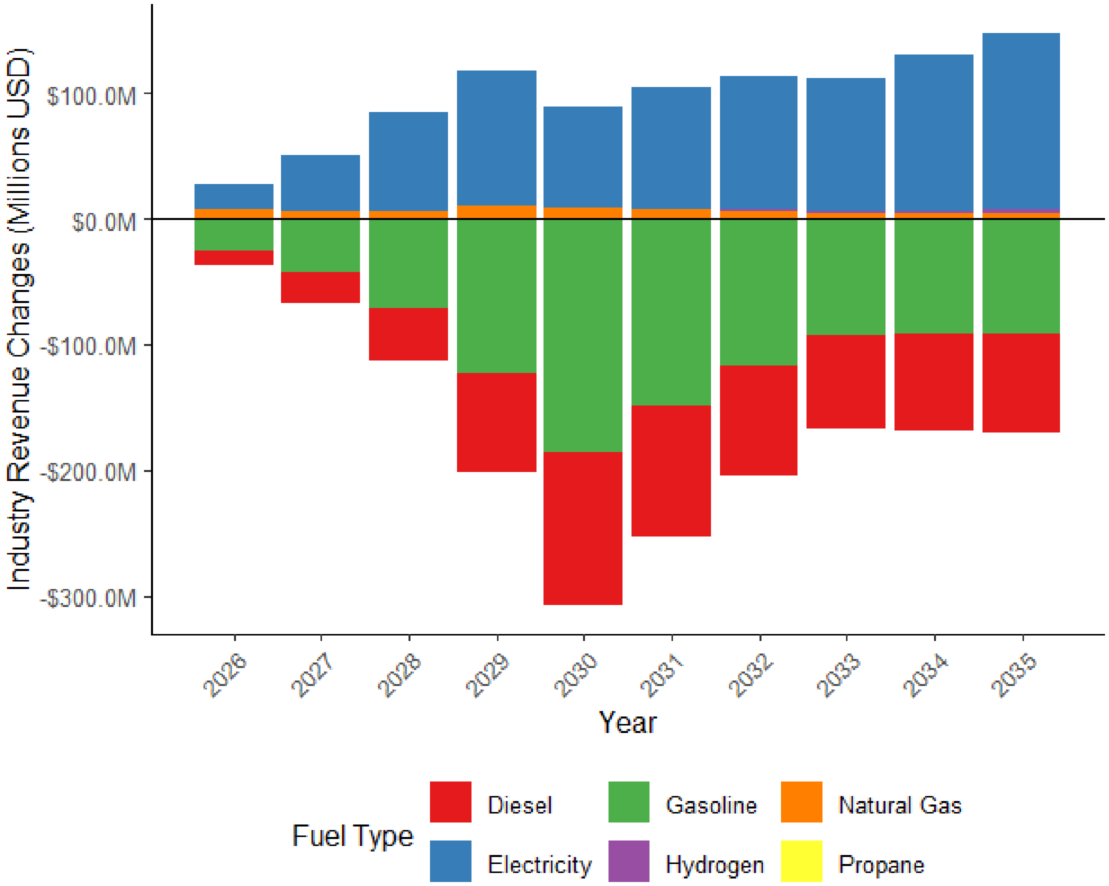
[66] This premium accounts for federal and state revenue sources, fuel sales, and environmental attributes like the fuel pathway's CI considered in the CTFP, as well as the cost of producing and transporting BBDs.

Figure 6-2. Fuel industry revenue changes by year (in 2023 USD)



6.2.2.6 Economic Impacts of Health and Productivity Effects

ERG modeled health impacts with EPA's COBRA, as detailed in the previous chapter. For all health impacts requiring emergency room visits, ERG modeled the cost of a visit as a change in demand for hospital services in IMPLAN. Because reduced tailpipe emissions equate to better air quality, improved health outcomes, and fewer hospital visits, the CTFP is expected to reduce hospital revenue. This analysis did not include mortality impacts.

ERG also simulated changes in productivity as fewer workdays lost to poor health (specifically, respiratory distress and disease). COBRA estimates the value of productivity gained from fewer lost workdays, so ERG modeled this improved productivity in IMPLAN as increased labor income across the entire state of New Mexico, as shown in Table 6-8.

Table 6-8. Annual health and labor impacts over time (in 2023 USD)

Year	Hospital Cost Changes	Labor Income
2026	-$23,836	$2,759
2027	-$29,457	$2,819
2028	-$36,778	$2,990
2029	-$49,652	$3,916
2030	-$45,540	$3,544
2031	-$40,309	$3,148
2032	-$34,707	$2,726
2033	-$19,604	$1,671
2034	-$8,327	$857
2035	-$1,554	$349

6.2.3 Consumer Impacts

As discussed in Section 6.2.2, regulated parties will generate revenue from the sale of credits under the CTFP and incur expenditures from purchasing these credits. This analysis accounts for uncertainty in the degree to which transportation fuel retail prices will incorporate credit revenue or deficit expenditures under the CTFP by modeling EIAs under two PTR scenarios:

1. A 100 percent PTR scenario, in which all revenue changes from credits and deficits are reflected in retail fuel prices.

2. A 0 percent PTR scenario, in which the industries absorb all revenue changes as a change in operating costs that, in turn, affects profit margins. The following section outlines how these assumptions influenced the modeling approach.

In the 100 percent PTR scenario, fuel dispensers in New Mexico incorporate the full amount of credit revenue or deficit expenditures per unit of fuel that they dispense to New Mexico consumers. In such cases, regulated parties would fully account for the revenue and expenditures resulting from CTFP compliance across all stages of the supply chain, up to and including when retailers dispense fuel to consumers. Regulated parties would see no change in profit margins, and fuel consumers would internalize all CTFP fuel market impacts from retail price changes.

By contrast, under the 0 percent PTR scenario, retail transportation fuel prices do not fall in response to CTFP credit market revenue or rise in response to CTFP credit market expenditures. Regulated parties do not pass through any CTFP revenue or expenditures to the point of retail. The analysis assumes that, as a result, regulated parties would fully internalize the CTFP's fuel market effects in the form of commensurate changes to profit margins across the transportation fuel value chain, due to the incremental cost of BBDs as well as incremental REC retirement costs and impairment costs. In this scenario, New Mexico fuel consumers are unaffected by the CTFP.

Direct impacts from both PTR scenarios can be calculated as the number of credits and deficits generated, multiplied by the credit unit price by year (deficit prices are equal to negative credit prices), as shown in Table 6-9.

Table 6-9. Fuel credit price by year

Year	Credit Price (2023 USD/MT)
2026	$111.93
2027	$96.92
2028	$93.70
2029	$82.47
2030	$71.99
2031	$60.90
2032	$50.08
2033	$40.49
2034	$40.57
2035	$40.80

As mentioned, consumers will see changes in retail fuel prices in the 100 percent PTR scenario. New Mexico fuel consumers include households, commercial businesses, and government entities. ERG used data from the CARB Standard Regulatory Impact Assessment (SRIA)[67] to assume the proportion of each fuel that each consumer type purchased, shown in Table 6-10.

Table 6-10. CARB SRIA consumer type spending proportion by fuel type

Consumer	Gasoline, Electricity, Hydrogen	Diesel, Natural Gas, Propane
Household	92.0%	2.0%
Government	1.0%	1.0%
Business	7.0%	97.0%

Changes on the consumer side (100 percent PTR scenario) are modeled in IMPLAN as follows:

- **Household spending** is modeled through IMPLAN's institutional spending patterns, where ERG split costs based on proportions of homes within each income bracket.
- **Government spending** is also modeled through IMPLAN's institutional spending patterns, as a change in state and local government investment.
- **Business spending** is modeled as changes in revenue to specific industries, based on how reliant each industry is on gasoline and diesel.

The 0 percent PTR scenario was modeled with the assumption that credits and deficits result in revenue impacts for fuel industry sectors. These impacts were modeled as changes in the fuel commodity of each specific industry. Since BBD markets in New Mexico are nascent, ERG chose to use the refined petroleum product commodity to model these industries, as the supply chains are

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[67] California Air Resources Board, "Low Carbon Fuel Standard 2023 Amendments: Standardized Regulatory Impact Assessment (SRIA)," September 8, 2023, https://ww2.arb.ca.gov/sites/default/files/2023-09/lcfs_sria_2023_0.pdf.

similar. Table 6-11 shows the IMPLAN industry associated with each credit- and deficit-generating industry.

Table 6-11. Fuel mapping to IMPLAN commodities

Consumer	Gasoline, Electricity, Hydrogen
Electricity	3034 - Electricity generation
Hydrogen	3154 - Other basic inorganic chemicals
CNG, RNG	3043 - Natural gas distribution
Gasoline, diesel, renewable diesel, biodiesel, ethanol	3146 - Refined petroleum products

6.2.3.1 Households

Households are a major consumer of fuel, purchasing 92 percent of gasoline, electricity, and hydrogen (Table 6-10). Table 6-12 shows the fuel cost changes over time for households. Households are the largest consumer of both gasoline fuel and low-carbon alternatives, primarily electricity and hydrogen.

Table 6-12. Annual household consumer cost changes (in 2023 USD)

Year	Gasoline	Diesel	Electricity	Hydrogen	Natural Gas	Propane	Total
2026	-$23,388,409	-$233,720	$15,140,016	$0	$131,840	$0	-$8,350,273
2027	-$40,048,960	-$467,881	$30,514,962	$0	$114,739	$0	-$9,887,141
2028	-$65,559,837	-$827,178	$53,005,652	$0	$109,398	$0	-$13,271,965
2029	-$112,248,020	-$1,596,496	$66,457,347	$0	$212,145	-$5,164	-$47,180,188
2030	-$169,932,756	-$2,450,939	$73,964,717	$0	$162,814	-$17,950	-$98,274,114
2031	-$136,231,225	-$2,088,322	$89,798,767	$589,528	$136,134	-$17,113	-$47,812,231
2032	-$107,453,845	-$1,749,317	$97,972,682	$981,314	$110,615	-$15,743	-$10,154,294
2033	-$85,417,444	-$1,468,569	$97,229,058	$1,204,350	$88,348	-$14,148	$11,621,595
2034	-$84,020,324	-$1,524,730	$113,902,538	$1,627,832	$87,416	-$15,668	$30,057,063
2035	-$83,447,636	-$1,585,629	$129,162,444	$2,069,533	$86,768	-$17,324	$46,268,156

6.2.3.2 Businesses

Businesses are the largest consumers of many transportation fuels, particularly diesel and its alternatives, including natural gas and propane (Table 6-10). Table 6-13 shows the fuel cost changes over time for business consumers. The fuel impacts of diesel include deficits generated from fossil diesel and credits generated from biodiesel and renewable diesel.

Table 6-13. Annual business consumer cost changes (in 2023 USD)

Year	Gasoline	Diesel	Electricity	Hydrogen	Natural Gas	Propane	Total
2026	-$1,779,553	-$11,335,414	$1,151,958	$0	$6,394,244	$0	-$5,568,765
2027	-$3,047,204	-$22,692,227	$2,321,791	$0	$5,564,843	$0	-$17,852,797
2028	-$4,988,248	-$40,118,131	$4,033,039	$0	$5,305,786	$0	-$35,767,555
2029	-$8,540,610	-$77,430,047	$5,056,537	$0	$10,289,029	-$250,443	-$70,875,533
2030	-$12,929,666	-$118,870,552	$5,627,750	$0	$7,896,485	-$870,595	-$119,146,578
2031	-$10,365,419	-$101,283,626	$6,832,515	$44,855	$6,602,515	-$829,971	-$98,999,132
2032	-$8,175,836	-$84,841,893	$7,454,443	$74,665	$5,364,819	-$763,516	-$80,887,319
2033	-$6,499,153	-$71,225,606	$7,397,863	$91,635	$4,284,866	-$686,198	-$66,636,593
2034	-$6,392,851	-$73,949,412	$8,666,497	$123,857	$4,239,667	-$759,909	-$68,072,150
2035	-$6,349,277	-$76,903,003	$9,827,577	$157,464	$4,208,245	-$840,216	-$69,899,209

6.2.3.3 Government

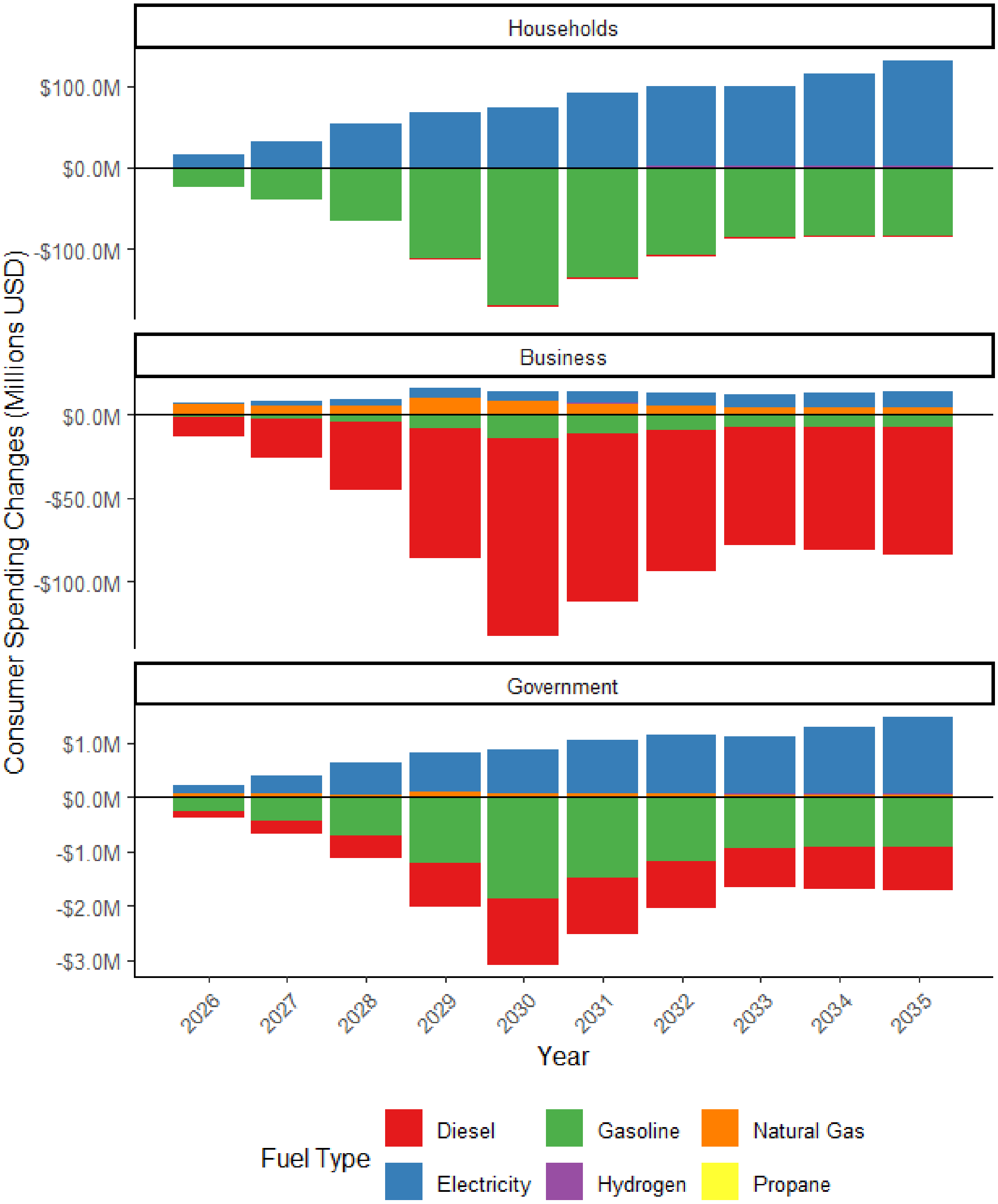
Government impacts are the results of governments spending and saving money to fuel their fleets. Government accounts for about 1 percent of total consumer spending across all fuel types (Table 6-10). Table 6-14 shows government impacts by fuel type over time.

Table 6-14. Annual government consumer cost changes (in 2023 USD)

Year	Gasoline	Diesel	Electricity	Hydrogen	Natural Gas	Propane	Total
2026	-$254,222	-$116,860	$164,565	$0	$65,920	$0	-$140,596
2027	-$435,315	-$233,940	$331,684	$0	$57,370	$0	-$280,201
2028	-$712,607	-$413,589	$576,148	$0	$54,699	$0	-$495,349
2029	-$1,220,087	-$798,248	$722,362	$0	$106,072	-$2,582	-$1,192,482
2030	-$1,847,095	-$1,225,470	$803,964	$0	$81,407	-$8,975	-$2,196,169
2031	-$1,480,774	-$1,044,161	$976,074	$6,408	$68,067	-$8,556	-$1,482,943
2032	-$1,167,977	-$874,659	$1,064,920	$10,666	$55,307	-$7,871	-$919,612
2033	-$928,450	-$734,285	$1,056,838	$13,091	$44,174	-$7,074	-$555,707
2034	-$913,264	-$762,365	$1,238,071	$17,694	$43,708	-$7,834	-$383,991
2035	-$907,040	-$792,814	$1,403,940	$22,495	$43,384	-$8,662	-$238,697

Households begin to save significant amounts towards 2035 as they spend more on electricity and less on gasoline, as shown in Figure 6-3Figure 6-3.

Figure 6-3. Consumer spending by consumer type, fuel type, and year (in 2023 USD)



6.3 Results

This section documents the results of the macroeconomic analysis (in 2024 U.S. dollars). ERG shows total impacts on the fuel market (which includes credits and deficits, REC retirements, biodiesel and renewable diesel supply costs, and banking costs), FSE credits, and hospitalization and productivity. The fuel market is the common component between scenarios, since FSE credits and health impacts are not reliant on consumers.

6.3.1 Economic Impact Analysis Results

In this section, ERG documents the full EIA results, including impacts related to the fuel market, FSE credits, and hospitalization and productivity. Here, ERG shows the results for both the 0 percent and 100 percent PTR scenarios. The credit and deficit costs are the only components of this analysis that are subject to the passthrough; therefore, FSE credits and health impacts are equal in both scenarios. Table 6-15 presents the complete results of the 0 percent PTR scenario. These results present all impacts, including impacts related to the fuel market (credits and deficits, REC retirements, biodiesel and renewable diesel supply costs, and bank holding costs), FSE credits, and health and productivity changes. As stated above, IMPLAN results provide estimates across key economic indicators. Employment represents the number of full-time and part-time jobs supported. Labor income includes all wages, salaries, and benefits earned by workers. Value-added reflects the contribution to gross domestic product (GDP). Economic output represents the total value of all goods and services produced.

Table 6-15. Annual results for the 0 percent PTR scenario (in 2024 USD)

Year	Employment	Labor Income	Value Added	Output
2026	5.6	$260,575	-$2,276,120	-$14,377,391
2027	77.9	$4,547,444	$2,418,911	-$9,580,665
2028	103.6	$5,811,311	$1,296,657	-$21,918,723
2029	81.3	$2,424,817	-$17,421,742	-$82,789,262
2030	-148.1	-$17,315,596	-$77,659,252	-$236,820,261
2031	-49.6	-$8,389,496	-$48,207,118	-$160,882,936
2032	8.6	-$2,594,332	-$26,777,980	-$104,029,960
2033	45.6	$1,088,090	-$12,895,910	-$65,596,984
2034	67.0	$3,130,080	-$6,268,878	-$51,874,927
2035	65.5	$3,640,781	-$2,584,385	-$45,078,981

Table 6-16 shows the results of the 100 percent PTR scenario.

Table 6-16. Annual results for the 100 percent PTR scenario (in 2024 USD)

Year	Employment	Labor Income	Value Added	Output
2026	-105.3	-$5,952,495	-$10,629,993	-$18,842,097
2027	-156.3	-$8,934,857	-$15,772,592	-$25,010,784
2028	-318.3	-$18,680,200	-$31,793,308	-$53,515,054
2029	-844.2	-$48,896,607	-$84,601,898	-$147,452,979
2030	-1710.1	-$99,043,848	-$171,230,034	-$307,413,387
2031	-1180.4	-$69,631,487	-$117,451,371	-$212,308,525
2032	-772.7	-$46,931,942	-$76,077,050	-$139,770,919
2033	-499.1	-$31,471,463	-$48,441,880	-$90,779,270
2034	-451.9	-$29,257,279	-$43,341,746	-$82,764,504
2035	-336.8	-$23,723,138	-$31,182,804	-$64,364,888

6.3.1.1 Credit and Deficit Impacts

This section documents ERG's results explicitly for the fuel market. This includes credits, deficits, REC retirements, bank holding costs, and BD and RD supply costs. While more deficits are generated than credits (since some credits were apportioned to FSE credits), the results are negative, largely due to REC retirements, banking costs, and BD and RD supply costs. Table 6-17 shows the breakdown of results for the 0 percent PTR scenario, and Table 6-18 shows results of the 100 percent PTR scenario.

Table 6-17. Direct, indirect, and induced effects annually for the 0 percent PTR scenario (in 2024 USD)

Year	Direct	Indirect	Induced
2026	-$8,993,861	-$5,485,195	$124,823
2027	-$17,326,704	-$9,790,960	-$214,940
2028	-$30,092,303	-$16,500,201	-$682,904
2029	-$71,471,707	-$38,608,656	-$3,274,056
2030	-$155,628,931	-$81,800,091	-$10,969,552
2031	-$112,096,241	-$59,197,574	-$7,112,908
2032	-$76,949,450	-$40,904,457	-$4,104,839
2033	-$53,221,357	-$28,498,766	-$2,215,072
2034	-$45,057,933	-$24,351,255	-$1,206,016
2035	-$38,389,883	-$20,974,485	-$348,094

Table 6-18. Direct, indirect, and induced effects annually for the 100 percent PTR scenario (in 2024 USD)

Year	Direct	Indirect	Induced
2026	-$11,585,837	-$4,090,019	-$3,143,083
2027	-$25,335,412	-$10,107,821	-$7,319,490
2028	-$46,187,213	-$19,087,533	-$13,596,993
2029	-$106,126,311	-$41,538,844	-$30,352,982
2030	-$191,666,349	-$73,203,716	-$54,121,634
2031	-$135,586,427	-$54,802,606	-$39,443,278
2032	-$90,561,617	-$39,631,864	-$27,506,225
2033	-$60,628,172	-$29,092,864	-$19,396,445
2034	-$55,156,721	-$28,054,230	-$18,293,829
2035	-$39,763,688	-$24,453,206	-$14,781,475

6.3.1.2 FSE Credit Impacts

FSE credits create direct jobs in New Mexico. These jobs have direct, indirect, and induced output impacts, shown in Table 6-19. Direct impacts ranged between $8 million and $22 million until 2035. Starting in 2036, the only remaining jobs supported by the FSE credits are fuel station maintenance jobs, which are assumed to be constant until at least 2040.

Table 6-19. Annual output results from job creation through FSE credits (in 2024 USD)

Year	Direct	Indirect	Induced
2027	$12,436,042	$2,757,102	$2,587,195
2028	$17,729,622	$3,959,808	$3,702,316
2029	$21,338,555	$4,800,605	$4,472,471
2030	$8,005,849	$1,892,714	$1,721,567
2031	$12,144,437	$2,825,715	$2,589,915
2032	$12,398,228	$2,906,704	$2,654,473
2033	$12,649,566	$2,987,056	$2,718,477
2034	$12,898,514	$3,066,782	$2,781,938
2035	$9,996,850	$2,447,912	$2,189,898
2036–2040	$2,949,311	$902,421	$731,797

6.3.1.3 Economic Results of Health Impacts

Health impacts from the CTFP include hospitalization and productivity cost changes, shown in Table 6-20. Negative hospitalization values are a result of improved health outcomes and reduced hospital use in New Mexico. While these are negative impacts within the economy, they provide a benefit in the form of improved health that cannot be accurately captured in this analysis but are discussed in Chapter 5. Productivity cost changes only result in induced impacts from fewer workdays lost and are not assumed to impact business revenue. Improved productivity only increases induced impacts, slightly offsetting the negative induced impacts of hospitalization costs.

Table 6-20. Direct, indirect, and induced health impact annually (in 2024 USD)

Year	Direct	Indirect	Induced
2026	-$16,070	-$4,940	-$4,057
2027	-$19,859	-$6,105	-$5,391
2028	-$24,795	-$7,622	-$7,069
2029	-$33,474	-$10,290	-$9,621
2030	-$30,702	-$9,438	-$8,854
2031	-$27,176	-$8,354	-$7,830
2032	-$23,399	-$7,193	-$6,732
2033	-$13,216	-$4,063	-$3,719
2034	-$5,614	-$1,726	-$1,485
2035	-$1,048	-$322	-$157

6.4 Data Sharing

The macroeconomic analysis contributed to the BCA results, which are shown through 2030 in

Table *6-21* and through 2040 in Table 6-22 (in 2024 U.S. dollars). ERG averaged the 0 percent PTR scenario and the 100 percent PTR scenario to create a 50 percent PTR scenario, where industries are expected to pass half of the revenue changes onto consumers with fuel price changes. ERG used this 50 percent PTR scenario to estimate the macroeconomic impacts and used these averaged results in the BCA.

It is worth noting that GHG reductions and monetized benefits through the social cost of carbon were supplied by BRG using a combination of the published NM-GREET CI values and their fuel projections, except for hydrogen, electricity, and renewable diesel and biodiesel blends. For hydrogen, BRG has baked in the assumption of a long-term processing shift from steam methane reforming of landfill gas to electrolysis after 2030 rather than one of these pathways defined in NM-GREET. For electricity, BRG applied decreasing CI values over time to account for the expected switch to cleaner and renewable sources of electricity generation, which are not specified annually in NM-GREET. For RD and BD blends, BRG utilized realized feedstock ratios from historical producer data, so again this did not tie back to a particular feedstock-specific NM-GREET pathway.

The BCA also used the health impacts from Chapter 5. As stated above, this health analysis in the EIA only considered costs from changes in hospitalization and productivity (since mortality data is not an appropriate impact in an EIA). In the BCA, ERG used the total avoided costs from the COBRA analysis, including mortality, as well as the indirect and induced impacts from the IMPLAN EIAs. Direct health benefits and costs were updated with the three percent discount rate and included indirect and induced health impacts from the EIA.

ERG also included the FSE credits as direct jobs created within the state. When translating for the BCA, ERG included direct, indirect, and induced output values from the EIA rather than an explicit number of jobs. Finally, ERG included NMVES updates to the BCA. Updates to the NMVES analysis are outlined in Appendix D.2.

Table 6-21. Summary of total CTFP and NMVES benefits and costs through 2030 (in 2024 USD)

NMVES Total*		-$397,615,611	-$397,615,611
CTFP	**Benefits (average)**	**Costs**	**Net**
Fuel Markets**		-$481,018,805	-$481,018,805
Direct fuel markets		*-$293,686,741*	
Indirect and induced		*-$187,332,064*	
Health effects***	$10,240,199		$10,240,199
GHG emissions	$1,227,826,621		$1,227,826,621
Direct Jobs from FSE	$77,218,383		$77,218,383
CTFP TOTAL	$1,315,285,202	-$481,018,805	$834,266,397
NMVES + CTFP suite	$1,315,285,202	-$878,634,417	$436,650,786

**Accounts for indirect and induced consumer effects and baseline of EPA Multi-Pollutant and Phase 3 Heavy-Duty Rules; health benefits averaged.*

***The fuel market impacts are the 50 percent pass-through scenario that averages the results from the 0 percent and 100 percent passthrough scenarios.*

****Represents an average between a lower- and upper-bound estimate of health benefits from criteria pollutant and ozone precursor reductions.*

Table 6-22. Summary of total CTFP and NMVES benefits and costs through 2040 (in 2024 USD)

NMVES Total*	$188,043,999		$188,043,999
CTFP	**Benefits (average)**	**Costs**	**Net**
Fuel Markets**		-$959,423,181	-$959,423,181
Direct fuel markets		*-$577,919,646*	
Indirect and induced		*-$381,503,535*	
Health effects***	$15,712,160		$15,712,160
GHG emissions	$2,435,963,386		$2,435,963,386
Direct Jobs from FSE	$161,894,181		$161,894,181
CTFP TOTAL	$2,613,569,726	-$959,423,181	$1,654,146,545
NMVES + CTFP suite	$2,801,613,725	-$959,423,181	$1,842,190,544

**Accounts for indirect and induced consumer effects and baseline of EPA Multi-Pollutant and Phase 3 Heavy-Duty Rules; health benefits averaged.*

***The fuel market impacts are the 50 percent pass-through scenario that averages the results from the 0 percent and 100 percent passthrough scenarios.*

****Represents an average between a lower- and upper-bound estimate of health benefits from criteria pollutant and ozone precursor reductions.*

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Figure B-4. Other bus (MOVES sourceTypeID 41, not for transit or school applications) fuel penetrations for (1) current federal standards and (2) NMVES (based on California’s standards) over time... B-6

Figure B-5. Transit bus (MOVES sourceTypeID 42) fuel penetrations for (1) current federal standards and (2) NMVES (based on California’s standards) over time B-7

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Figure B-11. Short-haul combination truck (MOVES sourceTypeID 61) fuel penetrations for (1) current federal standards and (2) NMVES (based on California’s standards) over time B-13

Figure B-12. Long-haul combination truck (MOVES sourceTypeID 62) fuel penetrations for (1) current federal standards and (2) NMVES (based on California’s standards) over time B-14

A. Fuel Carbon Intensities

A.1 Summary

Crude oil CI was calculated with a well-to-refinery scope using OPGEE v2.0, parameterized with crude oil production and foreign import data from the U.S. Energy Information Administration. Table A-1 details the weighted CI for PADD3 for 2018, which is 11.7 g CO_2e/MJ refinery inputs. This CI is for a well-to-refinery gate boundary and is used in place of GREET's default crude-oil-extraction-stage value.

Table A-1. CI of PADD3 crude oil for 2018

Summary Result	Value	Units
Total foreign imports	7.68E+12	MJ
Total PADD3 production	1.55E+13	MJ
Import CI (weighted)	12.6	g CO_2e/MJ refinery input
PADD3 CI (U.S. average)	11.3	g CO_2e/MJ refinery input
Weighted CI	11.7	g CO_2e/MJ refinery input

A.2 Methods

Country-specific crude oil CI and crude oil properties (API gravity, energy density) were sourced from Masnadi et al. (2018); they represent ~98 percent of crude oil production for the study's 2015 scope.[68] These values are detailed in Table A-2. Crude oil production and foreign import data for PADD3 were sourced from the U.S. Energy Information Administration for 2018—please note that only crude oil imports were considered for CI weighting (i.e. oil products such as gasoline blending components were not included).[69] Imports to PADD3 from other PADDs were not included in the calculation. In 2018, total crude oil imports were 1,017,321 thousand barrels (bbl) and PADD3 crude oil production was 2,582,134 thousand bbl.

Import volumes (in bbl) were converted to MJ using their average API gravity. CIs (in g CO_2e/MJ refinery input) were then weighted based on the import amount, in MJ, from each country. (Note that, for energy density, the lower heating value was used.) For crude oil production from PADD3, it was assumed that both CI and crude oil properties were the same as the U.S. average in Masnadi et al. (2018). Where needed, crude oil API gravity was converted to specific gravity with the following formula:

$$Specific\ Gravity = \frac{131.5 + API\ Gravity}{141.5}$$

Energy density, in MJ/kg crude oil, was calculated using OPGEE's "Crude Oil Chemical Composition" table, which is copied in Table A-3. Energy densities for non-integer API gravities

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[68] Mohammad S. Masnadi et al., "Global Carbon Intensity of Crude Oil Production," *Science* 361, no. 6405 (August 31, 2018): 851–53, https://doi.org/10.1126/science.aar6859.

[69] U.S. Energy Information Administration, "Gulf Coast (PADD3) Field Production of Crude Oil," accessed January 24, 2025, https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=mcrfpp31&f=a.

were linearly interpolated from the nearest values available. For all calculations, the volumetric conversion factor of 1 m^3 = 6.28981 bbl was used.

Table A-2. Crude oil CI, 2018 import volume, and API gravity by country

Country	CI ($g\ CO_2e/MJ$) (Masnadi 2018)	2018 Import Volume (thousand bbl) (U.S. Energy Information Administration, 2025)	Average Crude API Gravity (Masnadi 2018)
Angola	7.5	6,967	29.80
Argentina	9.1	2,867	30.01
Australia	9.1	529	35.39
Azerbaijan	6.3	3,833	34.83
Barbados	9.3	50	27.31
Belize	8.8	198	40.30
Bolivia	9.0	318	37.04
Brazil	10.3	19,887	25.05
Canada	17.6	180,246	20.02
Chad	10.2	3,554	28.94
Colombia	8.3	53,880	19.62
Ecuador	9.3	12,015	25.56
Egypt	10.6	2,761	31.56
Equatorial Guinea	6.4	1,943	32.55
Gabon	13.2	398	33.16
Ghana	5.2	3	37.00
Guatemala	9.8	2,501	16.72
Iraq	14.1	144,524	30.32
Italy	6.1	438	33.21
Kuwait	6.9	13,377	33.03
Libya	11.0	598	36.31
Mexico	9.9	216,855	24.68
Niger	11.3	10,465	32.50
Nigeria	12.6	10,465	35.39
Saudi Arabia	4.6	141,071	33.89
Trinidad and Tobago	14.3	2,155	25.21
United Kingdom	7.9	12,508	35.10
Venezuela	20.3	181,614	16.56

Table A-3. Crude Oil API gravity and energy density values from OPGEE v3.0[70]

API Gravity	Specific Gravity	Lower Heating Value (MJ/kg)
4	1.04	39.57
5	1.04	39.70
6	1.03	39.83
7	1.02	39.97
8	1.01	40.10
9	1.01	40.24
10	1.00	40.38
11	0.99	40.51
12	0.99	40.65
13	0.98	40.80
14	0.97	40.94
15	0.97	41.08
16	0.96	41.23
17	0.95	41.37
18	0.95	41.52
19	0.94	41.67
20	0.93	41.82
21	0.93	41.98
22	0.92	42.13
23	0.92	42.29
24	0.91	42.44
25	0.90	42.60
26	0.90	42.76
27	0.89	42.93
28	0.89	43.09
29	0.88	43.26
30	0.88	43.42
31	0.87	43.59
32	0.87	43.77
33	0.86	43.94
34	0.85	44.11
35	0.85	44.29
36	7.804	44.47
37	0.84	44.65
38	0.83	44.83
39	0.83	45.02
40	0.83	45.21
41	0.82	45.40
42	0.82	45.59
43	0.81	45.78
44	0.81	45.98
45	0.80	46.17

A.3 OPGEE v2.0c Copyright Statement

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- be sent to: Adam Brandt, Department of Energy Resources Engineering, Stanford University, abrandt@stanford.edu

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[70] Hassan M. El-Houjeiri et al., "Oil Production Greenhouse Gas Emissions Estimator OPGEE v2.0 User Guide & Technical Documentation," 2017, https://pangea.stanford.edu/departments/ere/dropbox/EAO/OPGEE/OPGEE_documentation_v2.0.pdf.

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B. Projected Emission Reductions

Fuel penetrations over time by vehicle (source use) type are key inputs for modeling the NMVES and federal baseline scenarios in MOVES. As discussed in Projected Emission Reductions (Chapter 4), these fuel penetrations are summarized through the MOVES AVFT table. ERG used different AVFT tables for each policy scenario.

Light-duty fuel penetrations (for passenger cars, passenger trucks, and light commercial trucks) in the NMVES scenario were adopted from New Mexico's prior rule and should be consistent with California's ACC II Program.[71] Heavy-duty fuel penetrations (for all other MOVES source types) in the NMVES scenario were pulled from EPA's docketed Phase 3 rulemaking files.[72] Luckily, EPA had already developed a side case with a custom AVFT table for California's ACT Program when analyzing the federal GHG Phase 3 Rule for heavy-duty vehicles, so ERG could simply use the ACT AVFT in any MOVES runs. ERG then incorporated the NMVES LD penetrations into the existing ACT AVFT to represent the full NMVES scenario for LDVs and HDVs. The MOVES5 release includes the latest federal regulations, particularly Phase 3 and the LD Multi-Pollutant Rule, so ERG could run default MOVES5 fuel penetrations without any further modification for the federal baseline scenario in New Mexico's clean fuels program. Figures B-1 through B-12 compare fuel penetrations for the NMVES and federal baseline scenarios by MOVES source type.

The other key MOVES inputs for the CTFP emissions analysis were New Mexico county databases from the 2020 NEI, which EPA has conveniently made available through an NEI file transfer protocol (FTP) site.[73] These CDBs contain New Mexico-specific information on VMT, vehicle populations, age distributions, average speeds, fuels, and meteorology. For the NMVES scenario, ERG inserted the custom NMVES AVFT into every CDB. For the federal baseline scenario, the AVFT was left unchanged. ERG also grew 2020 VMT and populations for future evaluation years using growth rates discussed in Section 4.2.2 and created a distinct set of CDBs for each evaluation year and each of New Mexico's 31 counties.

In the interest of model runtime, ERG set up two types of MOVES run specifications (often referred to as runspecs): (1) annual runspecs for all pollutants and processes except evaporative emissions (see Table B-1 below), and (2) hourly runspecs in January and July for VOC evaporative effects in particular (see Table B-2). ERG then developed New Mexico-specific emission factors per unit energy for all pollutants and non-evaporative processes, as well as monthly average VOC evaporative EFs. To determine full VOC emission factors, ERG simply added the VOC non-evaporative and evaporative EFs together. The same VOC evaporative effects were used for both NMVES and federal baseline scenarios. Lastly, ERG did some Bernalillo County runs to model nondefault fuel blends (namely, B0, B5, and E15) with the MOVES Fuel Wizard by policy scenario to expedite processing of fuel effects. Using the Fuel Wizard interface is time consuming, so instead

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[71] New Mexico Environment Department, "New Motor Vehicle Emissions Standards (Advanced Clean Cars II/Advanced Clean Trucks)," accessed May 29, 2025, https://www.env.nm.gov/climate-change-bureau/transportation/.

[72] U.S. Environmental Protection Agency, "Greenhouse Gas Emissions Standards for Heavy-Duty Engines and Vehicles-Phase 3," Docket, accessed June 26, 2025, https://www.regulations.gov/docket/EPA-HQ-OAR-2022-0985.

[73] U.S. Environmental Protection Agency, "2020 National Emissions Inventory Data," accessed June 26, 2025, https://gaftp.epa.gov/Air/emismod/2020/2020emissions/.

of creating custom fuels with the Fuel Wizard for each county, ERG selected Bernalillo as a representative county for evaluating these fuel effects.

Table B-3 through B-6 show the fuel volumes forecasts for the NMVES and federal baseline scenarios before and after BRG modifications to New Mexico’s statewide fleet and activity. The before case estimates volumes from ERG’s initial county-level MOVES runs for each policy scenario, respectively, prior to BRG’s ZEV fleet and activity adjustments. The after case computes volumes for the final NMVES and federal rules after BRG’s adjustments. These baseline fuel volumes were used to calculate the necessary adjustments to the baseline emission inventories and subsequent benefits, as discussed in Section 4.4. In either case, baseline volumes assume no CTFP implementation.

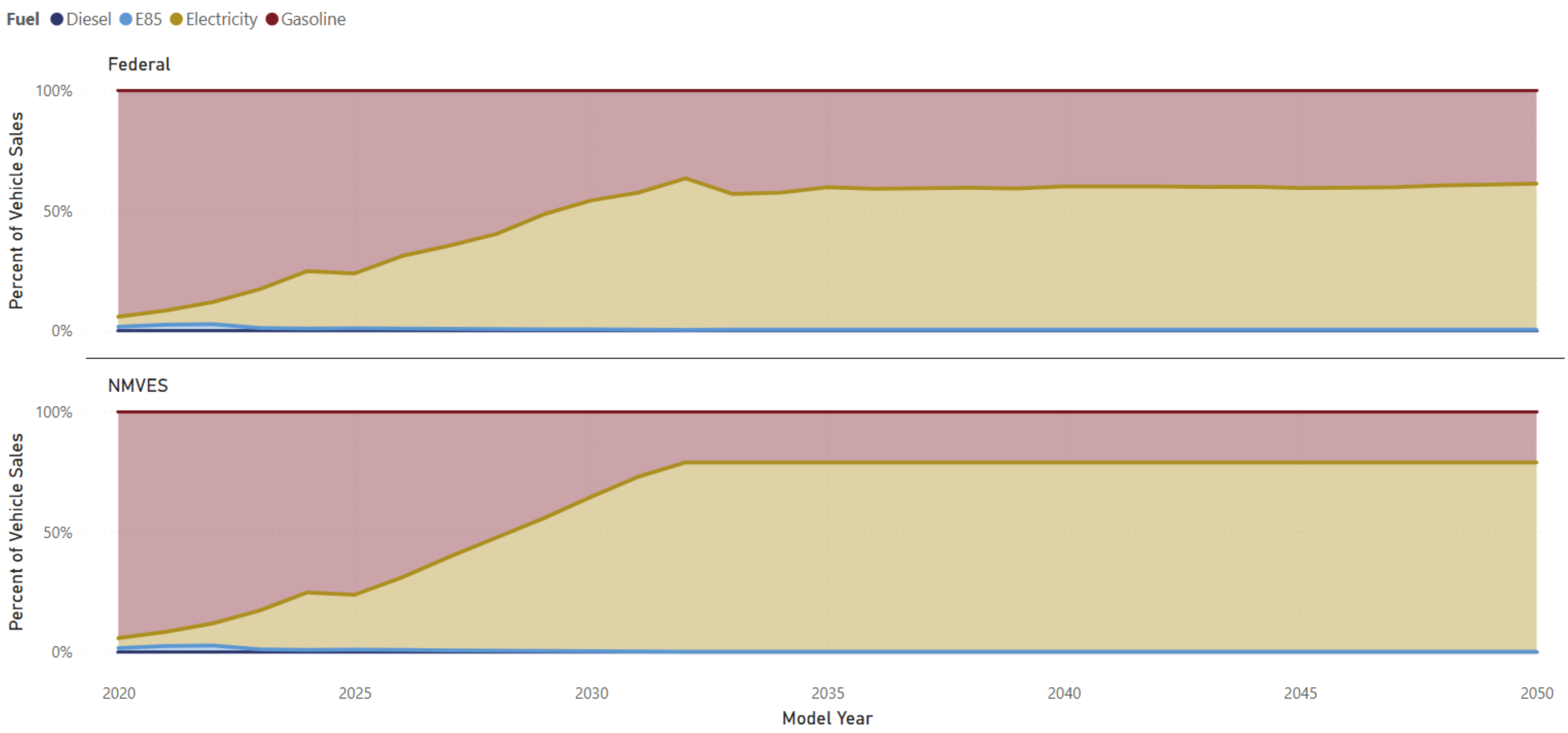

Figure B-1. Passenger car (MOVES sourceTypeID 21) fuel penetrations for (1) current federal standards and (2) NMVES (based on California's standards) over time

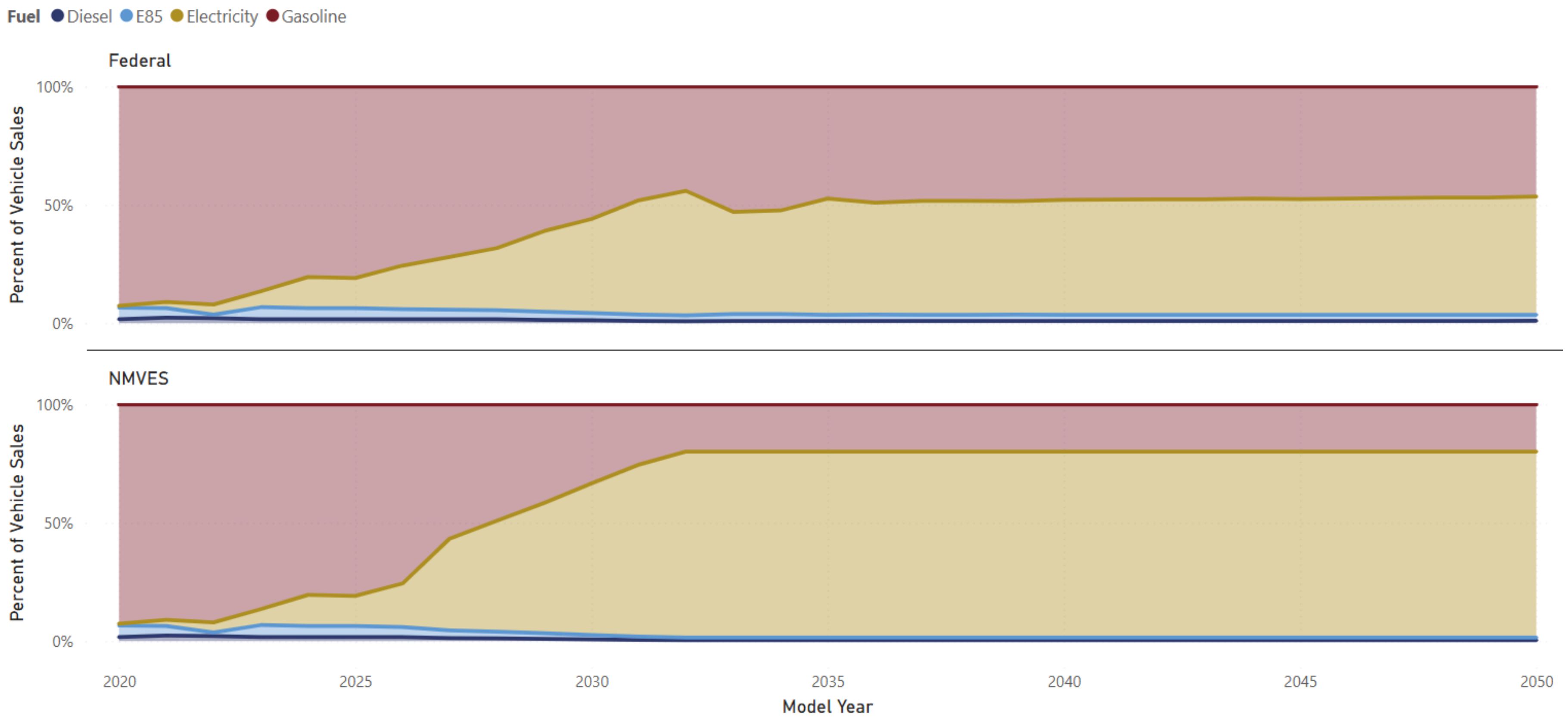

Figure B-2. Passenger truck (MOVES sourceTypeID 31) fuel penetrations for (1) current federal standards and (2) NMVES (based on California's standards) over time

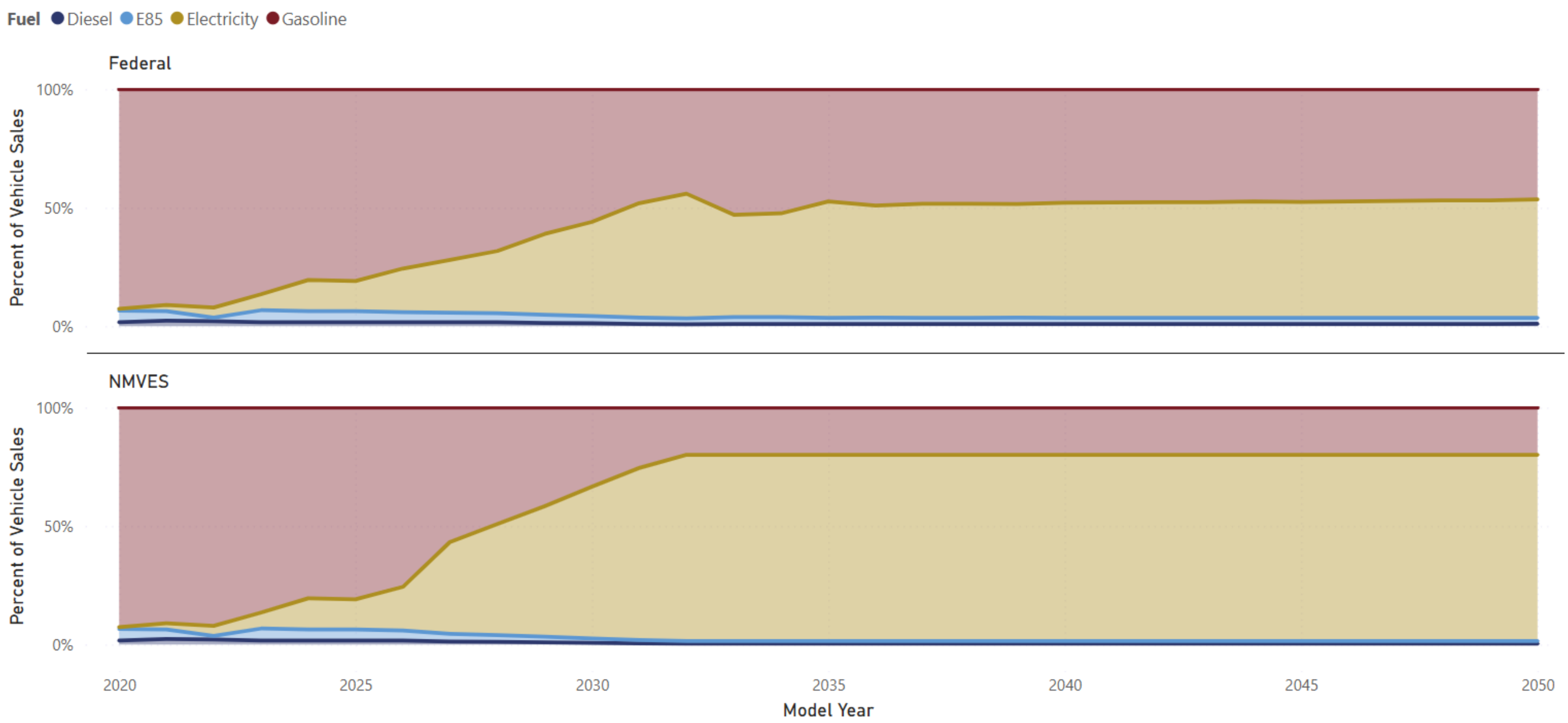

Figure B-3. Light commercial truck (MOVES sourceTypeID 32) fuel penetrations for (1) current federal standards and (2) NMVES (based on California's standards) over time

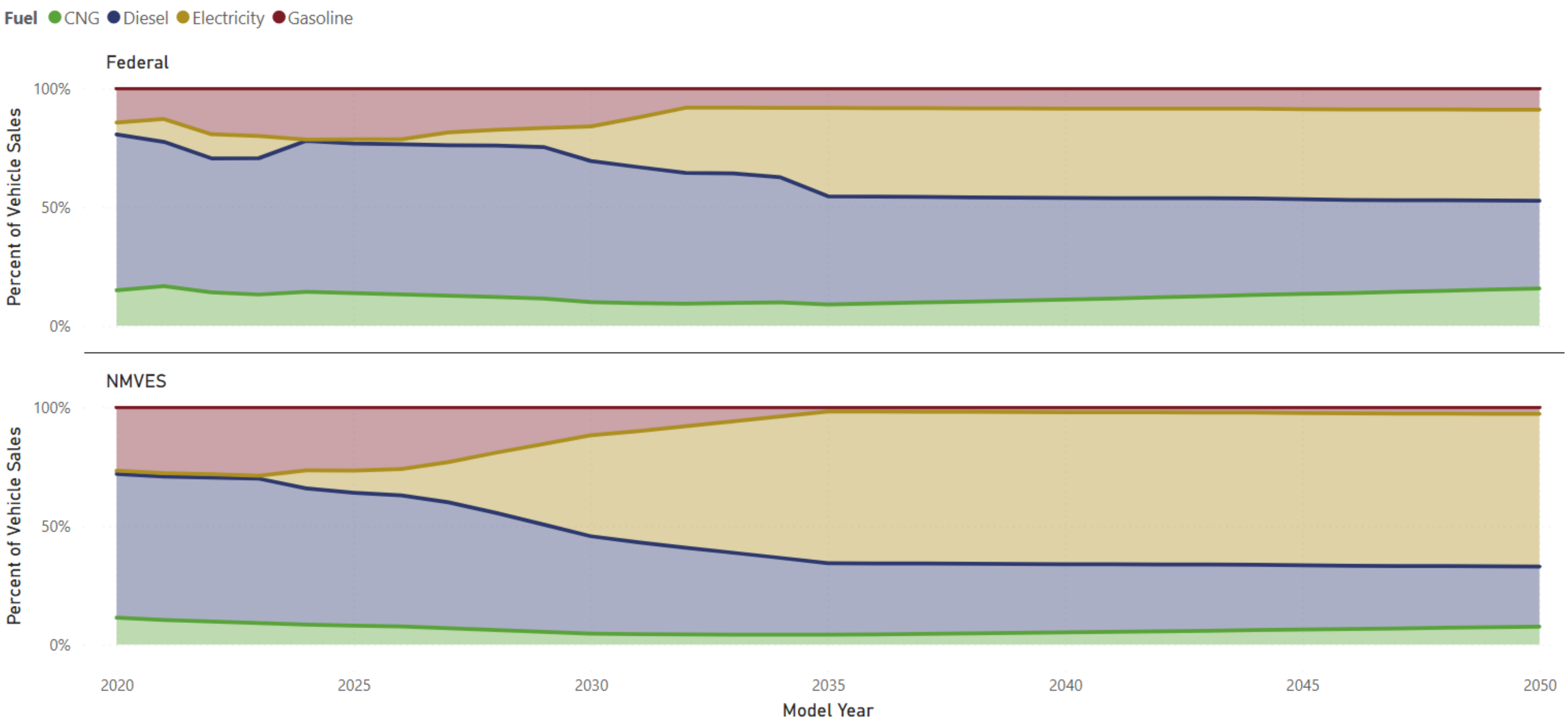

Figure B-4. Other bus (MOVES sourceTypeID 41, not for transit or school applications) fuel penetrations for (1) current federal standards and (2) NMVES (based on California's standards) over time

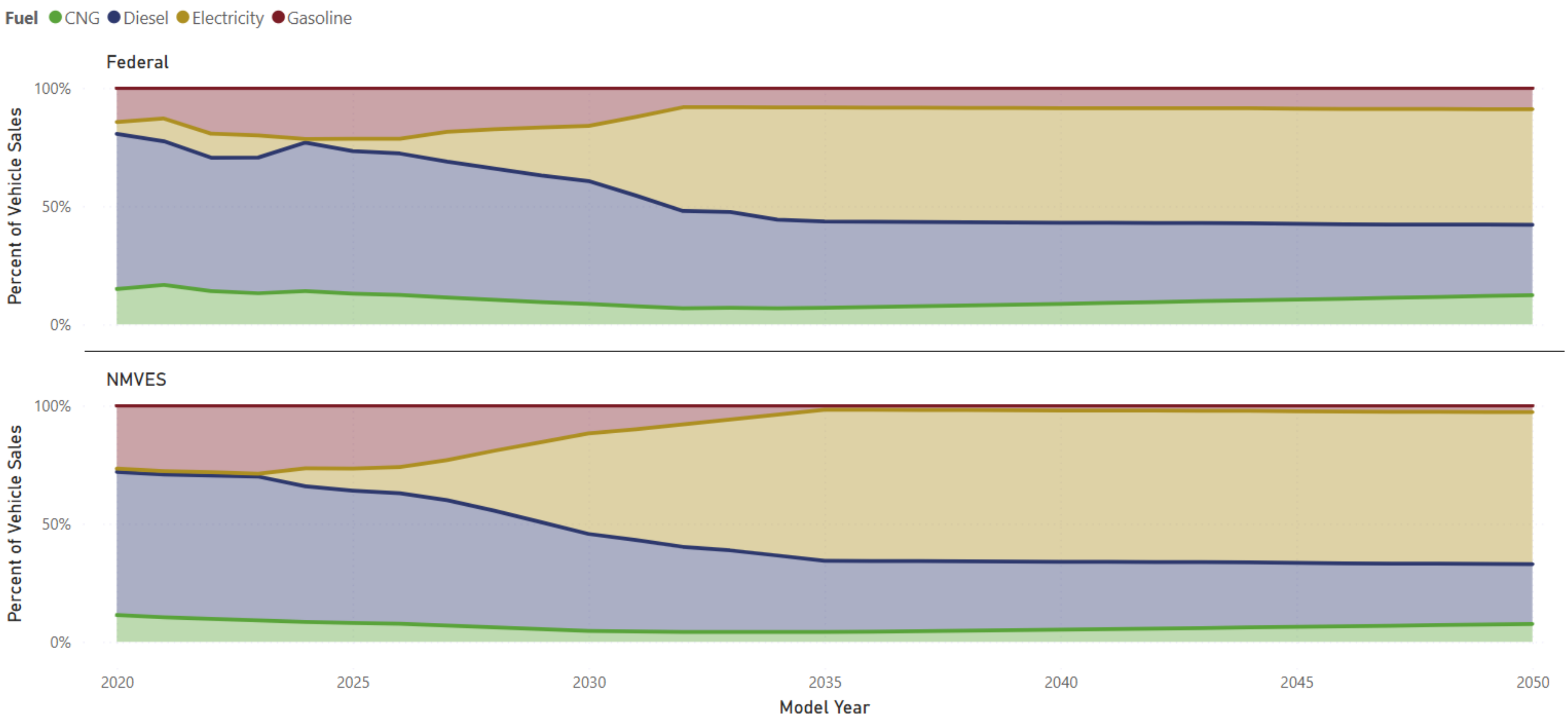

Figure B-5. Transit bus (MOVES sourceTypeID 42) fuel penetrations for (1) current federal standards and (2) NMVES (based on California's standards) over time

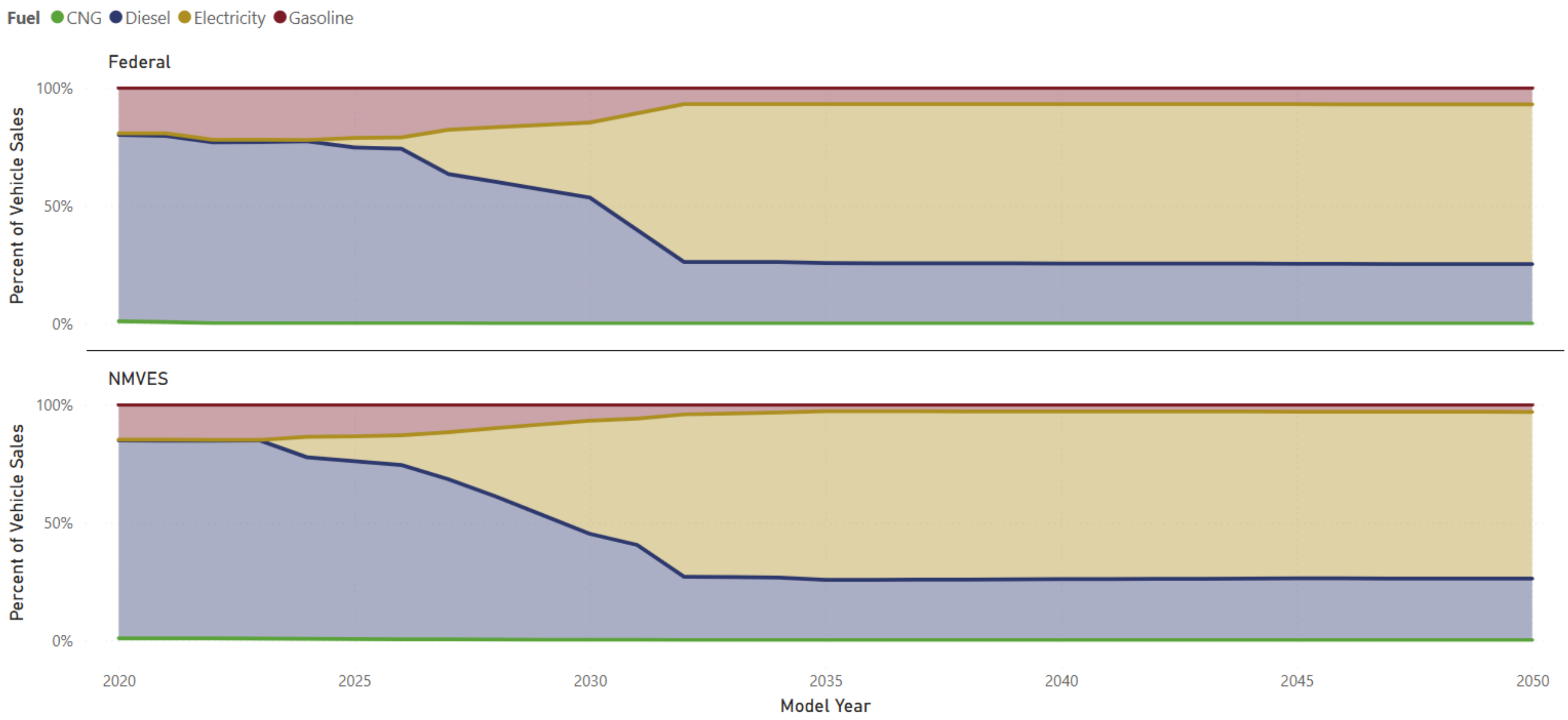

Figure B-6. School bus (MOVES sourceTypeID 43) fuel penetrations for (1) current federal standards and (2) NMVES (based on California's standards) over time

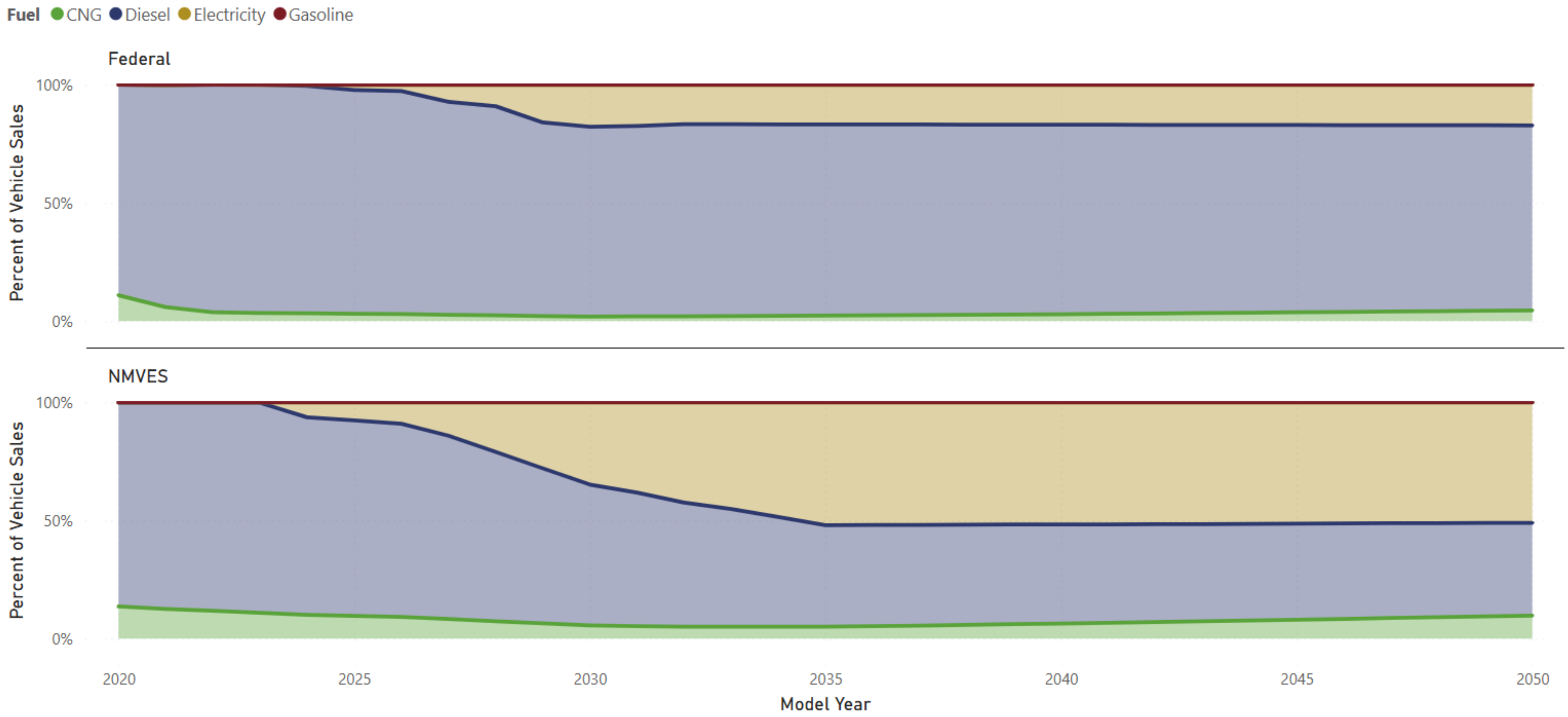

Figure B-7. Refuse truck (MOVES sourceTypeID 51) fuel penetrations for (1) current federal standards and (2) NMVES (based on California's standards) over time

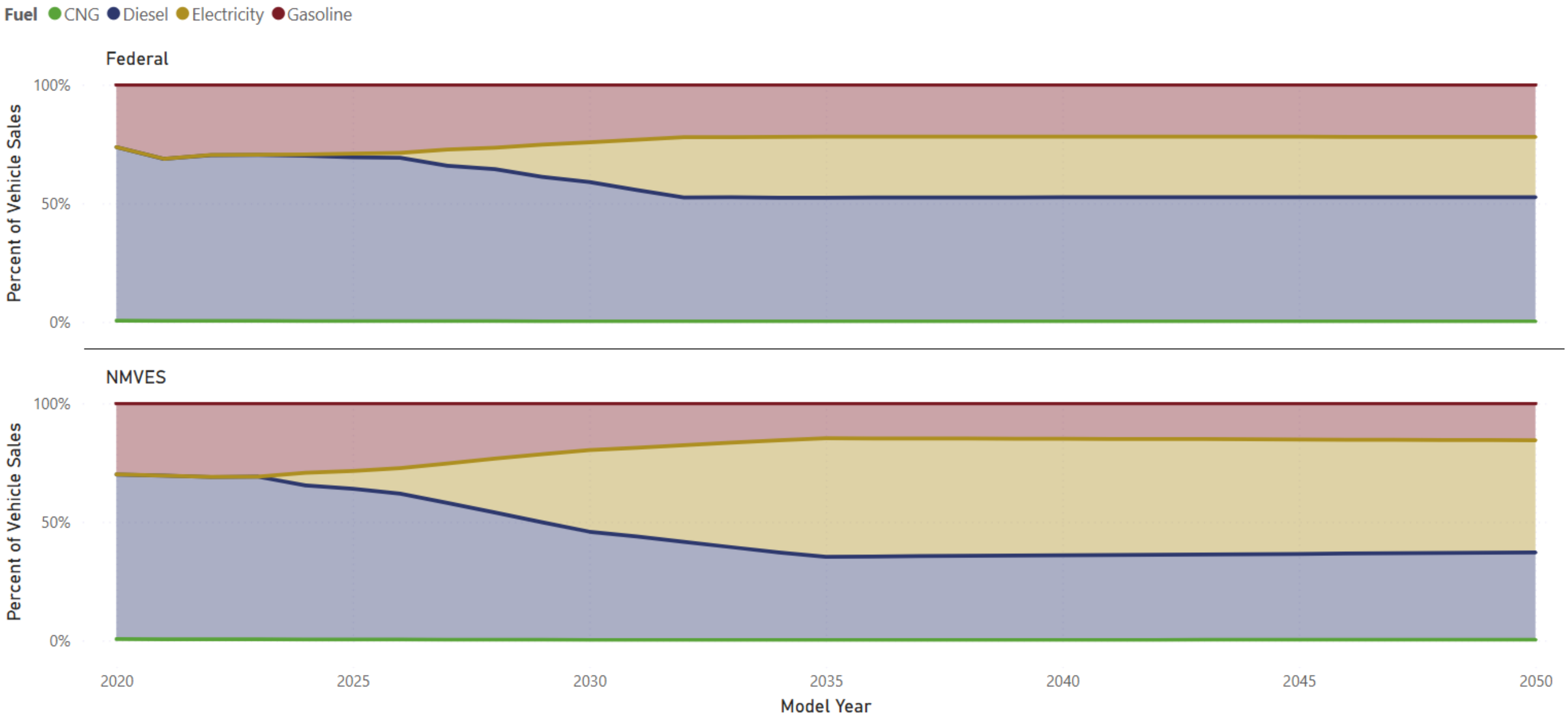

Figure B-8. Short-haul single unit truck (MOVES sourceTypeID 52) fuel penetrations for (1) current federal standards and (2) NMVES (based on California's standards) over time

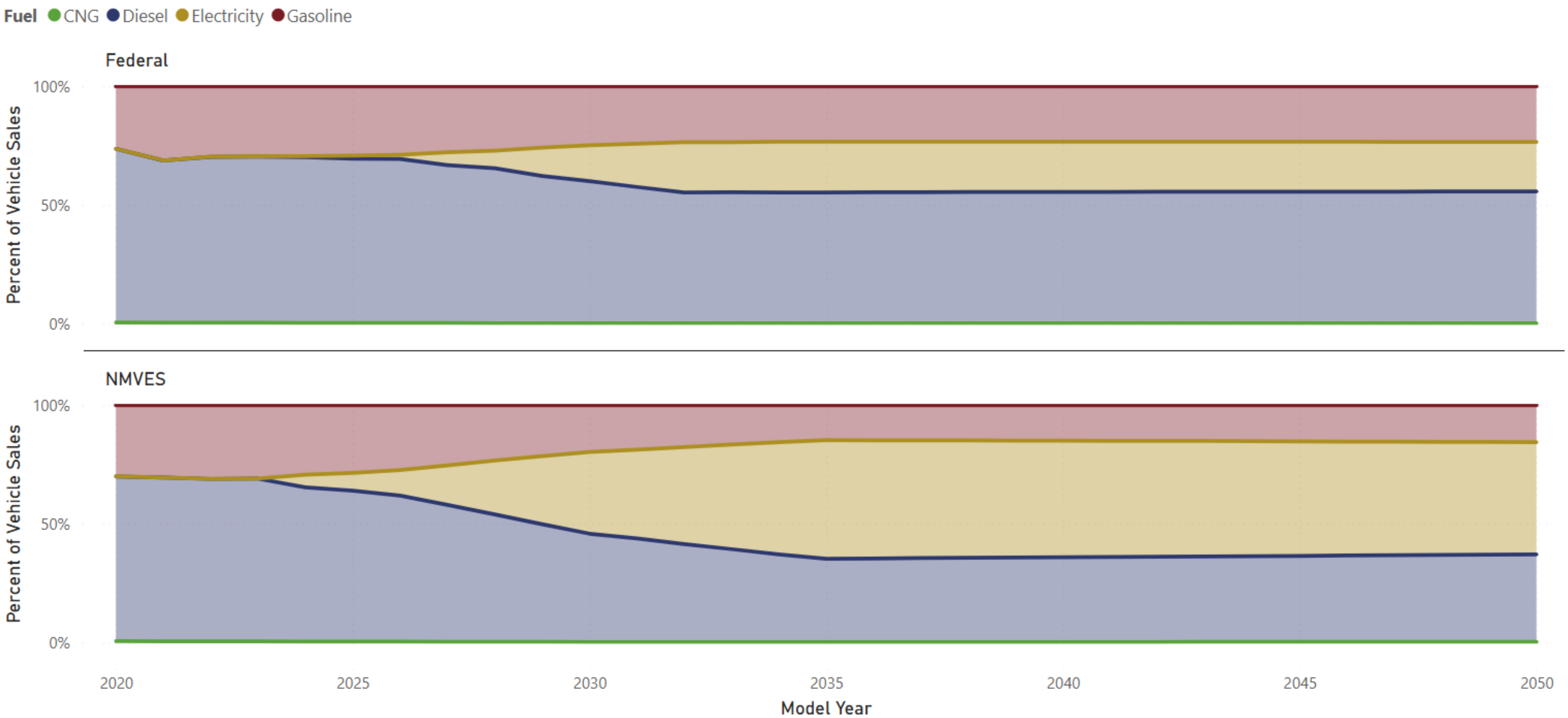

Figure B-9. Long-haul single unit truck (MOVES sourceTypeID 53) fuel penetrations for (1) current federal standards and (2) NMVES (based on California's standards) over time

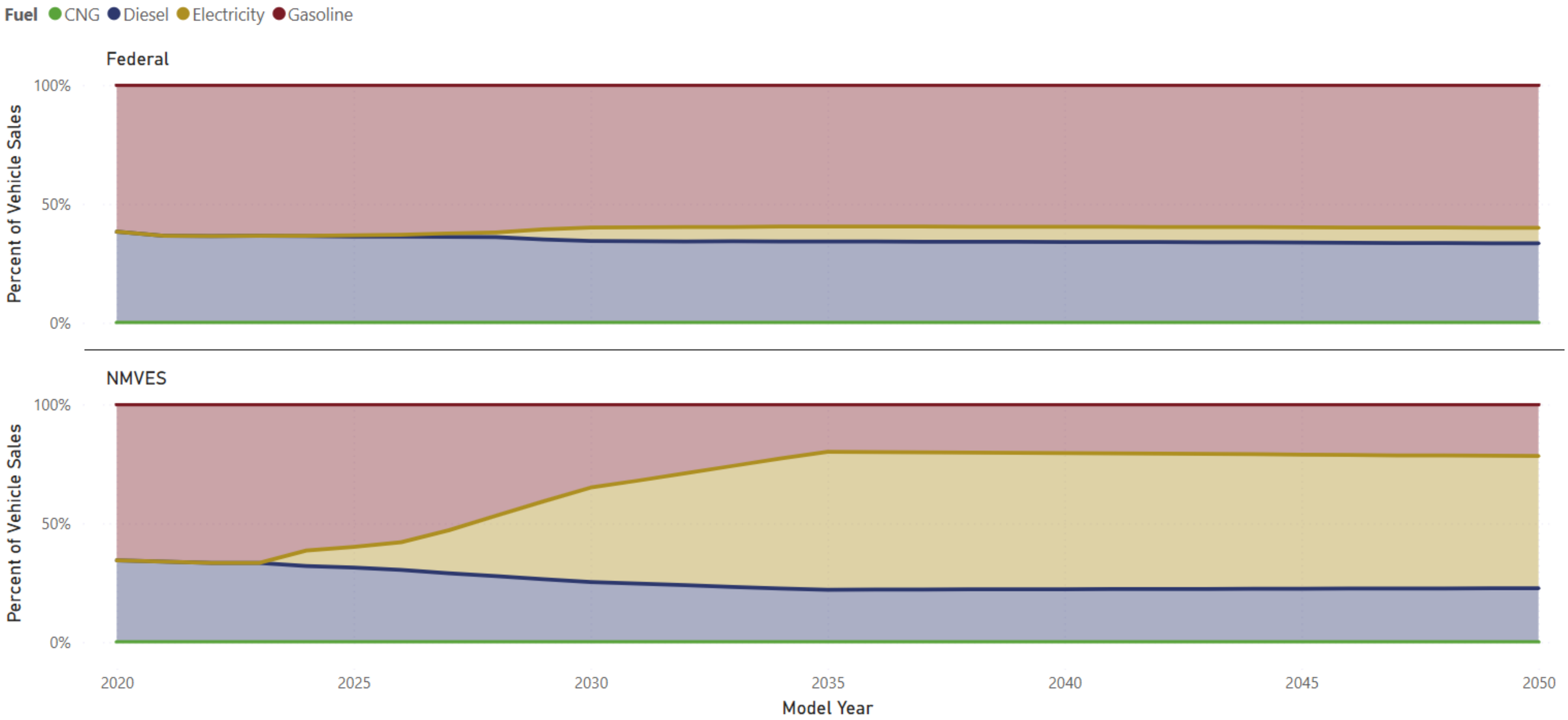

Figure B-10. Motor home (MOVES sourceTypeID 53) fuel penetrations for (1) current federal standards and (2) NMVES (based on California's standards) over time

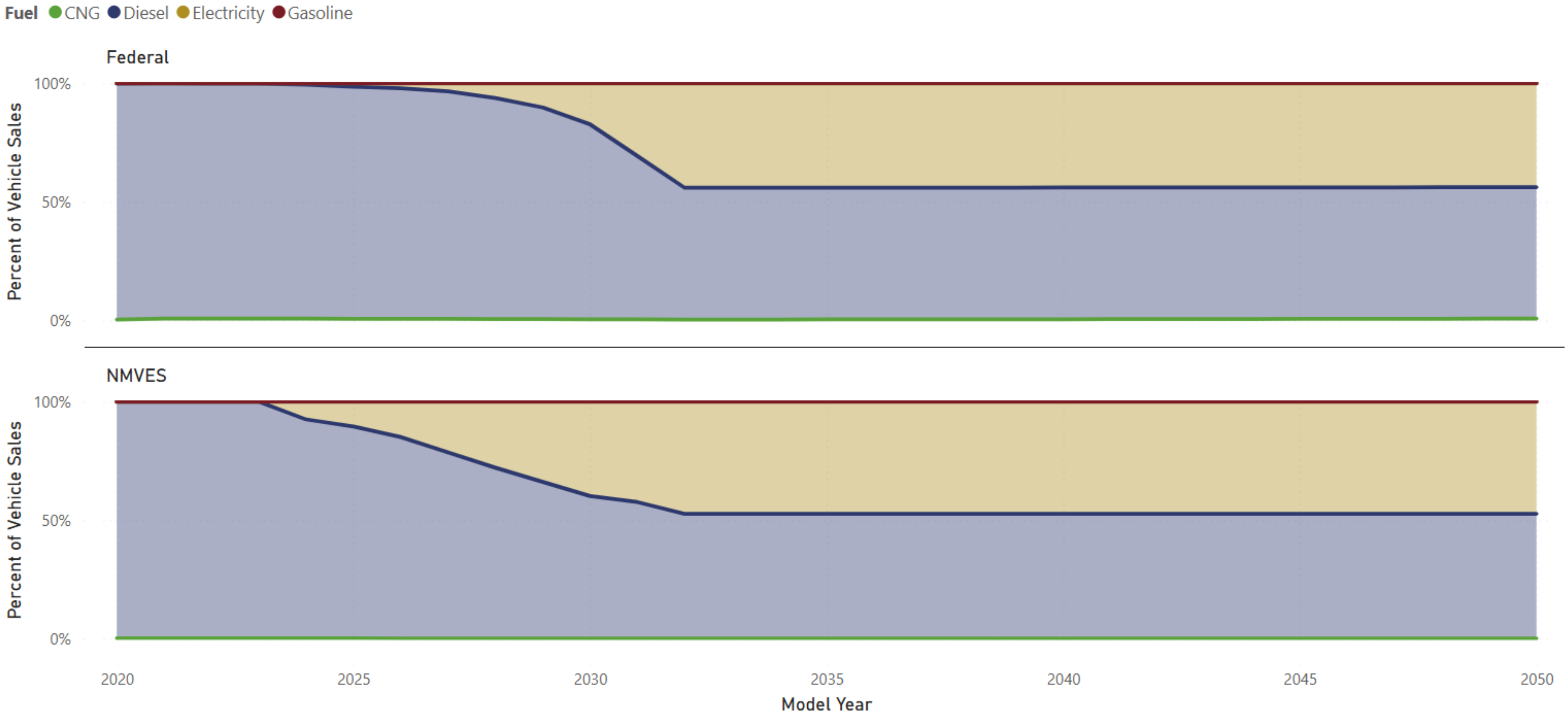

Figure B-11. Short-haul combination truck (MOVES sourceTypeID 61) fuel penetrations for (1) current federal standards and (2) NMVES (based on California's standards) over time

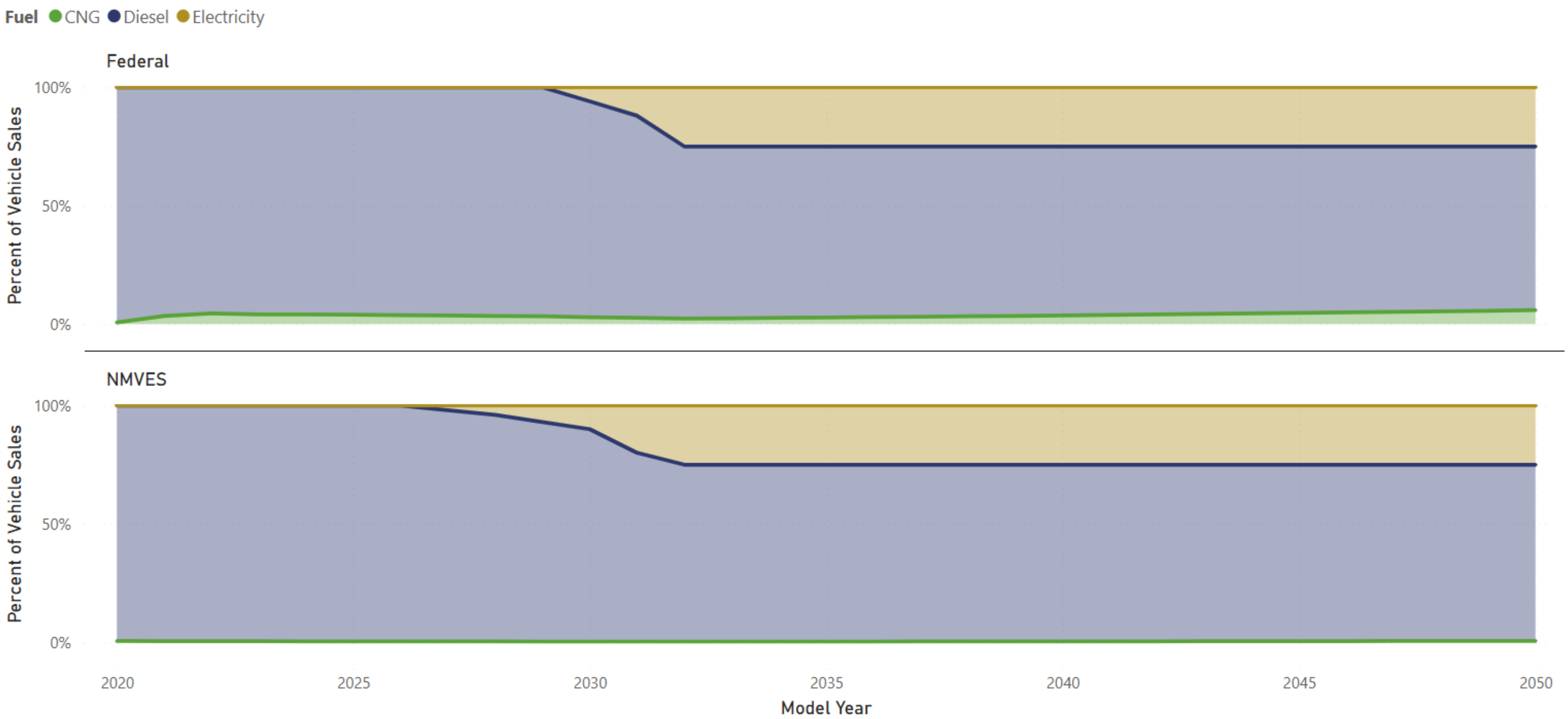

Figure B-12. Long-haul combination truck (MOVES sourceTypeID 62) fuel penetrations for (1) current federal standards and (2) NMVES (based on California's standards) over time

Table B-1. Onroad New Mexico county runspecs for all pollutants (non-evaporative only)

Category	Variable	Input
Description		“New Mexico CTFP - <xxx> County (20<xx>) - <NMVES or Federal> Reference”
Scale	Model	Onroad
	Domain/Scale	County
	Calculation Type	Inventory
Time Spans	Years	[2020, 2030, 2035, 2040, 2050]
	Months	All Selected
	Days	All Selected
	Hours	All Selected
Geographic Bounds	States	New Mexico
	Counties (FIPS code)	[Bernalillo (35001), Catron (35003), Chaves (35005), Cibola (35006), Colfax (35007), Curry (35009), De Baca (35011), Dona Ana (35013), Eddy (35015), Grant (35017), Guadalupe (35019), Harding (35021), Hidalgo (35023), Lea (35025), Lincoln (35027), Los Alamos (35028), Luna (35029), McKinley (35031), Mora (35033), Otero (35035), Quay (35037), Rio Arriba (35039), Roosevelt (35041), San Juan (35043), San Miguel (35045), Sandoval (35047), Santa Fe (35049), Sierra (35051), Socorro (35053), Taos (35055), Torrance (35057), Union (35059), Valencia (35061)]
Vehicles/Equipment	Onroad Vehicles	All Allowable Fuel/Source Type Combinations Selected
Pollutants and Processes (selected)	Total Gaseous Hydrocarbons (THC)	Running Exhaust, Crankcase Running Exhaust, Start Exhaust, Crankcase Start Exhaust, Extended Idle Exhaust, Crankcase Extended Idle Exhaust, Other Hotelling Exhaust, Refueling Displacement Vapor Loss, Refueling Spillage Loss
	Non-Methane Hydrocarbons (NMHC)	Running Exhaust, Crankcase Running Exhaust, Start Exhaust, Crankcase Start Exhaust, Extended Idle Exhaust, Crankcase Extended Idle Exhaust, Other Hotelling Exhaust, Refueling Displacement Vapor Loss, Refueling Spillage Loss
	Volatile Organic Compounds (VOCs)	Running Exhaust, Crankcase Running Exhaust, Start Exhaust, Crankcase Start Exhaust, Extended Idle Exhaust, Crankcase Extended Idle Exhaust, Other Hotelling Exhaust, Refueling Displacement Vapor Loss, Refueling Spillage Loss
	Methane (CH_4)	Running Exhaust, Crankcase Running Exhaust, Start Exhaust, Crankcase Start Exhaust, Extended Idle Exhaust, Crankcase Extended Idle Exhaust, Other Hotelling Exhaust

Category	Variable	Input
	Carbon Monoxide (CO)	Running Exhaust, Crankcase Running Exhaust, Start Exhaust, Crankcase Start Exhaust, Extended Idle Exhaust, Crankcase Extended Idle Exhaust, Other Hotelling Exhaust
	Nitrogen Oxides (NO_x)	Running Exhaust, Crankcase Running Exhaust, Start Exhaust, Crankcase Start Exhaust, Extended Idle Exhaust, Crankcase Extended Idle Exhaust, Other Hotelling Exhaust
	Nitrous Oxide (N_2O)	Running Exhaust, Start Exhaust
	Primary Exhaust $PM_{2.5}$ – Total	Running Exhaust, Crankcase Running Exhaust, Start Exhaust, Crankcase Start Exhaust, Extended Idle Exhaust, Crankcase Extended Idle Exhaust, Other Hotelling Exhaust
	Primary Exhaust $PM_{2.5}$ – Species	Running Exhaust, Crankcase Running Exhaust, Start Exhaust, Crankcase Start Exhaust, Extended Idle Exhaust, Crankcase Extended Idle Exhaust, Other Hotelling Exhaust
	Primary $PM_{2.5}$ – Brakewear Particulate	Brakewear
	Primary $PM_{2.5}$ – Tirewear Particulate	Tirewear
	Sulfur Dioxide (SO_2)	Running Exhaust, Crankcase Running Exhaust, Start Exhaust, Crankcase Start Exhaust, Extended Idle Exhaust, Crankcase Extended Idle Exhaust, Other Hotelling Exhaust
	Total Energy Consumption	Running Exhaust, Start Exhaust, Extended Idle Exhaust, Other Hotelling Exhaust
	Atmospheric CO_2	Running Exhaust, Start Exhaust, Extended Idle Exhaust, Other Hotelling Exhaust
	CO_2 Equivalent	Running Exhaust, Crankcase Running Exhaust, Start Exhaust, Crankcase Start Exhaust, Extended Idle Exhaust, Crankcase Extended Idle Exhaust, Other Hotelling Exhaust
Road Type	Available Road Types	All Selected
General Output	Output Database	"<yyyymmdd>_c350xx_ctfp_nmves_ref_out"
	Units	Mass: Grams, Energy: Kilojoules, Distance: Miles
	Activity	Distance Traveled, Source Hours Operating, Population
Output Emissions Details	Output Aggregation	Year, County
	For All Vehicle/Equipment Categories	Fuel Type, Emission Process
	Onroad	Source Use Type, Regulatory Class
Create Input Database	Database	"c350<xx>y20<xx>_<yyyymmdd>_nmves_ref"

Category	Variable	Input
Advanced Features	Preaggregation Options	Year, County

Table B-2. Onroad New Mexico county runspecs for VOC evaporative effects only

Category	Variable	Input
Description		“New Mexico CTFP - <xxx> County (20<xx>) – VOC Evap Effects”
Scale	Model	Onroad
	Domain/Scale	County
	Calculation Type	Inventory
Time Spans	Years	[2020, 2030, 2035, 2040, 2050]
	Months	January, July
	Days	All Selected
	Hours	All Selected
Geographic Bounds	States	New Mexico
	Counties (FIPS code)	[Bernalillo (35001), Catron (35003), Chaves (35005), Cibola (35006), Colfax (35007), Curry (35009), De Baca (35011), Dona Ana (35013), Eddy (35015), Grant (35017), Guadalupe (35019), Harding (35021), Hidalgo (35023), Lea (35025), Lincoln (35027), Los Alamos (35028), Luna (35029), McKinley (35031), Mora (35033), Otero (35035), Quay (35037), Rio Arriba (35039), Roosevelt (35041), San Juan (35043), San Miguel (35045), Sandoval (35047), Santa Fe (35049), Sierra (35051), Socorro (35053), Taos (35055), Torrance (35057), Union (35059), Valencia (35061)]
Vehicles/Equipment	Onroad Vehicles	All Allowable Fuel/Source Type Combinations Selected
Pollutants and Processes (selected)	Volatile Organic Compounds (VOCs)	Evap Permeation, Evap Fuel Vapor Venting, Evap Fuel Leaks
	Total Energy Consumption	Running Exhaust, Start Exhaust, Extended Idle Exhaust, Other Hotelling Exhaust
Road Type	Available Road Types	All Selected
General Output	Output Database	“<yyyymmdd>_c350xx_nm_ctfp_voc_out”
	Units	Mass: Grams, Energy: Kilojoules, Distance: Miles
	Activity	Distance Traveled, Source Hours Operating, Population
Output Emissions Details	Output Aggregation	Month, County
	For All Vehicle/Equipment Categories	Fuel Type, Emission Process
	Onroad	Source Use Type, Regulatory Class
Create Input Database	Database	“c350<xx>y20<xx>_<yyyymmdd>_nmves_ref”
Advanced Features	Preaggregation Options	Hour, County

Table B-3. Nonroad New Mexico county runspecs for all pollutants and processes

Category	Variable	Input
Description		“New Mexico CTFP – 20<xx> - Nonroad”
Scale	Model	Nonroad
	Domain/Scale	County
	Calculation Type	Inventory
Time Spans	Years	[2020, 2030, 2035, 2040, 2050]
	Months	All Selected
	Days	All Selected
	Hours	-
Geographic Bounds	States	New Mexico
	Counties (FIPS code)	[Bernalillo (35001), Catron (35003), Chaves (35005), Cibola (35006), Colfax (35007), Curry (35009), De Baca (35011), Dona Ana (35013), Eddy (35015), Grant (35017), Guadalupe (35019), Harding (35021), Hidalgo (35023), Lea (35025), Lincoln (35027), Los Alamos (35028), Luna (35029), McKinley (35031), Mora (35033), Otero (35035), Quay (35037), Rio Arriba (35039), Roosevelt (35041), San Juan (35043), San Miguel (35045), Sandoval (35047), Santa Fe (35049), Sierra (35051), Socorro (35053), Taos (35055), Torrance (35057), Union (35059), Valencia (35061)]
Vehicles/Equipment	Nonroad Equipment	All Allowable Fuel/Source Type Combinations Selected
Pollutants and Processes (selected)	Total Gaseous Hydrocarbons (THC)	Running Exhaust, Crankcase Running Exhaust, Refueling Displacement Vapor Loss, Refueling Spillage Loss, Evap Tank Permeation, Evap Hose Permeation, Diurnal Vapor Venting, Hot Soak Fuel Vapor Venting, Running Loss Fuel Vapor Venting
	Non-Methane Hydrocarbons (NMHC)	Running Exhaust, Crankcase Running Exhaust, Refueling Displacement Vapor Loss, Refueling Spillage Loss, Evap Tank Permeation, Evap Hose Permeation, Diurnal Vapor Venting, Hot Soak Fuel Vapor Venting, Running Loss Fuel Vapor Venting
	Volatile Organic Compounds (VOCs)	Running Exhaust, Crankcase Running Exhaust, Refueling Displacement Vapor Loss, Refueling Spillage Loss, Evap Tank Permeation, Evap Hose Permeation, Diurnal Vapor Venting, Hot Soak Fuel Vapor Venting, Running Loss Fuel Vapor Venting
	Methane (CH_4)	Running Exhaust, Crankcase Running Exhaust, Refueling Displacement Vapor Loss, Refueling Spillage Loss, Evap Tank Permeation, Evap Hose Permeation, Diurnal Vapor Venting, Hot Soak Fuel Vapor Venting, Running Loss Fuel Vapor Venting
	Carbon Monoxide (CO)	Running Exhaust
	Nitrogen Oxides	Running Exhaust

Category	Variable	Input
	(NO$_x$)	
	Primary Exhaust PM$_{2.5}$ – Total	Running Exhaust
	Primary Exhaust PM10 – Total	Running Exhaust
	Sulfur Dioxide (SO$_2$)	Running Exhaust
	Brake Specific Fuel Consumption (BSFC)	Running Exhaust
	Atmospheric CO$_2$	Running Exhaust
Road Type	Available Road Types	-
General Output	Output Database	"<yyyymmdd>_c35_ctfp_nonroad_out"
	Units	Mass: Grams, Energy: Kilojoules, Distance: Miles
Output Emissions Details	Output Aggregation	24-Hour Day, County
	For All Vehicle/Equipment Categories	Fuel Type, Emission Process, SCC
	Nonroad	Sector
Create Input Database	Database	-
Advanced Features	Preaggregation Options	Day, County

Table B-4. NMVES fuel volumes forecast for final rules after BRG modifications (no CTFP implementation)

Year	Gasoline	Ethanol	Diesel	BD	RD	Electricity	H_2	CNG	RNG	Propane
2025	939,852,773	69,549,793	813,320,074	19,356,448	0	3,189,677	10,275	15,873,896	0	7,746,500
2026	934,191,905	69,134,073	794,313,340	18,904,101	0	9,033,105	64,853	16,209,014	0	8,014,948
2027	924,025,289	68,385,161	774,777,456	18,439,161	0	16,542,981	130,474	16,534,566	0	8,283,396
2028	909,853,295	67,340,050	754,817,713	17,964,133	0	25,601,940	207,123	16,850,881	0	8,551,844
2029	890,451,571	65,908,204	734,530,153	17,481,303	0	36,693,447	296,025	17,158,278	0	8,820,292
2030	936,074,901	69,287,513	714,264,283	16,998,989	0	50,181,725	434,824	17,457,065	0	9,088,741
2031	888,146,851	65,737,864	708,683,934	16,866,181	0	64,463,446	1,960,094	17,561,568	0	9,463,520
2032	841,480,224	62,281,633	703,097,272	16,733,222	0	78,664,846	3,467,086	17,666,466	0	9,838,299
2033	796,420,903	58,944,391	697,505,804	16,600,149	0	92,647,682	4,956,462	17,771,778	0	10,213,079
2034	752,512,254	55,692,367	691,910,925	16,466,995	0	106,560,011	6,428,843	17,877,518	0	10,587,858
2035	709,691,362	52,520,903	686,313,926	16,333,791	0	120,411,117	7,884,809	17,983,700	0	10,962,638
2036	673,050,723	49,807,879	682,574,410	16,244,793	0	134,877,173	8,929,562	18,032,087	0	11,425,623
2037	637,967,444	47,210,136	678,800,229	16,154,970	0	149,384,034	9,964,391	18,082,402	0	11,888,607
2038	604,016,478	44,696,238	674,994,230	16,064,390	0	164,061,214	10,989,678	18,134,627	0	12,351,592
2039	571,125,713	42,260,848	671,159,082	15,973,116	0	178,910,597	12,005,768	18,188,742	0	12,814,577
2040	539,229,647	39,899,117	667,297,292	15,881,208	0	193,934,151	13,012,973	18,244,728	0	13,277,562
2041	511,506,949	37,847,585	661,712,478	15,748,293	0	205,500,003	13,919,346	18,469,764	0	13,781,495
2042	484,891,884	35,878,010	656,107,327	15,614,895	0	217,149,575	14,822,704	18,694,661	0	14,285,428
2043	459,293,975	33,983,698	650,482,391	15,481,025	0	228,883,384	15,723,204	18,919,423	0	14,789,361
2044	434,633,483	32,158,749	644,838,211	15,346,698	0	240,701,954	16,620,993	19,144,051	0	15,293,295
2045	410,839,745	30,397,936	639,175,310	15,211,925	0	252,605,824	17,516,202	19,368,549	0	15,797,228
2046	387,849,826	28,696,603	633,494,201	15,076,718	0	264,595,541	18,408,952	19,592,918	0	16,301,161
2047	365,607,414	27,050,584	627,795,381	14,941,090	0	276,671,665	19,299,355	19,817,161	0	16,805,094
2048	344,061,899	25,456,135	622,079,336	14,805,052	0	288,834,767	20,187,512	20,041,281	0	17,309,027
2049	323,167,619	23,909,877	616,346,542	14,668,616	0	301,085,425	21,073,518	20,265,279	0	17,812,960
2050	302,883,215	22,408,751	610,597,462	14,531,792	0	313,424,232	21,957,460	20,489,158	0	18,316,894

Table B-5. NMVES fuel volumes forecast from initial MOVES runs prior to BRG modifications (no CTFP implementation)

Year	Gasoline	Ethanol	Diesel	BD	RD	Electricity	H_2	CNG	RNG	Propane
2025	803,072,833	59,432,771	781,916,241	18,609,059	0	36,032,435	296,979	14,120,998	0	7,746,500
2026	806,285,198	59,672,509	765,448,960	18,217,149	0	42,779,772	349,418	14,265,262	0	8,014,948
2027	808,729,984	59,855,452	749,445,515	17,836,278	0	49,778,289	399,866	14,409,547	0	8,283,396
2028	811,508,395	60,063,027	733,884,348	17,465,933	0	56,657,219	448,436	14,553,852	0	8,551,844
2029	813,405,593	60,205,405	718,745,351	17,105,636	0	63,852,370	495,229	14,698,176	0	8,820,292
2030	880,659,495	65,183,179	704,009,739	16,754,939	0	72,273,602	593,633	14,842,520	0	9,088,741
2031	824,060,272	60,992,278	690,424,583	16,431,621	0	91,498,913	3,157,792	14,834,120	0	9,463,520
2032	769,278,835	56,935,936	677,011,110	16,112,390	0	110,455,257	5,672,142	14,829,153	0	9,838,299
2033	716,540,382	53,030,799	663,765,191	15,797,146	0	129,042,432	8,138,447	14,827,529	0	10,213,079
2034	665,439,614	49,246,892	650,682,829	15,485,795	0	147,385,519	10,558,372	14,829,157	0	10,587,858
2035	615,890,996	45,577,885	637,760,152	15,178,245	0	165,497,136	12,933,492	14,833,951	0	10,962,638
2036	578,656,928	42,821,350	630,804,478	15,012,705	0	181,673,707	14,203,520	14,961,298	0	11,425,623
2037	543,109,669	40,189,655	623,922,862	14,848,927	0	197,823,916	15,453,058	15,090,291	0	11,888,607
2038	508,894,605	37,656,574	617,113,957	14,686,880	0	214,046,801	16,682,936	15,220,882	0	12,351,592
2039	475,927,246	35,215,853	610,376,463	14,526,532	0	230,344,728	17,893,920	15,353,024	0	12,814,577
2040	444,130,751	32,861,805	603,709,113	14,367,854	0	246,720,067	19,086,717	15,486,674	0	13,277,562
2041	421,175,336	31,163,056	601,926,933	14,325,439	0	256,219,824	19,667,340	15,783,417	0	13,781,495
2042	399,243,858	29,540,067	600,156,275	14,283,299	0	265,745,970	20,244,058	16,080,035	0	14,285,428
2043	378,254,866	27,986,809	598,396,943	14,241,428	0	275,298,747	20,816,959	16,376,530	0	14,789,361
2044	358,136,439	26,497,965	596,648,748	14,199,822	0	284,878,401	21,386,133	16,672,900	0	15,293,295
2045	338,824,728	25,068,809	594,911,508	14,158,477	0	294,485,178	21,951,671	16,969,146	0	15,797,228
2046	320,262,761	23,695,127	593,185,049	14,117,389	0	304,119,325	22,513,659	17,265,269	0	16,301,161
2047	302,399,475	22,373,142	591,469,202	14,076,553	0	313,781,092	23,072,183	17,561,270	0	16,805,094
2048	285,188,897	21,099,452	589,763,804	14,035,965	0	323,470,729	23,627,328	17,857,148	0	17,309,027
2049	268,589,479	19,870,984	588,068,698	13,995,623	0	333,188,490	24,179,175	18,152,903	0	17,812,960
2050	252,563,532	18,684,949	586,383,734	13,955,522	0	342,934,629	24,727,804	18,448,537	0	18,316,894

Table B-6. Federal baseline fuel volumes forecast for final rules after BRG modifications (no CTFP implementation)

Year	Gasoline	Ethanol	Diesel	BD	RD	Electricity	H_2	CNG	RNG	Propane
2025	940,409,857	69,591,330	807,804,701	19,225,186	0	4,079,587	0	17,339,680	0	7,746,500
2026	938,032,269	69,418,312	790,337,116	18,809,470	0	8,338,911	0	17,940,062	0	8,014,948
2027	931,557,346	68,942,298	773,407,936	18,406,567	0	13,789,117	0	18,518,877	0	8,283,396
2028	922,128,385	68,247,824	756,992,739	18,015,897	0	20,114,088	0	19,076,915	0	8,551,844
2029	907,639,530	67,179,172	740,996,817	17,635,205	0	28,126,370	38,223	19,614,934	0	8,820,292
2030	960,783,641	71,114,508	725,568,375	17,268,019	0	37,758,525	62,612	20,133,661	0	9,088,741
2031	932,289,651	69,002,743	722,620,318	17,197,857	0	45,367,608	165,374	20,512,258	0	9,463,520
2032	908,358,918	67,228,527	719,793,915	17,130,591	0	51,593,610	238,712	20,888,721	0	9,838,299
2033	863,353,808	63,896,104	716,868,091	17,060,958	0	65,659,976	313,982	21,263,075	0	10,213,079
2034	812,418,547	60,125,294	713,930,119	16,991,037	0	82,277,008	389,009	21,635,346	0	10,587,858
2035	777,227,091	57,518,753	710,971,081	16,920,614	0	93,567,204	463,793	22,005,558	0	10,962,638
2036	747,215,393	55,296,273	710,139,480	16,900,822	0	105,014,982	555,521	22,268,605	0	11,425,623
2037	719,022,957	53,208,428	709,262,307	16,879,946	0	116,304,613	647,269	22,530,904	0	11,888,607
2038	691,886,291	51,198,757	708,342,203	16,858,048	0	127,690,383	739,008	22,792,471	0	12,351,592
2039	665,737,154	49,262,208	707,381,669	16,835,188	0	139,173,257	830,716	23,053,318	0	12,814,577
2040	640,513,574	47,394,194	706,383,075	16,811,422	0	150,754,253	922,367	23,313,461	0	13,277,562
2041	616,759,185	45,636,338	702,700,133	16,723,771	0	160,052,572	1,028,291	23,876,606	0	13,781,495
2042	594,094,748	43,959,123	698,992,969	16,635,543	0	169,394,897	1,134,677	24,440,003	0	14,285,428
2043	572,431,613	42,355,993	695,262,164	16,546,752	0	178,781,332	1,241,512	25,003,640	0	14,789,361
2044	551,691,710	40,821,170	691,508,281	16,457,413	0	188,211,985	1,348,784	25,567,502	0	15,293,295
2045	531,805,916	39,349,543	687,731,865	16,367,537	0	197,686,970	1,456,481	26,131,574	0	15,797,228
2046	512,712,720	37,936,560	683,933,440	16,277,137	0	207,206,410	1,564,591	26,695,845	0	16,301,161
2047	494,357,132	36,578,153	680,113,515	16,186,225	0	216,770,432	1,673,104	27,260,300	0	16,805,094
2048	476,689,782	35,270,670	676,272,580	16,094,814	0	226,379,168	1,782,007	27,824,927	0	17,309,027
2049	459,666,168	34,010,818	672,411,110	16,002,913	0	236,032,758	1,891,289	28,389,714	0	17,812,960
2050	443,246,033	32,795,620	668,529,559	15,910,535	0	245,731,346	2,000,941	28,954,649	0	18,316,894

Table B-7. Federal baseline fuel volumes forecast from initial MOVES runs prior to BRG modifications (no CTFP implementation)

Year	Gasoline	Ethanol	Diesel	BD	RD	Electricity	H_2	CNG	RNG	Propane
2025	1,007,592,539	74,559,090	820,026,066	19,516,046	0	517,453	0	17,339,680	0	7,746,500
2026	998,921,429	73,920,702	802,172,514	19,091,144	0	2,590,921	0	17,940,062	0	8,014,948
2027	982,976,900	72,744,467	783,679,565	18,651,025	0	6,765,716	0	18,518,877	0	8,283,396
2028	960,647,158	71,096,058	764,653,658	18,198,221	0	13,361,972	0	19,076,915	0	8,551,844
2029	930,241,413	68,850,447	745,121,155	17,733,361	0	23,504,235	0	19,614,934	0	8,820,292
2030	965,105,910	71,434,114	725,603,036	17,268,844	0	37,918,192	0	20,133,661	0	9,088,741
2031	939,059,835	69,503,358	722,671,196	17,199,068	0	45,691,213	165,374	20,512,258	0	9,463,520
2032	917,683,553	67,918,028	719,862,395	17,132,221	0	52,098,996	238,712	20,888,721	0	9,838,299
2033	873,244,669	64,627,474	716,943,629	17,062,756	0	66,372,432	313,982	21,263,075	0	10,213,079
2034	822,219,295	60,850,001	714,009,058	16,992,915	0	83,224,585	389,009	21,635,346	0	10,587,858
2035	787,967,792	58,312,964	711,059,989	16,922,730	0	94,786,075	463,793	22,005,558	0	10,962,638
2036	758,840,923	56,155,912	710,237,091	16,903,145	0	106,555,044	555,521	22,268,605	0	11,425,623
2037	731,435,977	54,126,297	709,368,174	16,882,466	0	118,199,048	647,269	22,530,904	0	11,888,607
2038	704,984,372	52,167,282	708,455,889	16,860,754	0	129,977,114	739,008	22,792,471	0	12,351,592
2039	679,423,639	50,274,242	707,502,744	16,838,070	0	141,890,780	830,716	23,053,318	0	12,814,577
2040	654,697,106	48,442,982	706,511,118	16,814,470	0	153,941,648	922,367	23,313,461	0	13,277,562
2041	631,261,262	46,708,680	702,834,897	16,726,978	0	163,641,358	1,028,291	23,876,606	0	13,781,495
2042	608,859,737	45,050,906	699,134,242	16,638,905	0	173,410,095	1,134,677	24,440,003	0	14,285,428
2043	587,406,783	43,463,317	695,409,739	16,550,265	0	183,248,265	1,241,512	25,003,640	0	14,789,361
2044	566,826,980	41,940,333	691,661,958	16,461,070	0	193,156,285	1,348,784	25,567,502	0	15,293,295
2045	547,053,627	40,477,020	687,891,449	16,371,335	0	203,134,578	1,456,481	26,131,574	0	15,797,228
2046	528,027,438	39,068,992	684,098,742	16,281,071	0	213,183,582	1,564,591	26,695,845	0	16,301,161
2047	509,695,476	37,712,332	680,284,350	16,190,291	0	223,303,738	1,673,104	27,260,300	0	16,805,094
2048	492,010,266	36,403,528	676,448,770	16,099,007	0	233,495,502	1,782,007	27,824,927	0	17,309,027
2049	474,929,063	35,139,418	672,592,479	16,007,230	0	243,759,335	1,891,289	28,389,714	0	17,812,960
2050	458,413,240	33,917,145	668,715,936	15,914,971	0	254,095,707	2,000,941	28,954,649	0	18,316,894

C. Avoided Health Damages

C.1 Running COBRA

ERG used COBRA's default 2028 data for the emissions baseline and the 2028 Source Receptor (S-R) Matrix. ERG selected the New Mexico statewide tier as the emissions source location. Given that this analysis was not at the county level, ERG did not run COBRA for a particular county. In most cases, the emission changes were a reduction in tons. However, in the few cases when emissions increased for a particular pollutant, ERG input these as an increases in emissions.

When running COBRA, ERG selected the default 2 percent discount rate, which aligns with the Circular No. A-4 recommendation.[74] COBRA uses a discount rate to express future economic values in present terms. This accounts for present dollars being worth more now than in the future due to the potential for investment.[75]

C.1.1 COBRA RESULTS BY HEALTH OUTCOME

Table C-1. Cumulative total health benefits by health outcome in 2024 USD

Health Outcome	**Scenario: CTFP-Only** Cumulative (2026–2035)	**Scenario: NMVES + CTFP** Cumulative (2026–2040)
\$ Total health benefits (low estimate)	\$10,995,856	\$38,190,099
\$ Total health benefits (high estimate)	\$20,792,795	\$51,542,167
\$ Total mortality (low estimate)	\$10,553,101	\$35,201,667
\$ Total mortality (high estimate)	\$20,350,041	\$48,553,735
\$ PM mortality, all causes (low)	\$8,870,305	\$12,233,097
\$ PM mortality, all causes (high)	\$18,667,245	\$25,585,164
\$ PM infant mortality	\$18,313	\$24,212
\$ Total O_3 mortality	\$1,664,482	\$22,944,358
\$ O_3 mortality (short-term exposure)	\$71,401	\$983,616
\$ O_3 mortality (long-term exposure)	\$1,593,082	\$21,960,741
\$ Total asthma symptoms	\$42,481	\$527,768
\$ PM asthma symptoms, albuterol use	\$181	\$244
\$ O_3 asthma symptoms, chest tightness	\$11,654	\$145,336
\$ O_3 asthma symptoms, cough	\$13,746	\$171,439
\$ O_3 asthma symptoms, shortness of breath	\$5,881	\$73,346
\$ O_3 asthma symptoms, wheeze	\$11,018	\$137,402
\$ Total incidence, asthma	\$149,350	\$737,511
\$ PM incidence, asthma	\$101,441	\$135,371
\$ O_3 incidence, asthma	\$47,909	\$602,138
\$ Total incidence, hay fever/rhinitis	\$15,998	\$81,202
\$ PM incidence, hay fever/rhinitis	\$10,817	\$14,532

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[74] U.S. Environmental Protection Agency, "COBRA Questions and Answers," accessed May 23, 2025, https://www.epa.gov/cobra/cobra-questions-and-answers.

[75] U.S. Environmental Protection Agency, "COBRA Questions and Answers," accessed May 23, 2025, https://www.epa.gov/cobra/cobra-questions-and-answers.

Health Outcome	**Scenario: CTFP-Only** Cumulative (2026–2035)	**Scenario: NMVES + CTFP** Cumulative (2026–2040)
$ O_3 incidence, hay fever/rhinitis	$5,056	$65,044
$ Total ER visits, respiratory	$950	$5,594
$ PM ER visits, respiratory	$580	$781
$ O_3 ER visits, respiratory	$370	$4,814
$ Total hospital admits, all respiratory	$1,987	$4,803
$ PM hospital admits, all respiratory	$1,815	$2,456
$ O_3 hospital admits, all respiratory	$172	$2,347
$ PM nonfatal heart attacks	$31,327	$42,758
$ PM minor restricted activity days	$49,394	$66,038
$ PM work loss days	$21,350	$28,540
$ PM incidence, lung cancer	$2,096	$2,886
$ PM Hospital Admissions cardio cerebro and peripheral vascular disease	$1,686	$2,312
$ PM Hospital Admissions Alzheimer's Disease	$4,055	$5,596
$ PM Hospital Admissions Parkinson's Disease	$833	$1,127
$ PM incidence, stroke	$2,598	$3,506
$ PM incidence, out-of-hospital cardiac arrest	$547	$737
$ PM ER visits, all cardiac outcomes	$348	$475
$ O_3 ER visits, asthma	$1	$13
$ O_3 school loss days, all causes	$112,028	$1,437,538

Table C-2. CTFP-only annual statewide health impacts by category (2026–2030) in 2024 USD

Health Outcome	2026	2027	2028	2029	2030
$ Total health benefits (low estimate)	$1,057,152	$1,175,689	$1,351,048	$1,800,124	$1,648,187
$ Total health benefits (high estimate)	$2,149,363	$2,293,274	$2,538,385	$3,349,942	$3,050,428
$ Total mortality (low estimate)	$1,021,636	$1,129,814	$1,292,337	$1,721,739	$1,577,418
$ Total mortality (high estimate)	$2,113,847	$2,247,399	$2,479,675	$3,271,557	$2,979,659
$ PM mortality, all causes (low)	$962,016	$992,852	$1,063,472	$1,397,922	$1,274,042
$ PM mortality, all causes (high)	$2,054,227	$2,110,437	$2,250,808	$2,947,739	$2,676,283
$ PM infant mortality	$2,232	$2,225	$2,304	$2,929	$2,585
$ Total O_3 mortality	$57,386	$134,736	$226,563	$320,888	$300,790
$ O_3 mortality (short-term exposure)	$2,463	$5,782	$9,721	$13,767	$12,903
$ O_3 mortality (long-term exposure)	$54,924	$128,955	$216,842	$307,122	$287,888
$ Total asthma symptoms	$1,641	$3,715	$6,059	$8,354	$7,622
$ PM, albuterol use	$22	$22	$23	$29	$26
$ O_3, chest tightness	$446	$1,018	$1,663	$2,294	$2,093
$ O_3, cough	$527	$1,200	$1,962	$2,706	$2,469
$ O_3, shortness of breath	$225	$514	$839	$1,157	$1,056
$ O_3, wheeze	$422	$962	$1,572	$2,169	$1,978
$ Total incidence, asthma	$14,054	$16,392	$19,506	$25,644	$22,954
$ PM incidence, asthma	$12,218	$12,207	$12,668	$16,213	$14,349
$ O_3 incidence, asthma	$1,836	$4,184	$6,838	$9,431	$8,605
$ Total incidence, hay fever/rhinitis	$1,475	$1,732	$2,075	$2,741	$2,466
$ PM incidence, hay fever/rhinitis	$1,280	$1,285	$1,341	$1,724	$1,534
$ O_3 incidence, hay fever/rhinitis	$195	$447	$734	$1,017	$932
$ Total ER visits, respiratory	$84	$104	$127	$169	$153
$ PM ER visits, respiratory	$71	$71	$74	$94	$84
$ O_3 ER visits, respiratory	$14	$33	$53	$75	$69
$ Total hospital admits, all respiratory	$225	$235	$255	$330	$295
$ PM hospital admits, all respiratory	$219	$220	$231	$296	$264
$ O_3 hospital admits, all respiratory	$6	$14	$25	$34	$32
$ PM nonfatal heart attacks	$3,662	$3,720	$3,924	$5,091	$4,577
$ PM minor restricted activity days	$6,028	$6,041	$6,290	$8,080	$7,176
$ PM work loss days	$2,613	$2,617	$2,721	$3,494	$3,101
$ PM incidence, lung cancer	$242	$247	$261	$339	$306
$ PM Hospital Admissions cardio cerebro and peripheral vascular disease	$196	$200	$211	$274	$246
$ PM Hospital Admissions Alzheimer's Disease	$465	$476	$505	$656	$593
$ PM Hospital Admissions Parkinson's Disease	$100	$101	$106	$135	$121
$ PM incidence, stroke	$317	$318	$332	$423	$376
$ PM incidence, out-of-hospital cardiac arrest	$67	$67	$70	$89	$79
$ PM ER visits, all cardiac outcomes	$41	$42	$44	$56	$50
$ O_3 ER visits, asthma	$0	$0	$0	$0	$0
$ O_3 school loss days, all causes	$4,304	$9,871	$16,225	$22,507	$20,654

Table C-3. CTFP-only annual statewide health impacts by category (2031–2035) in 2024 USD

Health Outcome	2031	2032	2033	2034	2035
$ Total health benefits (low estimate)	$1,468,852	$1,273,946	$754,678	$358,145	$108,034
$ Total health benefits (high estimate)	$2,714,056	$2,351,338	$1,414,186	$695,799	$236,023
$ Total mortality (low estimate)	$1,407,443	$1,222,138	$726,573	$347,111	$106,895
$ Total mortality (high estimate)	$2,652,646	$2,299,530	$1,386,081	$684,765	$234,885
$ PM mortality, all causes (low)	$1,139,313	$992,387	$611,377	$314,941	$121,984
$ PM mortality, all causes (high)	$2,384,517	$2,069,779	$1,270,886	$652,595	$249,973
$ PM infant mortality	$2,240	$1,891	$1,131	$565	$210
$ Total O_3 mortality	$265,890	$227,860	$114,064	$31,603	-$15,299
$ O_3 mortality (short-term exposure)	$11,404	$9,772	$4,891	$1,355	-$656
$ O_3 mortality (long-term exposure)	$254,485	$218,088	$109,173	$30,248	-$14,643
$ Total asthma symptoms	$6,562	$5,480	$2,676	$726	-$355
$ PM, albuterol use	$23	$19	$11	$6	$2
$ O_3, chest tightness	$1,802	$1,505	$734	$199	-$98
$ O_3, cough	$2,125	$1,774	$866	$234	-$116
$ O_3, shortness of breath	$909	$760	$371	$100	-$49
$ O_3, wheeze	$1,704	$1,423	$694	$188	-$93
$ Total incidence, asthma	$19,872	$16,740	$9,344	$3,988	$857
$ PM incidence, asthma	$12,466	$10,555	$6,326	$3,172	$1,266
$ O_3 incidence, asthma	$7,407	$6,185	$3,018	$816	-$409
$ Total incidence, hay fever/rhinitis	$2,145	$1,816	$1,018	$436	$94
$ PM incidence, hay fever/rhinitis	$1,340	$1,140	$687	$346	$139
$ O_3 incidence, hay fever/rhinitis	$806	$676	$331	$90	-$45
$ Total ER visits, respiratory	$132	$112	$63	$26	$4
$ PM ER visits, respiratory	$74	$63	$38	$19	$8
$ O_3 ER visits, respiratory	$59	$49	$25	$6	-$3
$ Total hospital admits, all respiratory	$258	$220	$130	$64	$23
$ PM hospital admits, all respiratory	$231	$197	$119	$59	$25
$ O_3 hospital admits, all respiratory	$28	$24	$11	$3	-$2
$ PM nonfatal heart attacks	$4,037	$3,473	$2,113	$1,075	$439
$ PM minor restricted activity days	$6,256	$5,316	$3,197	$1,609	$638
$ PM work loss days	$2,700	$2,292	$1,378	$693	$277
$ PM incidence, lung cancer	$272	$234	$142	$73	$30
$ PM Hospital Admissions cardio cerebro and peripheral vascular disease	$217	$188	$115	$58	$24
$ PM Hospital Admissions Alzheimer's Disease	$526	$455	$278	$142	$58
$ PM Hospital Admissions Parkinson's Disease	$106	$90	$54	$28	$11
$ PM incidence, stroke	$329	$280	$168	$85	$34
$ PM incidence, out-of-hospital cardiac arrest	$70	$58	$36	$17	$7
$ PM ER visits, all cardiac outcomes	$45	$38	$24	$12	$5
$ O_3 ER visits, asthma	$0	$0	$0	$0	$0
$ O_3 school loss days, all causes	$17,882	$15,017	$7,371	$2,004	-$1,007

Table C-4. CTFP + NMVES annual statewide health impacts by category (2026–2030) in 2024 USD

Health Outcome	2026	2027	2028	2029	2030
$ Total health benefits (low estimate)	$1,057,152	$1,677,763	$1,960,638	$2,519,313	$2,476,231
$ Total health benefits (high estimate)	$2,149,363	$2,877,135	$3,250,299	$4,192,996	$4,021,059
$ Total mortality (low estimate)	$1,021,636	$1,578,916	$1,839,350	$2,369,025	$2,324,505
$ Total mortality (high estimate)	$2,113,847	$2,778,288	$3,129,010	$4,042,708	$3,869,333
$ PM mortality, all causes (low)	$962,016	$1,065,342	$1,154,927	$1,509,518	$1,403,481
$ PM mortality, all causes (high)	$2,054,227	$2,264,714	$2,444,588	$3,183,201	$2,948,309
$ PM infant mortality	$2,232	$2,389	$2,503	$3,165	$2,849
$ Total O_3 mortality	$57,386	$511,186	$681,918	$856,342	$918,174
$ O_3 mortality (short-term exposure)	$2,463	$21,936	$29,258	$36,738	$39,385
$ O_3 mortality (long-term exposure)	$54,924	$489,250	$652,660	$819,604	$878,789
$ Total asthma symptoms	$1,641	$14,034	$18,193	$22,232	$23,194
$ PM, albuterol use	$22	$23	$25	$31	$29
$ O_3, chest tightness	$446	$3,860	$5,005	$6,116	$6,383
$ O_3, cough	$527	$4,554	$5,904	$7,215	$7,529
$ O_3, shortness of breath	$225	$1,949	$2,526	$3,086	$3,221
$ O_3, wheeze	$422	$3,650	$4,732	$5,782	$6,034
$ Total incidence, asthma	$14,054	$28,968	$34,334	$42,645	$42,033
$ PM incidence, asthma	$12,218	$13,094	$13,753	$17,498	$15,794
$ O_3 incidence, asthma	$1,836	$15,874	$20,581	$25,148	$26,239
$ Total incidence, hay fever/rhinitis	$1,475	$3,075	$3,664	$4,572	$4,530
$ PM incidence, hay fever/rhinitis	$1,280	$1,379	$1,455	$1,861	$1,688
$ O_3 incidence, hay fever/rhinitis	$195	$1,695	$2,209	$2,711	$2,842
$ Total ER visits, respiratory	$84	$200	$241	$300	$300
$ PM ER visits, respiratory	$71	$76	$80	$102	$92
$ O_3 ER visits, respiratory	$14	$124	$161	$198	$208
$ Total hospital admits, all respiratory	$225	$292	$324	$411	$387
$ PM hospital admits, all respiratory	$219	$237	$250	$320	$291
$ O_3 hospital admits, all respiratory	$6	$56	$74	$91	$97
$ PM nonfatal heart attacks	$3,662	$3,990	$4,259	$5,494	$5,038
$ PM minor restricted activity days	$6,028	$6,477	$6,824	$8,715	$7,892
$ PM work loss days	$2,613	$2,805	$2,953	$3,768	$3,410
$ PM incidence, lung cancer	$242	$265	$284	$367	$337
$ PM Hospital Admissions cardio cerebro and peripheral vascular disease	$196	$214	$229	$295	$272
$ PM Hospital Admissions Alzheimer's Disease	$465	$511	$548	$709	$654
$ PM Hospital Admissions Parkinson's Disease	$100	$109	$115	$147	$133
$ PM incidence, stroke	$317	$341	$361	$458	$415
$ PM incidence, out-of-hospital cardiac arrest	$67	$72	$76	$96	$87
$ PM ER visits, all cardiac outcomes	$41	$45	$47	$61	$55
$ O_3 ER visits, asthma	$0	$0	$0	$1	$1
$ O_3 school loss days, all causes	$4,304	$37,448	$48,835	$60,016	$62,985

Table C-5. CTFP + NMVES annual statewide health impacts by category (2031–2035) in 2024 USD

Health Outcome	2031	2032	2033	2034	2035
$ Total health benefits (low estimate)	$2,620,440	$2,750,404	$2,566,239	$2,514,028	$2,665,917
$ Total health benefits (high estimate)	$4,043,311	$4,040,128	$3,474,869	$3,139,200	$3,119,450
$ Total mortality (low estimate)	$2,447,225	$2,557,045	$2,367,133	$2,302,885	$2,419,454
$ Total mortality (high estimate)	$3,870,097	$3,846,769	$3,275,762	$2,928,056	$2,872,985
$ PM mortality, all causes (low)	$1,301,728	$1,187,806	$842,157	$582,967	$432,110
$ PM mortality, all causes (high)	$2,724,600	$2,477,530	$1,750,786	$1,208,140	$885,642
$ PM infant mortality	$2,560	$2,266	$1,560	$1,050	$748
$ Total O_3 mortality	$1,142,936	$1,366,973	$1,523,416	$1,718,868	$1,986,594
$ O_3 mortality (short-term exposure)	$49,021	$58,624	$65,327	$73,701	$85,160
$ O_3 mortality (long-term exposure)	$1,093,915	$1,308,349	$1,458,089	$1,645,167	$1,901,434
$ Total asthma symptoms	$28,103	$32,737	$35,551	$39,109	$46,265
$ PM, albuterol use	$26	$23	$16	$11	$8
$ O_3, chest tightness	$7,736	$9,013	$9,790	$10,772	$12,744
$ O_3, cough	$9,124	$10,632	$11,549	$12,707	$15,032
$ O_3, shortness of breath	$3,904	$4,549	$4,940	$5,437	$6,432
$ O_3, wheeze	$7,313	$8,521	$9,256	$10,184	$12,049
$ Total incidence, asthma	$46,023	$49,659	$48,923	$50,106	$57,363
$ PM incidence, asthma	$14,226	$12,612	$8,687	$5,839	$4,442
$ O_3 incidence, asthma	$31,798	$37,046	$40,235	$44,266	$52,920
$ Total incidence, hay fever/rhinitis	$4,989	$5,412	$5,362	$5,522	$6,398
$ PM incidence, hay fever/rhinitis	$1,528	$1,362	$943	$638	$490
$ O_3 incidence, hay fever/rhinitis	$3,460	$4,050	$4,419	$4,884	$5,907
$ Total ER visits, respiratory	$337	$372	$376	$394	$461
$ PM ER visits, respiratory	$84	$75	$52	$35	$27
$ O_3 ER visits, respiratory	$253	$297	$325	$359	$435
$ Total hospital admits, all respiratory	$383	$377	$320	$285	$298
$ PM hospital admits, all respiratory	$263	$236	$164	$111	$86
$ O_3 hospital admits, all respiratory	$119	$141	$156	$174	$213
$ PM nonfatal heart attacks	$4,608	$4,150	$2,903	$1,981	$1,542
$ PM minor restricted activity days	$7,131	$6,341	$4,378	$2,947	$2,219
$ PM work loss days	$3,078	$2,735	$1,886	$1,269	$961
$ PM incidence, lung cancer	$311	$281	$197	$135	$106
$ PM Hospital Admissions cardio cerebro and peripheral vascular disease	$249	$224	$158	$108	$84
$ PM Hospital Admissions Alzheimer's Disease	$602	$545	$383	$264	$207
$ PM Hospital Admissions Parkinson's Disease	$121	$108	$75	$51	$39
$ PM incidence, stroke	$376	$335	$233	$158	$122
$ PM incidence, out-of-hospital cardiac arrest	$79	$71	$49	$33	$26
$ PM ER visits, all cardiac outcomes	$51	$46	$32	$22	$17
$ O_3 ER visits, asthma	$1	$1	$1	$1	$1
$ O_3 school loss days, all causes	$76,775	$89,967	$98,282	$108,760	$130,354

Table C-6. CTFP + NMVES annual statewide health impacts by category (2036–2040) in 2024 USD

Health Outcome	2036	2037	2038	2039	2040
$ Total health benefits (low estimate)	$2,722,761	$2,889,335	$3,054,389	$3,216,983	$3,498,505
$ Total health benefits (high estimate)	$3,063,169	$3,244,754	$3,424,334	$3,600,880	$3,901,223
$ Total mortality (low estimate)	$2,466,184	$2,621,815	$2,776,497	$2,929,350	$3,180,648
$ Total mortality (high estimate)	$2,806,591	$2,977,233	$3,146,442	$3,313,249	$3,583,366
$ PM mortality, all causes (low)	$325,385	$340,847	$355,904	$370,465	$398,442
$ PM mortality, all causes (high)	$665,791	$696,266	$725,847	$754,362	$801,159
$ PM infant mortality	$552	$566	$577	$587	$607
$ Total O_3 mortality	$2,140,248	$2,280,403	$2,420,017	$2,558,298	$2,781,600
$ O_3 mortality (short-term exposure)	$91,740	$97,740	$103,717	$109,636	$119,172
$ O_3 mortality (long-term exposure)	$2,048,508	$2,182,663	$2,316,301	$2,448,662	$2,662,427
$ Total asthma symptoms	$48,738	$50,793	$52,735	$54,553	$59,889
$ PM, albuterol use	$6	$6	$6	$6	$7
$ O_3, chest tightness	$13,426	$13,992	$14,527	$15,027	$16,498
$ O_3, cough	$15,837	$16,505	$17,136	$17,727	$19,461
$ O_3, shortness of breath	$6,775	$7,061	$7,332	$7,584	$8,326
$ O_3, wheeze	$12,693	$13,229	$13,734	$14,207	$15,597
$ Total incidence, asthma	$59,035	$61,491	$63,813	$65,988	$73,078
$ PM incidence, asthma	$3,255	$3,331	$3,399	$3,458	$3,765
$ O_3 incidence, asthma	$55,780	$58,160	$60,415	$62,529	$69,312
$ Total incidence, hay fever/rhinitis	$6,591	$6,869	$7,133	$7,382	$8,229
$ PM incidence, hay fever/rhinitis	$360	$368	$376	$383	$419
$ O_3 incidence, hay fever/rhinitis	$6,231	$6,500	$6,758	$6,999	$7,809
$ Total ER visits, respiratory	$481	$503	$525	$546	$612
$ PM ER visits, respiratory	$19	$20	$20	$22	$24
$ O_3 ER visits, respiratory	$460	$483	$504	$525	$588
$ Total hospital admits, all respiratory	$290	$304	$319	$332	$373
$ PM hospital admits, all respiratory	$64	$66	$67	$69	$76
$ O_3 hospital admits, all respiratory	$227	$240	$251	$263	$297
$ PM nonfatal heart attacks	$1,143	$1,184	$1,222	$1,258	$1,394
$ PM minor restricted activity days	$1,632	$1,682	$1,728	$1,770	$1,923
$ PM work loss days	$706	$727	$746	$764	$834
$ PM incidence, lung cancer	$79	$82	$85	$88	$97
$ PM Hospital Admissions cardio cerebro and peripheral vascular disease	$63	$65	$68	$70	$77
$ PM Hospital Admissions Alzheimer's Disease	$155	$161	$167	$172	$191
$ PM Hospital Admissions Parkinson's Disease	$29	$30	$31	$32	$35
$ PM incidence, stroke	$90	$92	$94	$96	$106
$ PM incidence, out-of-hospital cardiac arrest	$18	$19	$19	$20	$23
$ PM ER visits, all cardiac outcomes	$12	$13	$13	$14	$15
$ O_3 ER visits, asthma	$1	$1	$1	$1	$2
$ O_3 school loss days, all causes	$137,513	$143,503	$149,192	$154,548	$170,981

Table C-7. CTFP-only annual statewide avoided incidence by category (2026–2030)

Health Outcome	2026	2027	2028	2029	2030
Total mortality (low estimate)	0.0614	0.0679	0.0777	0.1035	0.0948
Total mortality (high estimate)	0.1271	0.1351	0.1490	0.1966	0.1791
PM mortality, all causes (low)	0.0578	0.0597	0.0639	0.0840	0.0766
PM mortality, all causes (high)	0.1235	0.1269	0.1353	0.1772	0.1609
PM infant mortality	0.0001	0.0001	0.0001	0.0002	0.0001
Total O_3 mortality	0.0034	0.0081	0.0136	0.0193	0.0181
O_3 mortality (short-term exposure)	0.0001	0.0003	0.0006	0.0008	0.0008
O_3 mortality (long-term exposure)	0.0033	0.0078	0.0130	0.0185	0.0173
Total asthma symptoms	31.9847	36.8720	43.4820	57.2732	51.4438
PM asthma symptoms, albuterol use	28.3013	28.4730	29.7548	38.3406	34.1687
O_3 asthma symptoms, chest tightness	1.0148	2.3140	3.7820	5.2161	4.7595
O_3 asthma symptoms, cough	1.1970	2.7296	4.4612	6.1528	5.6142
O_3 asthma symptoms, shortness of breath	0.5121	1.1678	1.9086	2.6324	2.4019
O_3 asthma symptoms, wheeze	0.9594	2.1877	3.5755	4.9313	4.4996
Total incidence, asthma	0.1783	0.2079	0.2474	0.3253	0.2911
PM incidence, asthma	0.1550	0.1548	0.1607	0.2056	0.1820
O_3 incidence, asthma	0.0233	0.0531	0.0867	0.1196	0.1091
Total incidence, hay fever/rhinitis	1.1274	1.3239	1.5854	2.0948	1.8844
PM incidence, hay fever/rhinitis	0.9783	0.9824	1.0246	1.3178	1.1722
O_3 incidence, hay fever/rhinitis	0.1491	0.3416	0.5608	0.7770	0.7122
Total ER visits, respiratory	0.0443	0.0541	0.0667	0.0886	0.0799
PM ER visits, respiratory	0.0368	0.0370	0.0386	0.0496	0.0442
O_3 ER visits, respiratory	0.0075	0.0171	0.0281	0.0390	0.0357
Total hospital admits, all respiratory	0.0080	0.0084	0.0092	0.0119	0.0107
PM hospital admits, all respiratory	0.0077	0.0077	0.0080	0.0103	0.0092
O_3 hospital admits, all respiratory	0.0003	0.0007	0.0012	0.0016	0.0015
PM nonfatal heart attacks	0.0371	0.0377	0.0397	0.0515	0.0463
PM minor restricted activity days	42.0650	42.1619	43.8958	56.3878	50.0766
PM work loss days	7.1579	7.1682	7.4566	9.5721	8.4935
PM incidence, lung cancer	0.0046	0.0046	0.0049	0.0064	0.0057
PM Hospital Admissions cardio cerebro and peripheral vascular disease	0.0058	0.0059	0.0062	0.0081	0.0073
PM Hospital Admissions Alzheimer's Disease	0.0178	0.0181	0.0193	0.0250	0.0226
PM Hospital Admissions Parkinson's Disease	0.0036	0.0036	0.0038	0.0048	0.0043
PM incidence, stroke	0.0043	0.0043	0.0045	0.0057	0.0051
PM incidence, out-of-hospital cardiac arrest	0.0009	0.0009	0.0010	0.0012	0.0011
PM ER visits, all cardiac outcomes	0.0162	0.0165	0.0173	0.0223	0.0200
O_3 ER visits, asthma	0.0000	0.0001	0.0001	0.0002	0.0002
O_3 school loss days, all causes	2.1961	5.0367	8.2793	11.4847	10.5394

Table C-8. CTFP-only annual statewide avoided incidence by category (2031–2035)

Health Outcome	2031	2032	2033	2034	2035
Total mortality (low estimate)	0.0846	0.0735	0.0437	0.0209	0.0060
Total mortality (high estimate)	0.1594	0.1382	0.0833	0.0412	0.0132
PM mortality, all causes (low)	0.0685	0.0597	0.0367	0.0189	0.0068
PM mortality, all causes (high)	0.1433	0.1244	0.0764	0.0392	0.0140
PM infant mortality	0.0001	0.0001	0.0001	0.0000	0.0000
Total O_3 mortality	0.0160	0.0137	0.0069	0.0019	-0.0009
O_3 mortality (short-term exposure)	0.0007	0.0006	0.0003	0.0001	0.0000
O_3 mortality (long-term exposure)	0.0153	0.0131	0.0066	0.0018	-0.0008
Total asthma symptoms	44.7619	37.9048	21.4411	9.4041	2.1225
PM asthma symptoms, albuterol use	29.8903	25.4864	15.3804	7.7661	2.8799
O_3 asthma symptoms, chest tightness	4.0973	3.4214	1.6698	0.4513	-0.2087
O_3 asthma symptoms, cough	4.8331	4.0358	1.9696	0.5323	-0.2462
O_3 asthma symptoms, shortness of breath	2.0677	1.7266	0.8427	0.2277	-0.1053
O_3 asthma symptoms, wheeze	3.8736	3.2346	1.5786	0.4266	-0.1973
Total incidence, asthma	0.2521	0.2123	0.1185	0.0506	0.0100
PM incidence, asthma	0.1581	0.1339	0.0802	0.0402	0.0148
O_3 incidence, asthma	0.0939	0.0784	0.0383	0.0103	-0.0048
Total incidence, hay fever/rhinitis	1.6394	1.3877	0.7780	0.3332	0.0659
PM incidence, hay fever/rhinitis	1.0235	0.8711	0.5247	0.2644	0.0979
O_3 incidence, hay fever/rhinitis	0.6159	0.5166	0.2533	0.0688	-0.0319
Total ER visits, respiratory	0.0695	0.0588	0.0325	0.0134	0.0021
PM ER visits, respiratory	0.0386	0.0328	0.0198	0.0100	0.0037
O_3 ER visits, respiratory	0.0309	0.0260	0.0127	0.0035	-0.0016
Total hospital admits, all respiratory	0.0093	0.0079	0.0046	0.0022	0.0007
PM hospital admits, all respiratory	0.0080	0.0068	0.0041	0.0021	0.0008
O_3 hospital admits, all respiratory	0.0013	0.0011	0.0006	0.0002	-0.0001
PM nonfatal heart attacks	0.0409	0.0352	0.0214	0.0109	0.0041
PM minor restricted activity days	43.6530	37.0919	22.3081	11.2268	4.1504
PM work loss days	7.3976	6.2803	3.7739	1.8976	0.7009
PM incidence, lung cancer	0.0051	0.0044	0.0027	0.0014	0.0005
PM Hospital Admissions cardio cerebro and peripheral vascular disease	0.0065	0.0056	0.0034	0.0017	0.0006
PM Hospital Admissions Alzheimer's Disease	0.0201	0.0173	0.0106	0.0054	0.0020
PM Hospital Admissions Parkinson's Disease	0.0038	0.0032	0.0019	0.0010	0.0004
PM incidence, stroke	0.0044	0.0038	0.0023	0.0011	0.0004
PM incidence, out-of-hospital cardiac arrest	0.0010	0.0008	0.0005	0.0002	0.0001
PM ER visits, all cardiac outcomes	0.0176	0.0151	0.0092	0.0047	0.0017
O_3 ER visits, asthma	0.0002	0.0001	0.0001	0.0000	0.0000
O_3 school loss days, all causes	9.1249	7.6633	3.7614	1.0224	-0.4755

Table C-9. CTFP + NMVES annual statewide avoided incidence by category (2026–2030)

Health Outcome	2026	2027	2028	2029	2030
Total mortality (low estimate)	0.0614	0.0949	0.1106	0.1424	0.1397
Total mortality (high estimate)	0.1271	0.1670	0.1881	0.2430	0.2326
PM mortality, all causes (low)	0.0578	0.0640	0.0694	0.0907	0.0844
PM mortality, all causes (high)	0.1235	0.1361	0.1469	0.1913	0.1772
PM infant mortality	0.0001	0.0001	0.0001	0.0002	0.0002
Total O_3 mortality	0.0034	0.0307	0.0410	0.0515	0.0552
O_3 mortality (short-term exposure)	0.0001	0.0013	0.0018	0.0022	0.0024
O_3 mortality (long-term exposure)	0.0033	0.0294	0.0392	0.0493	0.0528
Total asthma symptoms	31.9847	62.4103	73.6228	91.8670	90.2956
PM asthma symptoms, albuterol use	28.3013	30.5460	32.3062	41.3802	37.6130
O_3 asthma symptoms, chest tightness	1.0148	8.7789	11.3831	13.9095	14.5145
O_3 asthma symptoms, cough	1.1970	10.3555	13.4273	16.4075	17.1211
O_3 asthma symptoms, shortness of breath	0.5121	4.4304	5.7446	7.0196	7.3249
O_3 asthma symptoms, wheeze	0.9594	8.2996	10.7616	13.1501	13.7220
Total incidence, asthma	0.1783	0.3674	0.4355	0.5409	0.5331
PM incidence, asthma	0.1550	0.1661	0.1744	0.2219	0.2003
O_3 incidence, asthma	0.0233	0.2013	0.2611	0.3190	0.3328
Total incidence, hay fever/rhinitis	1.1274	2.3497	2.8003	3.4941	3.4621
PM incidence, hay fever/rhinitis	0.9783	1.0538	1.1124	1.4223	1.2903
O_3 incidence, hay fever/rhinitis	0.1491	1.2958	1.6878	2.0718	2.1718
Total ER visits, respiratory	0.0443	0.1046	0.1265	0.1575	0.1577
PM ER visits, respiratory	0.0368	0.0397	0.0419	0.0535	0.0486
O_3 ER visits, respiratory	0.0075	0.0649	0.0846	0.1039	0.1091
Total hospital admits, all respiratory	0.0080	0.0109	0.0122	0.0155	0.0147
PM hospital admits, all respiratory	0.0077	0.0083	0.0087	0.0111	0.0101
O_3 hospital admits, all respiratory	0.0003	0.0027	0.0035	0.0043	0.0046
PM nonfatal heart attacks	0.0371	0.0404	0.0431	0.0556	0.0510
PM minor restricted activity days	42.0650	45.2024	47.6266	60.8186	55.0805
PM work loss days	7.1579	7.6849	8.0901	10.3238	9.3417
PM incidence, lung cancer	0.0046	0.0050	0.0053	0.0069	0.0063
PM Hospital Admissions cardio cerebro and peripheral vascular disease	0.0058	0.0063	0.0068	0.0088	0.0080
PM Hospital Admissions Alzheimer's Disease	0.0178	0.0195	0.0209	0.0270	0.0249
PM Hospital Admissions Parkinson's Disease	0.0036	0.0039	0.0041	0.0052	0.0048
PM incidence, stroke	0.0043	0.0046	0.0049	0.0062	0.0056
PM incidence, out-of-hospital cardiac arrest	0.0009	0.0010	0.0010	0.0013	0.0012
PM ER visits, all cardiac outcomes	0.0162	0.0177	0.0188	0.0241	0.0221
O_3 ER visits, asthma	0.0000	0.0003	0.0004	0.0005	0.0006
O_3 school loss days, all causes	2.1961	19.1091	24.9197	30.6254	32.1404

Table C-10. CTFP + NMVES annual statewide avoided incidence by category (2031–2035)

Health Outcome	2031	2032	2033	2034	2035
Total mortality (low estimate)	0.1471	0.1537	0.1423	0.1384	0.1357
Total mortality (high estimate)	0.2326	0.2312	0.1969	0.1760	0.1611
PM mortality, all causes (low)	0.0782	0.0714	0.0506	0.0350	0.0242
PM mortality, all causes (high)	0.1638	0.1489	0.1052	0.0726	0.0497
PM infant mortality	0.0001	0.0001	0.0001	0.0001	0.0000
Total O_3 mortality	0.0687	0.0822	0.0916	0.1033	0.1114
O_3 mortality (short-term exposure)	0.0029	0.0035	0.0039	0.0044	0.0048
O_3 mortality (long-term exposure)	0.0658	0.0786	0.0876	0.0989	0.1066
Total asthma symptoms	97.9645	104.8534	101.9344	103.2140	108.2422
PM asthma symptoms, albuterol use	34.1134	30.4556	21.1232	14.2974	10.1079
O_3 asthma symptoms, chest tightness	17.5915	20.4972	22.2641	24.4971	27.0366
O_3 asthma symptoms, cough	20.7508	24.1783	26.2626	28.8968	31.8925
O_3 asthma symptoms, shortness of breath	8.8778	10.3442	11.2359	12.3629	13.6445
O_3 asthma symptoms, wheeze	16.6311	19.3781	21.0486	23.1598	25.5607
Total incidence, asthma	0.5838	0.6299	0.6205	0.6355	0.6716
PM incidence, asthma	0.1804	0.1600	0.1102	0.0741	0.0520
O_3 incidence, asthma	0.4033	0.4699	0.5103	0.5615	0.6196
Total incidence, hay fever/rhinitis	3.8122	4.1357	4.0975	4.2194	4.4818
PM incidence, hay fever/rhinitis	1.1681	1.0409	0.7206	0.4868	0.3436
O_3 incidence, hay fever/rhinitis	2.6441	3.0948	3.3769	3.7325	4.1383
Total ER visits, respiratory	0.1769	0.1950	0.1973	0.2065	0.2218
PM ER visits, respiratory	0.0440	0.0393	0.0272	0.0184	0.0130
O_3 ER visits, respiratory	0.1329	0.1557	0.1701	0.1882	0.2088
Total hospital admits, all respiratory	0.0148	0.0148	0.0130	0.0120	0.0119
PM hospital admits, all respiratory	0.0091	0.0081	0.0056	0.0038	0.0027
O_3 hospital admits, all respiratory	0.0057	0.0067	0.0074	0.0083	0.0093
PM nonfatal heart attacks	0.0467	0.0420	0.0294	0.0201	0.0143
PM minor restricted activity days	49.7613	44.2501	30.5493	20.5656	14.4481
PM work loss days	8.4321	7.4916	5.1673	3.4753	2.4391
PM incidence, lung cancer	0.0058	0.0052	0.0037	0.0025	0.0018
PM Hospital Admissions cardio cerebro and peripheral vascular disease	0.0074	0.0067	0.0047	0.0032	0.0023
PM Hospital Admissions Alzheimer's Disease	0.0229	0.0208	0.0146	0.0101	0.0072
PM Hospital Admissions Parkinson's Disease	0.0043	0.0039	0.0027	0.0018	0.0013
PM incidence, stroke	0.0051	0.0045	0.0031	0.0021	0.0015
PM incidence, out-of-hospital cardiac arrest	0.0011	0.0010	0.0007	0.0005	0.0003
PM ER visits, all cardiac outcomes	0.0201	0.0181	0.0126	0.0086	0.0061
O_3 ER visits, asthma	0.0007	0.0008	0.0009	0.0010	0.0011
O_3 school loss days, all causes	39.1770	45.9094	50.1524	55.4985	61.6026

Table C-11. CTFP + NMVES annual statewide avoided incidence by category (2036–2040)

Health Outcome	2036	2037	2038	2039	2040
Total mortality (low estimate)	0.1383	0.1470	0.1557	0.1643	0.1671
Total mortality (high estimate)	0.1574	0.1669	0.1764	0.1858	0.1883
PM mortality, all causes (low)	0.0182	0.0191	0.0200	0.0208	0.0209
PM mortality, all causes (high)	0.0373	0.0390	0.0407	0.0423	0.0421
PM infant mortality	0.0000	0.0000	0.0000	0.0000	0.0000
Total O_3 mortality	0.1200	0.1279	0.1357	0.1435	0.1462
O_3 mortality (short-term exposure)	0.0051	0.0055	0.0058	0.0061	0.0063
O_3 mortality (long-term exposure)	0.1149	0.1224	0.1299	0.1373	0.1399
Total asthma symptoms	110.8002	115.3399	119.6227	123.6238	127.0495
PM asthma symptoms, albuterol use	7.4142	7.5956	7.7589	7.9032	7.9991
O_3 asthma symptoms, chest tightness	28.4835	29.6842	30.8191	31.8817	32.7990
O_3 asthma symptoms, cough	33.5992	35.0156	36.3545	37.6079	38.6900
O_3 asthma symptoms, shortness of breath	14.3747	14.9807	15.5535	16.0897	16.5527
O_3 asthma symptoms, wheeze	26.9286	28.0638	29.1368	30.1413	31.0086
Total incidence, asthma	0.6912	0.7200	0.7472	0.7726	0.7945
PM incidence, asthma	0.0381	0.0390	0.0398	0.0405	0.0409
O_3 incidence, asthma	0.6531	0.6810	0.7074	0.7321	0.7536
Total incidence, hay fever/rhinitis	4.6166	4.8120	4.9971	5.1709	5.3212
PM incidence, hay fever/rhinitis	0.2519	0.2580	0.2634	0.2682	0.2714
O_3 incidence, hay fever/rhinitis	4.3647	4.5540	4.7337	4.9027	5.0498
Total ER visits, respiratory	0.2308	0.2418	0.2523	0.2624	0.2713
PM ER visits, respiratory	0.0096	0.0098	0.0101	0.0103	0.0105
O_3 ER visits, respiratory	0.2213	0.2319	0.2422	0.2520	0.2608
Total hospital admits, all respiratory	0.0118	0.0124	0.0130	0.0135	0.0141
PM hospital admits, all respiratory	0.0019	0.0020	0.0020	0.0021	0.0021
O_3 hospital admits, all respiratory	0.0099	0.0104	0.0110	0.0115	0.0119
PM nonfatal heart attacks	0.0106	0.0110	0.0113	0.0117	0.0119
PM minor restricted activity days	10.6246	10.9480	11.2487	11.5251	11.7333
PM work loss days	1.7915	1.8442	1.8929	1.9374	1.9704
PM incidence, lung cancer	0.0013	0.0014	0.0014	0.0015	0.0015
PM Hospital Admissions cardio cerebro and peripheral vascular disease	0.0017	0.0018	0.0018	0.0019	0.0019
PM Hospital Admissions Alzheimer’s Disease	0.0054	0.0056	0.0058	0.0060	0.0062
PM Hospital Admissions Parkinson’s Disease	0.0010	0.0010	0.0010	0.0010	0.0010
PM incidence, stroke	0.0011	0.0011	0.0012	0.0012	0.0012
PM incidence, out-of-hospital cardiac arrest	0.0002	0.0002	0.0003	0.0003	0.0003
PM ER visits, all cardiac outcomes	0.0046	0.0047	0.0049	0.0050	0.0051
O_3 ER visits, asthma	0.0011	0.0012	0.0012	0.0013	0.0013
O_3 school loss days, all causes	64.9857	67.8163	70.5050	73.0359	75.2417

D. Macroeconomic Impacts

D.1 Business Consumer Proportions

As stated in economic impacts analysis, Section 1.2.3.2, ERG modeled changes in business expenditures as changes in revenue, depending on each industry's reliance on gasoline or diesel. Table D-1 presents the share of demand for each fuel type across different sectors. These estimates are based on data from the NEI.[76]

Table D-1. Business consumers by vehicle type

Industry	Gasoline	Diesel
Agricultural equipment	0.994%	0.024%
Commercial equipment	0.409%	0.507%
Construction equipment	8.217%	0.254%
Industrial equipment	0.606%	0.059%
Lawn and garden equipment	0.167%	1.604%
Logging equipment	0.002%	0.000%
Recreational equipment	0.010%	0.300%
Underground mining equipment	0.014%	0.000%
Combination long-haul truck	35.185%	0.000%
Combination short-haul truck	30.610%	0.271%
Motor home	0.186%	0.387%
Other buses	0.219%	0.000%
Refuse truck	0.178%	0.002%
School bus	1.562%	0.065%
Single unit long-haul truck	2.060%	0.943%
Single unit short-haul truck	13.578%	4.132%
Transit bus	0.327%	0.139%
Light commercial truck	0.630%	4.833%
Passenger car	0.188%	29.101%
Passenger truck	4.857%	56.111%
Motorcycle	0.000%	1.268%
Total	**100.0%**	**100.0%**

D.2 Updates to the NMVES Analysis

As part of the data shared with BRG, ERG updated its previous NMVES macroeconomic analysis of the ACC II and ACT. ERG updated vehicle population and VMT by adjusting the baseline of the

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[76] U.S. Environmental Protection Agency, “2020 National Emissions Inventory (NEI) Data,” accessed May 29, 2025, https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data.

NMVES analysis to the federal baseline, shown in Figure 4-1, which resulted in macroeconomic changes for vehicle costs, sales taxes, fuel costs, and maintenance costs.