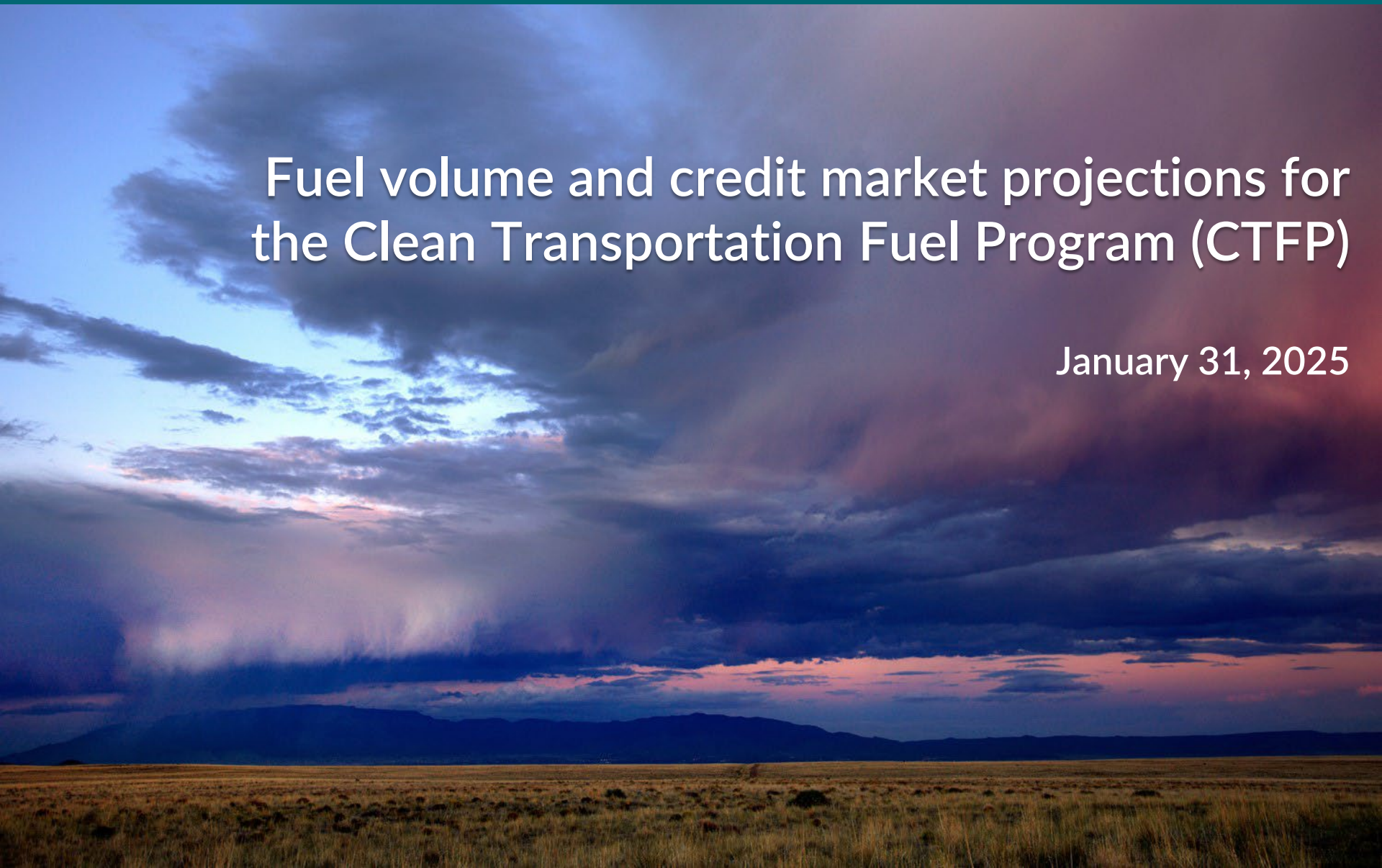
New Mexico Environment Department



Fuel volume and credit market projections for the Clean Transportation Fuel Program (CTFP)

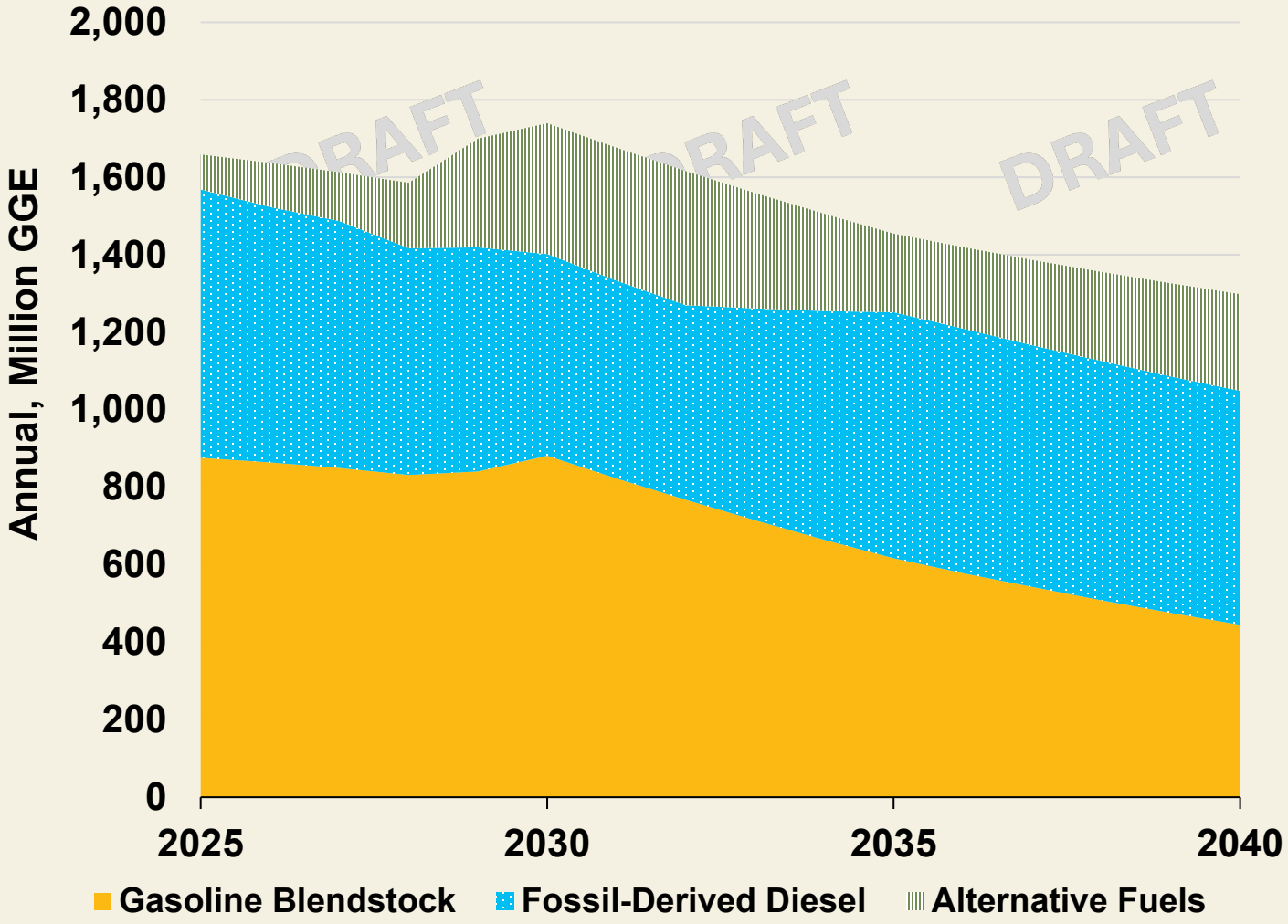
January 31, 2025

⚠ DISCLAIMER

The New Mexico Environment Department (NMED) is engaged in active and ongoing rulemaking and the development of the Clean Transportation Fuel Program (CTFP). The information contained in this presentation is preliminary and is subject to modification resulting from technical analyses, research, modeling, public and interested party input, Tribal engagement, and development processes. NMED reserves the ability to further adjust and update content in future versions and presentations. Nothing in this presentation is intended to represent information or language that is final or that would be proposed in the rulemaking; it is intended for educational purposes only.

Volumes by Fuel Category

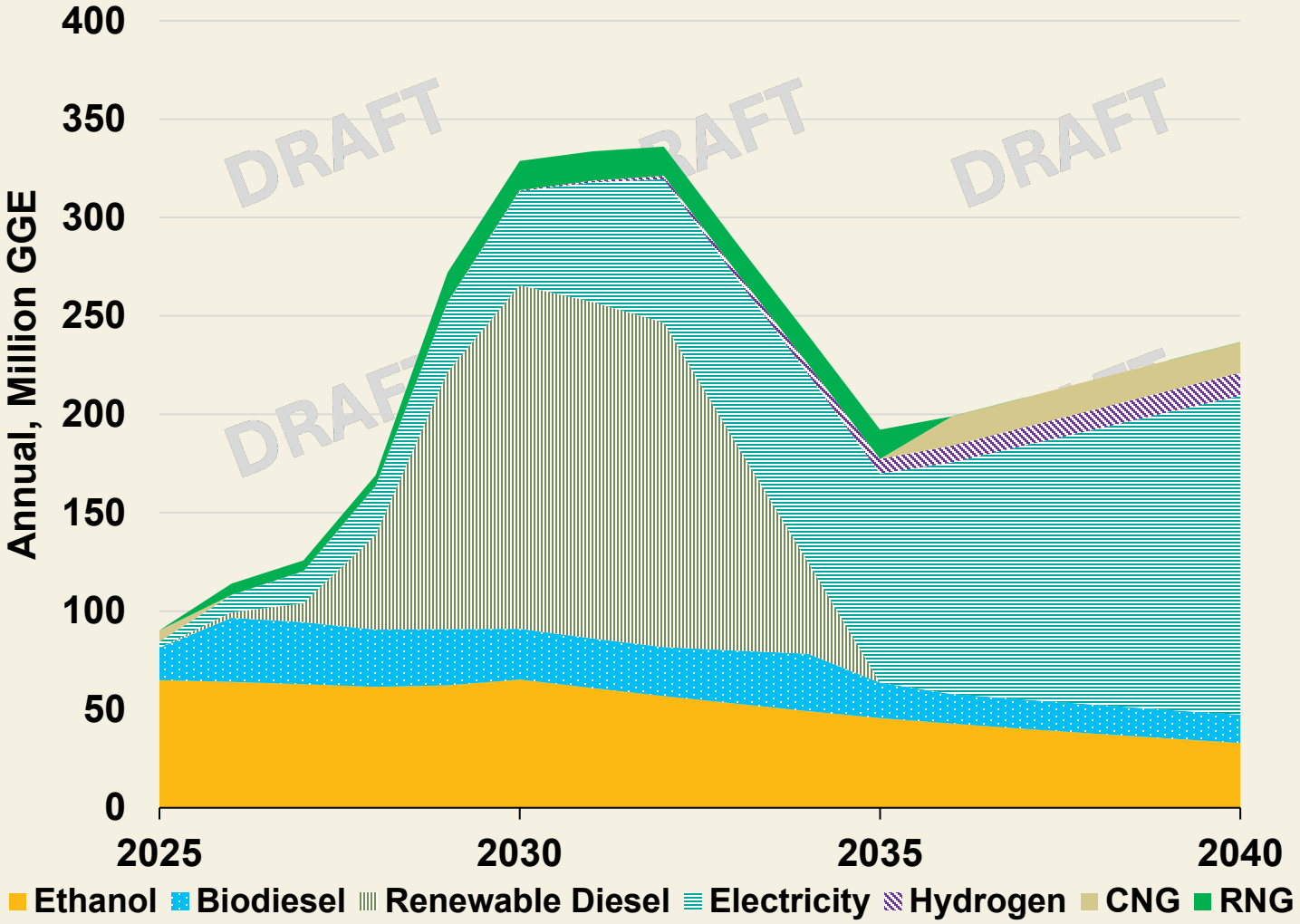
Volumetric Consumption of Fuels by Category under the CTFP, 2026-2040 (Million GGE)



GGE = Gallons of gasoline equivalent

Volumes by Alternative Fuel

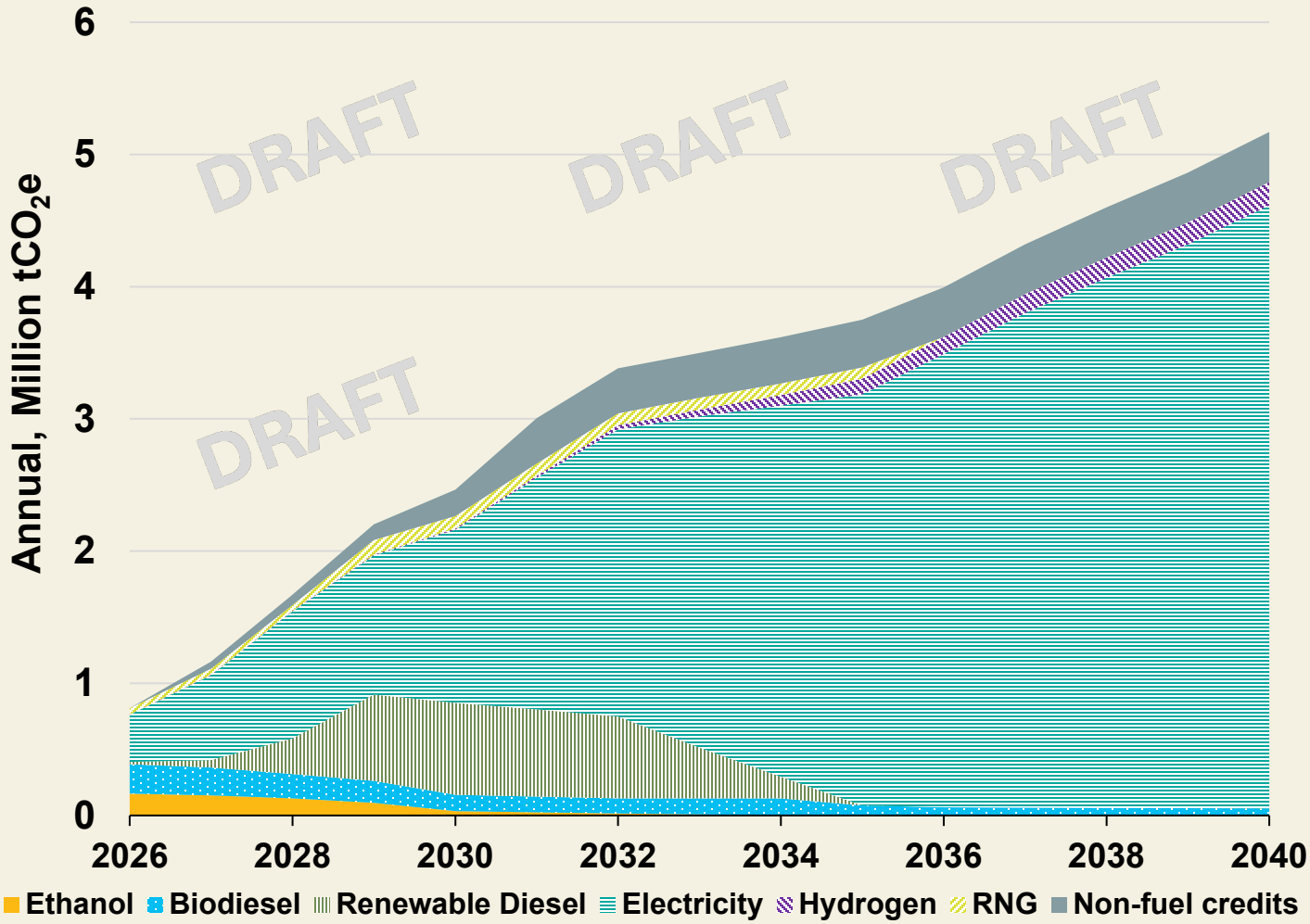
Volumetric Consumption of Alternative Fuels under the CTFP, 2025-2040 (Million GGE)



GGE = Gallons of gasoline equivalent

Credits by Alternative Fuel

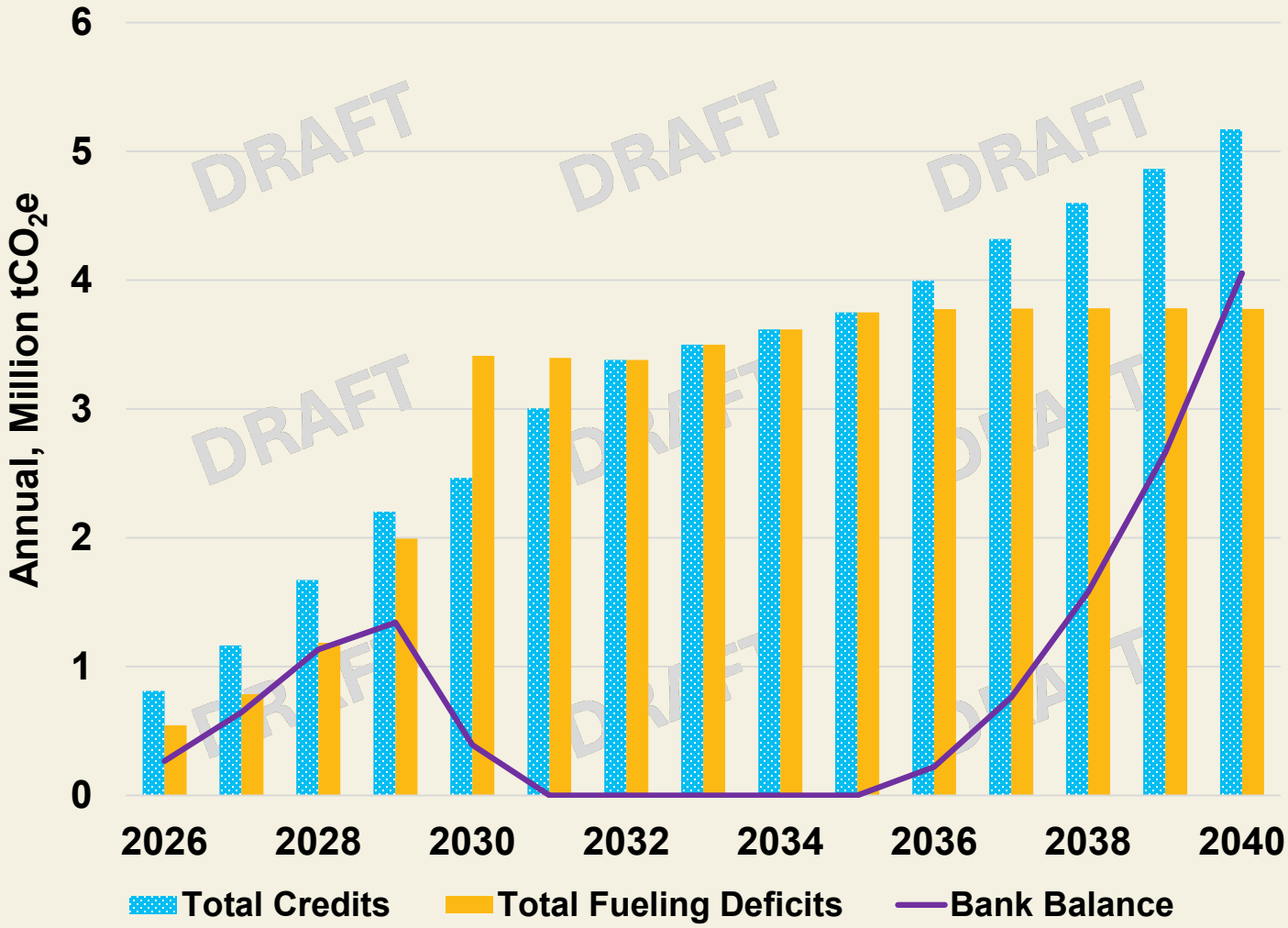
Annual Credit Generation by Alternative Fuel under the CTFP, 2026-2040 (Million tCO_2e)



tCO_2e = metric tons ("tonnes") of carbon dioxide equivalent

Credits by Alternative Fuel

Annual CTFP Credit and Deficit Generation and Bank Balance, 2026-2040 (Million tCO_2e)



tCO_2e = metric tons ("tonnes") of carbon dioxide equivalent

MODELING ASSUMPTIONS

FOR THE

FUEL VOLUME AND CREDIT MARKET PROJECTIONS

REGARDING THE

CLEAN TRANSPORTATION FUEL PROGRAM

March 18, 2025

The New Mexico Environment Department (NMED) is actively engaged in the development of the Clean Transportation Fuel Program (CTFP). The information presented here details modeling assumptions for draft results posted publicly on January 31, 2025. The information is preliminary and may be modified as research, modelling, public engagement, and input from Tribes, Pueblos, and Nations and interested parties progresses. This material is intended for descriptive and educational purposes and is not intended to convey final information, language, or findings that NMED will submit in the rulemaking process. NMED retains the right to adjust and update this content in future versions.

For additional information, please visit the NMED Climate Change Bureau's (CCB's) CTFP webpage at https://www.env.nm.gov/climate-change-bureau/clean-fuel-standard/.

Background

To further New Mexico's achievement of statewide greenhouse gas (GHG) reductions targets, the New Mexico state legislature passed a Clean Transportation Fuel Standard (CTFS, House Bill 41) on February 13, 2024, which was signed into law on March 5, 2024 (Ortez et al. 2024). The CTFS is codified under New Mexico Statute Annotated (NMSA) 1978, Sections 74-1-3, 7(A)(15), 8(A)(15), and 18. It mandates a declining carbon intensity (CI) of transportation fuels in the state to 20 percent and 30 percent below New Mexico's 2018 baseline by 2030 and 2040, respectively, and requires the Environmental Improvement Board to promulgate rules to implement a Clean Transportation Fuels Program (CTFP) by July 1, 2026 (NMSA 2024). To achieve this objective, the New Mexico Environment Department (NMED) released a CTFP Discussion Draft Rule (CTFP-DDR) on December 19, 2024 (NMED 2024). The CTFP-DDR proposes updates under Title 20, Chapter 2, Part 92 of the New Mexico Administrative Code (20.2.92 NMAC). Such measures would codify practices to achieve the 10 program requirements specified under NMSA 1978 74-1-18(C).

To assist with the public's understanding of how the CTFP would impact transportation fuel markets in New Mexico, NMED published initial fuel market modeling projections, based primarily on the language in the CTFP-DDR on January 31, 2025. This modeling work produced the following projections for CTFP impacts from 2025-2040:

- Volumes of overall categories of fuel consumed in New Mexico;
- Volumes of various types of alternative transportation fuel consumed in New Mexico;
- Credits generated under the CTFP by alternative transportation fuel; and
- Total credits, deficits, and credit bank balances under the CTFP (NMED 2025).

This document outlines the modeling assumptions underlying these projections to help illustrate the approach that NMED and contractors used to determine the program's impact.

Fleet and VMT modeling

The model estimates fuel consumption based on vehicle miles traveled (VMT) in New Mexico projected using version five of the US Environmental Protection Agency's Motor Vehicle Emission Simulator (EPA-MOVES5). EPA-MOVES5 is a publicly available, peer-reviewed mathematical model that estimates air pollution from vehicles and nonroad equipment (US EPA 2024a). MOVES5 runs use databases developed for each of New Mexico's 33 counties using US Environmental Protection Agency (US EPA) National Emissions Inventory data (US EPA 2023), with VMT and population projected using growth factors developed by the US Federal Highway Administration (US FHWA 2024). With these county inputs, EPA-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 (US EPA 2024a). Runs of EPA-MOVES5 produce results that the model then post-processes to aggregate vehicle populations and VMT statewide across nine vehicle categories:

- Light-duty (Class 1-2a) cars;
- Light-duty (Class 1-2a) trucks;
- Motorcycles;
- Light/heavy-duty (Class 2b-3) trucks;

- Light/heavy-duty (Class 4-5) trucks;
- Medium/heavy-duty (Class 6-7) trucks;
- Heavy-duty (Class 8) trucks;
- Buses; and
- Gliders.

The model examines EPA-MOVES5 runs under two scenarios: 1) the 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 (US EPA 2024c; 2024b) and 2) a second scenario, which 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 (SRCA 2023; OLRC 2025). 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 (ERG 2023).

Fuel Market Modeling

NMVES Modeling Scenario

The fuel market model assumes the NMVES scenario for its underlying VMT and vehicle population data. It assumes that the CTFP does not alter the composition of New Mexico's vehicle fleet compared to the NMVES projections. The following assumptions apply to the NMVES fleet projections:

- Starting in model year (MY) 2027, the model assumes a composition of new motor vehicle sales in the state that matches the ZEV delivery 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.
- The model estimates annual populations and VMT for battery electric vehicles (BEVs) and hydrogen-powered fuel cell electric vehicles (FCEVs) by assigning each an annual percentage of the total ZEV population and mileage. The model bases the annual plug-in hybrid electric vehicle (PHEV) population and VMT on the percentage of internal combustion engine (ICE) vehicle population and VMT.
- Because the average vehicle in New Mexico stays on the road for well over ten years, there is a significant time delay between new ZEV sales and New Mexico vehicle populations. The model assumes that New Mexico drivers slowly turn the vehicle population from ICE vehicles to ZEVs due to the relatively greater time between their purchase and retirement in New Mexico compared to the US average (Koupal et al. 2015).
- Pump-to-wheel (PTW) emissions for ZEVs (BEVs and FCEVs) are zero. The model includes well-to-pump (WTP) emissions for ZEVs. PHEVs have zero PTW emissions during all-electric operation, and non-zero PTW emissions during ICE powertrain operation. The model adjusts ZEV populations under EPA-MOVES5 to equal New Mexico's 2024 BEV and PHEV populations from Atlas Public Policy's EValuateNM tool (Atlas Public Policy 2023). Atlas Public Policy contractually aggregates vehicle registration data from the New Mexico Motor Vehicle Division.

The model requires additional assumptions and information to translate fleet and VMT into fuel volumes consumed under NMVES. The model incorporates fuel economy data by vehicle class and powertrain type provided by EPA-MOVES5, supplemented with US-FHWA data as appropriate, and adjusted to fit US Energy Information Administration State Energy Data System (EIA-SEDS) 2022 data for New Mexico (US EIA 2024d).

The model includes a select set of fuels that can generate credits and/or deficits. These include:

- Gasoline Blendstock;
- Fossil Diesel;
- Ethanol;
- Biodiesel (BD);
- Renewable diesel (RD);
- Electricity;
- Hydrogen;
- Compressed natural gas (CNG); and
- Liquified petroleum gases (LPGs) (e.g. propane).

NMVES+CTFP Modeling Scenario

The NMVES+CTFP model scenario evaluates the differential impact of the CTFP based only on the changes that its provisions cause to fuel consumption compared to the baseline NMVES-only projections. This allows for an analysis of the CTFP's incremental effects.

Policy, macroeconomic, and technological assumptions

The only policy difference between the NMVES+CTFP scenario and the NMVES-only scenario is the implementation of the CTFP. Like the NMVES-only scenario, the NMVES+CTFP scenario assumes that all other current federal and state regulations remain in place. NMVES+CTFP makes no additional inferences about future technological developments, shifting macroeconomic trends, or other policy changes. Furthermore, NMVES+CTFP assumes the same fuel economy across all vehicle types that the NMVES-only scenario model uses, as well as the same annual statewide vehicle fleet composition and the same VMT by vehicle type and class.

Per the CTFP-DDR, the NMVES+CTFP scenario model assumes that credits are fungible between parties, regardless of generation source or if they satisfy deficits from the production, import, and distribution of gasoline and gasoline substitutes (CTFP-DDR Table 1), or diesel and diesel substitutes (CTFP-DDR Table 2) (NMED 2024).

ICE vehicle fuel assumptions

For fossil- and biomass-derived fuels for use in ICE vehicles, the NMVES+CTFP scenario, like the NMVES-only scenario, assumes that:

- New Mexico uses CBOB (Conventional Blendstock for Oxygenate Blending).

- The ethanol blend wall remains at E10, with no use of E15, despite updated EPA rules allowing for up to 15 percent blending in vehicle model years after 2000 (US EPA 2019).[1,2]
- Ethanol is 100-percent corn-based, with no substitution of lower-CI ethanol feedstocks in the gasoline blending pool.

One way that the NMVES+CTFP scenario is unique is that, unlike the NMVES-only scenario, it assumes that future BD blending rates can exceed the 2.5 percent levels by volume observed in 2022 if doing is justified by underlying fuel market economics.

Additionally, the fuel market model under NMVES+CTFP assumes that:

- No additional states adopt CTFP-like policies, which are effective only in New Mexico and three states with similar policies (California, Oregon, and Washington);
- The CTFP comes into effect as outlined in the CTFP-DDR, with the exception of future credits available that equal up to five percent of the prior-year deficits for projects that quantifiably and verifiably reduce transportation fuel GHG emissions;
- Fuel suppliers blend BD volumes based on economics influenced by CTFP credit prices at rates of up to 5 percent by volume (B5).
    - Although biodiesel is generally available for blending at rates of up to 20 percent by volume, there are some diesel engines that are not rated for biodiesel blending above 5 percent. American Society for Testing and Materials (ASTM) standards for conventional diesel fuel allow for up to 5 percent biodiesel by volume (McCormick and Moriarty 2023);
    - This conservatively requires RD to meet the remaining blending requirements associated with diesel-fueled vehicles, with no further assistance from BD blending at rates of 6-20 percent. It is also in line with current practice in New Mexico, where BD blending has historically been between two and three percent.[3]
- Feedstock for producing biomass-based diesels (BBDs) like BD and RD consumed in New Mexico come from a mixture of sources, including lower-CI feedstocks like used cooking oil, tallow, and distillers' corn oil, as well as higher-CI feedstocks like soy.
- Fuel suppliers will bring BBD into New Mexico when it earns a greater premium over fossil diesel relative to its cost of supply and the level of this premium available in other states, accounting for:
    - Its post-tax value without environmental attribute value at the point of sale;

[1] This is partly due to conservative credit market assumptions and partly to observed ethanol blending rates in other states with similar programs not greatly exceeding 10 percent.
[2] For example, in California, which has had a CTFP-like policy for over a decade, the ethanol blending rate was 11.1 percent in 2022. Calculated using finished motor gasoline energy quantities from (US EIA 2024c), ethanol energy quantities from (US EIA 2024a), and heat content conversions from (US EIA 2025).
[3] Calculated using finished diesel energy quantities from (US EIA 2024d), biodiesel energy quantities from (US EIA 2024b), and heat content conversions from (US EIA 2025).

        - This roughly equals the value of fossil-derived diesel, with consumers assumed to be indifferent between the two;
    - Renewable Identification Numbers (RINs) traded under the federal Renewable Fuel Standard (RFS);
    - The value of federal production tax credits;
    - Differences in interstate transport costs; and
    - Environmental attribute credit revenue under the CTFP and similar state policies.

Fuel cell and hybrid vehicle fuel assumptions

For fuels used in fuel cell and hybrid vehicles, the NMVES+CTFP scenario, like the NMVES-only scenario, assumes that:

- Hydrogen for FCEVs can come from steam methane reforming of natural gas (with or without carbon capture and storage) from fossil sources or RNG, or electrolysis;
- PHEVs use a mixture of blended gasoline with electricity to power the drivetrain.

The NMVES+CTFP scenario further assumes that:

- EV charging can generate credits from retiring incremental renewable energy certificates (RECs) under the CTFP that would otherwise be eligible for retirement under New Mexico's Renewable Portfolio Standard (RPS), meet other comparable policies, or satisfy demand in voluntary REC markets.[4]
- Consumers will not respond to any improvements in total cost of ownership of ZEV and PHEVs compared to ICE vehicles from reduced fuel costs under the CTFP by purchasing more ZEVs and PHEVs, nor by driving them more.
- As in the CTFP-DDR, the Energy Economy Ratio (EER) is 3.4 for light- and medium-duty BEVs and PHEVs, 5.0 for heavy-duty BEVs and PHEVs, 2.5 for light-duty FCEVs, and 1.9 for heavy-duty FCEVs.

For electricity that is used as transportation fuel, the model assumes CIs that are specific to EVs in each utility service area. It estimates utility-specific grid electricity CIs for the average New Mexico consumer with data from Integrated Resource Plans (IRPs). These IRPs come from three investor-owned utilities (IOUs) and one generation and transmission cooperative (G&T) in New Mexico. These three IOUs and one G&T cover territory representing 87 percent of residential and commercial consumers in the state.[5]

- The model assumes that grid electricity for vehicle charging and fuel production has the CI of the three IOUs or one G&T whose service territory it is located within;

[4] For more information, see NMSA 1978, Chapter 62 - Electric, Gas and Water Utilities. Article 16: Renewable Energy Act (NMSA 2019).
[5] These are the Public Service Company of New Mexico (PNM 2023), El Paso Electric Company (EPE 2021), Southwestern Public Service Company (Xcel Energy) (SPS 2023), and Tri-State Generation and Transmission Association (Tri-State 2023), which provides power to most cooperatives in the western New Mexico.

- For vehicle charging and fuel production at locations outside the service territory of any IOUs or the G&T, the model assumes, depending upon where facilities are located, a grid electricity CI equal to either;
    - A weighted average of the two IOUs and G&T in the Western Energy Coordinating Council (WECC); or
    - The IOU in the Southwest Power Pool (SPP) region.[6,7,8]
- To ensure compliance in future years, the model assumes grid electricity CI reductions based upon a combination of the IRPs of the three IOUs and one G&T, statewide targets set under the state Energy Transition Act (ETA), New Mexico's RPS, and applicable New Mexico Public Regulation Commission (NM-PRC) rules.[9]

Lifecycle analysis assumptions

Under the NMVES+CTFP scenario, the model determines fuel CI values for each transportation fuel from lifecycle analysis (LCA) calculations using the Argonne National Laboratory's peer-reviewed Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation, specifically the 2023 Research and Development version (R&D GREET 2023). The program has updated many of the New Mexico-specific parameters since the release of the CTFP-DDR. GREET systematically examines the energy and environmental effects of a wide variety of transportation fuels and technologies across major sectors and energy systems (Wang et al. 2023).

The model adjusts CI values for gasoline and diesel fuel to make regionally specific calculations for upstream emissions using version 3.0 of the Oil Production Greenhouse Gas Emissions Estimator (OPGEE 3.0) (Brandt et al. 2022). These also account for New Mexico-specific aspects of the gasoline and diesel supply based on markets in Petroleum Administration for Defense District 3 (PADD3). The Indirect Land Use Change (ILUC) values for crop-based fuels are the same as those under similar programs in Washington and California.

Exempt uses, CNG, and credit banking assumptions

The NMVES+CTFP scenario additionally assumes that:

- 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 deficit generation will not opt in to become credit generators; and
- CNG can come from fossil sources, or it can be renewable natural gas (RNG).
    - All RNG comes from landfill gas and wastewater treatment plant gas, with no use of lower-CI RNG from agriculture. This also applies to RNG-derived hydrogen.

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[6] New Mexico is split between two electric interconnections, the Western Interconnection (or WECC region, serving approximately the western two-thirds of the state) and the Eastern Interconnection (or SPP region, serving approximately the eastern third). There is limited flow of electricity between the interconnections, which have only at a handful of direct current connections.
[7] Whereas WECC is a North American Electric Reliability Corporation (NERC) region, SPP is a Regional Transmission Organization (RTO) whose New Mexico footprint is within the Midwest Reliability Organization NERC region (US EPA 2022; FERC 2023; MRO 2022).
[8] For charging and fuel production facilities in the WECC region, the average grid electricity CI is weighted between PNM, EPE, and Tri-State. For those in the SPP region, the grid electricity CI is that of Xcel.
[9] See **Footnote 4**.

- Banked credits may be used for compliance without limitations on their age. The model also assumes that significant banking occurs in early years of the CTFP, as empirically observed in other states with similar programs.

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