New Mexico Public Utility Transportation Electrification Plans

Robert Lundin, Executive Assistant, New Mexico Public Regulation Commission

Enabling Statute

- Passed in 2019 legislative session.

62-8-12. Applications to expand transportation electrification.

A. No later than January 1, 2021, and thereafter upon request by the commission, but no more frequently than every two years, a public utility shall file with the commission an application to **expand transportation electrification**. Applications may include **investments** or **incentives** to facilitate the deployment of charging infrastructure and associated electrical equipment that support transportation electrification, including electrification of public transit and publicly owned vehicle fleets, **rate designs** or **programs** that encourage charging that supports the operation of the electric grid and customer education and outreach programs that increase awareness of such programs and of the benefits of transportation electrification.

Enabling Statute – Standard of Review

B. When considering applications for approval, **the commission shall consider** whether the investments, incentives, programs and expenditures are:

(1) reasonably expected to **improve** the public utility's **electrical system efficiency**, the **integration of variable resources**, **operational flexibility** and system utilization during off-peak hours;

(2) reasonably expected to **increase access** to the use of **electricity as a transportation fuel**, with consideration given for increasing such access to **low-income users and users in underserved communities**;

(3) designed to contribute to **the reduction of air pollution and greenhouse gases**;

(4) reasonably expected to support **increased consumer choices** in electric vehicle charging and related infrastructure and services; allow for **private capital investments and skilled jobs** in related services; and provide **customer information and education**;

(5) **reasonable and prudent**, as determined by the commission; and

(6) transparent, incorporating **public reporting** requirements to inform program design and commission policy.

Utility TEP Filings

Filing Dates

- Southwestern Public Service Company
  - 20-00150-UT
  - July 21, 2020
- Public Service Company of New Mexico
  - 20-00237-UT
  - December 18, 2020
- New Mexico Gas Company*
  - 20-00240-UT
  - December 29, 2020
- El Paso Electric Company
  - 20-00241-UT
  - December 30, 2020

Procedural Posture

- SPS
  - Litigated
  - Recommended Decision issued 8/02
- PNM
  - Litigated
  - Recommended Decision issued 8/30
- NMGC*
  - Application to find that TEP statute applies only to electric utilities.
  - Final Order issued 8/11
- EPE
  - Contested, partial settlement. Stipulation filed 6/14
  - Post-hearing briefing

Utility TEP Comparison - Overview

SPS – 20-00150-UT

Plan years 2022-24

- Residential Programs ☑
- Non-Residential Programs ☑
- Consumer Outreach ☑
- Budget ☑
- Regulatory Asset ☑
- Tariffs/Rates ☑
- Impact Study ☒
- Reporting ☑
- Third-Party Evaluation ☑

PNM – 20-00237-UT

Plan years 2022-23

- Residential Programs ☑
- Non-Residential Programs ☑
- Consumer Outreach ☑
- Budget ☑
- Regulatory Asset ☑
- Tariffs/Rates ☑
- Impact Study ☒
- Reporting ☑
- Third-Party Evaluation ☑

EPE – 20-00241-UT

Plan years 2022-23

- Residential Programs ☑
- Non-Residential Programs ☑
- Consumer Outreach ☑
- Budget ☑
- Regulatory Asset ☑
- Tariffs/Rates ☑
- Impact Study ☑
- Reporting ☑
- Third-Party Evaluation ☒

Utility TEP Comparison – Residential

SPS

- Home Wiring Rebate
  - $500 rebate
  - 240 volt installation
- Low-Income Rebate
  - $1,300 rebate
  - 240 volt installation
- Home Charging Service
  - Equipment, installation, and maintenance from SPS w/ no upfront costs, but monthly rider.
- EV Optimization
  - Programmed charging times.

PNM

- Level 2 Charger Rebate
  - $500* incentive
  - Charger purchase
- Low-Income Level 2 Installation Rebate
  - $2,000* incentive (Prosperity Works)
  - Installation costs

*Instant at point-of-sale incentive (Prosperity Works)

EPE

- Residential Smart Charging Rebate
  - $500* incentive
  - Charger purchase
- Low-Income Smart Charging Rebate
  - $2,300* incentive (Stip);
  - Charger and installation costs
  - No up-front payment (Stip)

*Instant rebate (Stip)

Utility TEP Comparison – Non-Residential

SPS

- Make-Ready Public Charging Stations
  - Electrical infrastructure to support 9 chargers
  - Customer/site host owns, operates, and maintains charger.
  - Default TOU rate, site host may opt-out. (alt to CCAE)
  - Site host offered 2 hardware options. (alt to ChargePoint)
  - Credit card readers initially (alt to CCAE)

PNM

- Make-Ready Public DCFC Installation
  - $25,000* incentive
  - Electrical infrastructure
- Make-Ready Public Level 2 Installation
  - $2,500 per port* (ChargePoint)
  - Installation costs
- Make-Ready Workplace Level 2 Installation
  - $2,500 per port* (ChargePoint)
  - Installation costs

*Instant at point-of-sale incentive (Prosperity Works)

EPE

- DCFC Smart Charging Rebate
  - 50% of installation costs up to $26,000 rebate
  - Rebate capped at $104,000 per site (Stip)
  - Credit card readers contested issue (Stip)
- Workplace Smart Charging Rebate
  - 50% of installation costs up to $3,500 rebate
  - Level 2 charging
  - Include public charging stations (Stip)

Utility TEP Comparison – Non-Residential

SPS

- Public Fast Charging
  - SPS to own and operate 8 public DCFC stations
  - Credit card readers initially (alt to CCAE)
  - Per kWh TOU rate

PNM

- Make-Ready Low-Income Multi-Family Housing Level 2 Installation Rebate
  - $5,000 per port* incentive (ChargePoint, alt to WRA and CCAE)
  - Installation costs
  - Duplicate program for multi-family housing (alt to WRA)
- Make-Ready Low-Income Mass Transit Level 2 Installation Rebate
  - Infrastructure installation costs for depot charging and/or en-route charging

*Instant at point-of-sale incentives (Prosperity Works)

EPE

- Multi-Unit Dwelling Smart Charging Rebate
  - 75% of installation costs up to $5,250 incentive (Stip)
  - Level 2 charging
  - Hotels not eligible (Stip)
- Public Transit and Fleet Smart Charging Rebate
  - 50% of installation costs up to $26,000 with up to $37,000 in make-ready support; DCFC.
  - 50% of installation costs up to $3,500 with up to $13,000 in make-ready support; level 2 charging.

Utility TEP Comparison – Tariffs/Rates

SPS

- EV Rider
  - % charge to secondary voltage customers excluding lighting
- EV Optimization Rider
  - $50 annual credit for customers participating in EV Optimization.
- EV Equipment Rider
  - $12/mo for customers who take part in Home Charging Service.

PNM

- TEP Rider
  - $/kWh charge to all non-lighting rate schedules
  - To collect actual costs from previous calendar year
  - To begin May 2023
  - Capped at $25,000/year per customer

EPE

- TEP Cost Rider
  - $0.000176/kWh
  - All non-lighting service customers
  - Monthly reconciliation adjustments (Stip)
  - Yearly factor adjustments (Stip)

Utility TEP Comparison – Tariffs/Rates

SPS

- Public Electric Vehicle Charging Service Rider
  - SPS-owned public charging stations
  - Per-kWh instead of per-minute rate (CCAE and WRA)
  - $0.183/kWh off-peak
    - Claimed equivalence to $2.25/gallon gasoline
  - $0.366/kWh on-peak
  - $0.53/min idling fee
  - Peak: 12pm-6pm, Mon-Fri, June-Sept

PNM

- Whole Home EV Charging Rate
  - $0.0304438/kWh, 10pm-5am
  - PNM installs smart meter
- Non-Residential TOU Charging Station
  - $81.91 customer charge
  - On-Peak
    - Summer: 5pm-10pm; $0.1855246/kWh
    - Non-Summer: 5am-8am + 5pm-8pm; $0.1373415/kWh
  - Off-Peak
    - All other hours; $0.0638779/kWh

EPE

- Experimental EV Charging
  - Customers with dedicated meter
  - Demand Charge withdrawn (Stip)
  - Rate/charge depends on class
  - Customer Charge: $0-$5.60 range
  - On-Peak: 1pm-7pm, Mon-Fri, June-Sept; $0.24325-$0.30537/kWh range
  - Super Off-Peak: 12am-8am; $0.00744-$0.00874/kWh range
  - Off-Peak: All other hours; $0.00186-$0.06782/kWh range
- Whole House/Service EV Standard and TOD Rate (Stip)
  - Per kWh credit for super off-peak usage
  - Rate depends on class; $0.00178/kWh-$0.03626/kWh range

Utility TEP Comparison – Budget

SPS

- $3,168,000 total (3 years)
  - $404,000 Residential and Commercial
  - $2,264,000 Public Charging
  - $350,000 Advisory Services
  - $150,000 Evaluator

PNM

- $10,891,250 total (2 years)
  - $1,800,000 Residential
  - $4,450,000 Commercial
  - $1,000,000 Marketing
  - $1,463,000 administrative
  - $2,178,250 flexibility included (Staff)

EPE

- $568,500 total (2 years)
  - $112,000 Residential
  - $349,500 Commercial
  - $37,000 Customer Outreach
  - $70,000 administrative
  - $36,920 Impact Study (withdrawn on motion)
  - 15% flexibility not included (Stip)
  - If any program spending reaches 75% of budget, EPE to file motion to expand budget (Stip)

May 25, 2021

Mr. Greg Lovato, Administrator
Nevada Division of Environmental Protection
901 S. Stewart Street, Suite 4001
Carson City, Nevada 89701

Re: Comments on LCB File No. R093-20I

Dear Mr. Lovato,

Natural Resources Defense Council, Nevada Conservation League, Plug In America, Southwest Energy Efficiency Project, and Western Resource Advocates, as partners of the Nevada Clean Cars (NCC) coalition, would like to thank you and agency staff for your work on the Clean Cars Nevada Initiative. We strongly support the efforts by the Nevada Division of Environmental Protection (NDEP) to develop an effective program that delivers strong climate, public health, and consumer benefits to the state. A range of organizations representing consumers, labor, businesses, public health, and environmental conservation support the Clean Cars Initiative and other complementary electric vehicle policies and programs to help the state achieve its goals of reducing transportation pollution.

We respectfully submit the following proposed amendments to NDEP's draft regulatory language for your consideration. The proposed amendments pertain to the issue of the initial credit banks under the proposed Zero-Emission Vehicle (ZEV) program (Chapter 445B, Sec. 33, Nevada Administrative Code).[1]

As noted in previous meetings and comments by our organizations, we support early action credits as an important mechanism to encourage manufacturers to deliver more ZEVs to the state prior to the start of the requirements. That said, we have strong concerns with proportional credits which, unrestricted, could overwhelm the Clean Cars Nevada program and result in far lower-than-expected deliveries to the state.

The Alliance for Automotive Innovation (AAI) has advocated for proportional credits based on concerns that Nevada (and other states considering adopting ZEV) will be at a very different starting "credit balance" position in comparison to California and other clean car states that adopted prior to 2013. This issue is not unique to Nevada, and a dialogue between clean car advocates and AAI has expanded over the course of 2021 from Virginia's legislative session to Minnesota's regulatory process, and now here in the Silver State.

[1] *Proposed Regulations of the State Environmental Commission, P2020-07*, Working Draft as of January 5, 2021. https://ndep.nv.gov/uploads/air-ccn-docs/Draft_Clean_Cars_Reg_Language.pdf

Through these conversations, a proposed compromise solution was recently developed. We recommend amendments as included in the appendix below and believe they address AAI's concerns by:

- Disallowing the use of proportional credits under the current clean car standards being proposed for Nevada (while allowing for early action credits to be generated by automakers to transition into the program)
- Allowing, under future Nevada clean car standards, use of proportional credits but restricted in such a manner that ensures the annual credit stringency — as measured based on (the credits from) actual ZEVs delivered for sale to the state — is equivalent to the annual credit stringency in California

The effective outcome, if NDEP adopts these changes, is that Nevada will have a program that is no more stringent and no less stringent than the ZEV program in California going forward. The solution effectively addresses concerns from both auto manufacturers and clean car advocates in a reasonable and amicable manner.

We appreciate NDEP's recent discussion at the May 27th workshop on Air Quality about deferring on the proportional credit issue. However, addressing the credit bank issue comprehensively under this rulemaking will actually allow all stakeholders to have greater certainty while avoiding the need to re-address these issues down the road.

Thank you for your consideration of the amendments and we look forward to working with NDEP to approve and implement a strong Clean Cars Nevada program. We are available at your convenience to discuss and answer any questions you or agency staff may have.

Respectfully submitted,

Simon Mui
Deputy Director, Clean Vehicles & Fuels Group
Natural Resources Defense Council

Paul Selberg
Executive Director
Nevada Conservation League

Travis Madsen
Director of Transportation
Southwest Energy Efficiency Project

Katherine Stainken
Policy Director
Plug In America

Aaron Kressig
Transportation Electrification Manager
Western Resources Advocates

CC: Bradley Crowell, Director, Department of Conservation and Natural Resources
Greg Lovato, Administrator, Division of Environmental Protection
Jeffrey Kinder, Deputy Administrator, Division of Environmental Protection
Danilo Dragoni, Chief, Bureau of Air Quality Planning, Division of Env. Protection
Scott Gilles, Senior Advisor, Office of Governor Steve Sisolak

PROPOSED AMENDMENTS

PROPOSED REGULATION OF THE
STATE ENVIRONMENTAL COMMISSION

P2020-07

Working Draft as of January 5, 2021

EXPLANATION – Matter in ***italics*** is new; matter in brackets [~~omitted material~~] is material to be omitted; **matter in green bold underlining is newly proposed language**.

A PERMANENT REGULATION relating to air pollution; adopting by reference certain provisions of California regulations for the Low-Emission Vehicle and Zero-Emission Vehicle programs relating to air quality; and providing other matters properly relating thereto.

Sec. 32. 1. Beginning with model year 2025, all zero emission vehicles must be certified by the Executive Officer of CARB in accordance with section 1962.2(a) of Title 13 of the California Code of Regulations, as adopted by reference pursuant to section 20 of this regulation.

2. Each manufacturer of vehicles must comply with the minimum ZEV credit percentage requirement for the sale of zero emissions vehicles set forth in section 1962.2(b) of Title 13 of the California Code of Regulations, as adopted pursuant to section 20 of this regulation.

Sec. 33. 1. Beginning with model year 2025, a manufacturer shall open an account in the California ZEV Credit System for banking credits generated in this State. The manufacturer may deposit and earn ZEV credits for each qualifying vehicle delivered for sale in this State in accordance with this section and sections 1962.2(c), (d) and (g) of Title 13 of the California Code of Regulations, as adopted by reference pursuant to section 20 of this regulation.

2. A manufacturer may earn early action credits for any 2023 and 2024 model year range extended battery electric vehicles, neighborhood electric vehicles, transitional zero emission vehicles and zero emission vehicles the manufacturer produces and delivers for sale in this State by reporting the total production and delivery of such vehicles to the Division at the end of the 2023 and 2024 model years. Any early action credits earned for model years 2023 and 2024 earned pursuant to this section will be deposited into the manufacturer's account in the California ZEV Credit System for model year 2025 in addition to the credits deposited pursuant to subsection 3.

3. A manufacturer may deposit into the account a number of credits equal to the manufacturer's 2025 model year starting California credit balance multiplied by the number

of new passenger cars and light-duty trucks the manufacturer produced and delivered for sale in this State in model year 2025 and divided by the number of new passenger cars and light- duty trucks that the manufacturer produced and delivered for sale in California in model year 2025.

4. A manufacturer may not make a deposit pursuant to subsection 3 until all credit obligations for model years 2024 and earlier have been satisfied in California.

5. Credits awarded under item 3:

(a) May not be traded, sold or used to satisfy a manufacturer's credit obligation in any model year unless and until the regulations in this part are superseded by new regulations updating the Clean Cars Nevada program, and

(b) May only be traded, sold or used in model years for which the credit obligation has been modified by such new regulations.

6. As part of any update to the regulations in this part to ensure compliance of the Clean Cars Nevada program with the California Advanced Clean Cars program, the updated regulations:

(a) Shall allow manufacturers to trade, sell and use credits awarded under item 3, in a manner consistent with the California Advanced Clean Cars program, and

(b) Shall result in a total ZEV credit percentage required from ZEVs delivered for sale in Nevada that is equivalent to the total ZEV credit percentage required from ZEVs delivered for sale in California for the same compliance year, and

(c) Shall adjust the Nevada ZEV credit bank balances under the new regulations referenced in subpart 5(a) to mirror changes made to the California ZEV credit banks including but not limited to discounting of credits in the credit bank and/or to mirror restrictions or limitations on use of the credits, and

(d) Must take into account only existing ZEV credit banks, any changes in or restrictions on use of ZEV credits, and the new regulatory requirements and not external factors such as the availability of infrastructure, incentives, or other supporting measures.

Sec. 34. On or before September 1 of each year, following the close of the model year, each manufacturer must submit to the Department a report detailing the credits generated or credits transferred to or from any another manufacturer for each qualifying vehicle sold or delivered for sale in this State during the previous model year. The report must be prepared in the same format as the report submitted to CARB.

May 28, 2021

Delivered via electronic mail

Mr. Greg Lovato
Administrator
Nevada Division of Environmental Protection
901 S Stewart Street
Carson City, NV 98701

Subject: Clean Cars Nevada – Proposed Regulatory Changes

Dear Mr. Lovato,

The Alliance for Automotive Innovation (Auto Innovators)[1] sincerely appreciates the work of you and your staff at the Nevada Division of Environmental Protection (NDEP), and your willingness to meet with stakeholders to understand the issues necessary for successful implementation of Clean Cars Nevada. This letter proposes a change to the zero emission vehicle (ZEV)[2] section of the draft regulations of January 5, 2021.

Background

Auto Innovators, our predecessor organizations, and our members have long worked with regulatory agencies at the federal and state level to develop and implement regulations that reduce emissions, increase efficiency, and improve safety and reliability. As a result, today's new vehicles are the cleanest, most efficient, safest, and most reliable in history. Our members have reduced criteria emissions from internal combustion engines (ICEs) to levels not measurable in the lab in the early 2000s, while also making tremendous advancements reducing greenhouse gas emissions from ICE vehicles.

Beyond ICE vehicles, our members are committed to net-zero carbon and electrification of the vehicle fleet. Virtually every automaker has announced broad electrification plans with several setting aspirational targets of 100 percent ZEVs in the 2035 to 2045 timeframe. Automakers expect to bring over 130 electric vehicle models to the market by 2026, with industry

[1] Formed in 2020, the Alliance for Automotive Innovation members include vehicle manufacturers (BMW, FCA, Ferrari, Ford, GM, Honda, Hyundai, Isuzu, Jaguar Land-Rover, Karma, Kia, Maserati, Mazda, Mercedes-Benz, Mitsubishi Motors, Nissan, Porsche, Subaru, Suzuki, Toyota, and Volkswagen), original equipment suppliers, technology companies, and other automotive-related companies and trade associations. The Alliance for Automotive Innovation is headquartered in Washington, DC, with offices in Detroit, MI and Sacramento, CA. For more information, visit our website http://www.autosinnovate.org.

[2] "ZEVs" or "electric vehicles" in this letter include plug-in hybrid, battery, and fuel cell electric vehicles.

investment in electrification projected to reach $250 billion by 2023.[3] Our goal is a vibrant, growing, and sustainable electric vehicle market.

However, automakers cannot meet these targets alone or without the active and full support of federal, state, and local governments, labor, commercial and residential builders, suppliers, dealers, utilities, battery manufacturers, hydrogen providers, and most importantly customers. As you recognize, adopting new vehicle regulations is just the first step and far more work is needed by many other sectors if we hope to succeed. Auto Innovators is committed to working with Nevada to develop, adopt, and implement the support measures necessary for a successful electric vehicle market.

Proposed Changes to the Draft Regulations

As we have discussed, proportional and early credits provide a smoother transition when a state adopts California's ZEV regulations, preventing market disruptions that might otherwise occur. We appreciate that both early credits and proportional credits are included in the January 5, 2021, draft regulations.

However, over the past few years, states adopting California's ZEV regulations have adopted differing requirements. For example, some states include early credits but no proportional credits, others proportional but no early credits, and still others a combination of both, and all of these with differing caps on the use of credits.

Varying requirements in each state make compliance difficult and require significant resources for all parties (stakeholders as well as the state agencies) during the rulemaking process. Consequently, Auto Innovators engaged in a dialogue with several non-governmental organizations (NGOs) – first in Virginia, then in Minnesota, and now in Nevada – to develop what we believe is a reasonable solution to address the concerns of stakeholders that could be used by any state adopting California's ZEV regulations.

We have agreed on the following concepts, which are implemented in the attached draft regulations. We support the adoption of the attached regulatory changes and hope that Nevada (and any state subsequently adopting California's ZEV regulations) can incorporate these into regulations.

1. **Early Credits**: Automakers would earn early credits from the time the regulations are adopted or at least two years prior to implementation (2023-2024MYs for Nevada). These credits could be used without restriction.

[3] See Alix Partners, *Betting Big in Electrification and Autonomous*, June 2018, Retrieved from https://iwk-cp.com/wp-content/uploads/2018/07/Automotive-Global-Outlook-2018-European-version_IWK_FINAL.pdf on May 13, 2021.

2. **Proportional Credits**:

    a. At the beginning of program implementation (2025MY for Nevada), each automaker would get a starting balance of credits proportional to their CA ZEV credit banks.

    b. These credits could not be used for any MY prior to when California changes its ZEV regulations.

    c. After the California regulations are updated, the state regulations would set a cap on the use of these (proportional) credits to ensure equivalent stringency to California (i.e., if an OEM is required to deliver 25% ZEVs in CA, it would be required to deliver 25% ZEVs in NV – no more, no less).

We believe this is a reasonable solution to the concerns of stakeholders and would appreciate your consideration. We would welcome the opportunity to talk to you and your staff further about these. In the meantime, if you have any questions, or need any additional information, please do not hesitate to contact me. We look forward to working with you.

Sincerely,

Steven Douglas
Vice President, Energy and Environment
Alliance for Automotive Innovation
(916) 447-7349
sdouglas@autosinnovate.org

Copy: Jeffrey Kinder, Deputy Administrator
Danilo Dragoni, Chief
Joseph Perreira
Sigurd Jaunarajs
Kathleen Morrison

Attachment

STATE OF NEW MEXICO
BEFORE THE ENVIRONMENTAL IMPROVEMENT BOARD

IN THE MATTER OF PROPOSED 20.2.91 NMAC
NEW MOTOR VEHICLE EMISSIONS STANDARDS **No. EIB 21-66 (R)**

BEFORE THE ALBUQUERQUE-BERNALILLO COUNTY
AIR QUALITY CONTROL BOARD

IN THE MATTER OF PROPOSED REPEAL AND REPLACE 20.11.104 NMAC
NEW MOTOR VEHICLE EMISSIONS STANDARDS **No. AQCB 2022-1**

DIRECT TESTIMONY OF CHUCK SHULOCK

My name is Chuck Shulock, and I am an environmental and climate policy consultant. My client for this work is the US Climate Alliance, which funded me to provide technical assistance to the New Mexico Environment Department for this rulemaking.

Before becoming a consultant, I spent 30 years working on environmental issues at California state agencies. I worked for many years at the California Air Resources Board, and while there I led the staff teams that prepared the 2001 and 2003 amendments to the Zero Emission Vehicle, or 'ZEV', regulation, and then served as project leader for the board's 2004 adoption of tailpipe standards to reduce greenhouse gas emissions from light duty vehicles. For the past several years I have been working on Advanced Clean Cars rulemakings in California and a number of other states. I have a deep understanding of the regulations before you today. **NMED-EHD Exhibit 25**.

My primary task for the Department has been to project the impacts of the Clean Car Rule. I have prepared a report outlining my findings, which is included in the record as **NMED-EHD Exhibit 26**. Before summarizing the impacts, however, I have been asked to walk you through the current federal and state regulatory landscape. There has been a lot of recent activity, and an understanding of how the Clean Car Rule fits into that broader picture will be useful in your deliberations.

The first thing to know is that although vehicle pollution control is the responsibility of the federal government, the Clean Air Act gives California the authority to adopt its own more stringent motor vehicle emission standards - if the US Environmental Protection Agency finds them to be necessary to meet California's unique air quality problems. Such EPA approval is granted via what is known as a "waiver," which allows California to enforce its own regulations.

The Clean Air Act also gives other states the authority to adopt the California standards if they so choose. Other states cannot adopt their own standards; instead they must choose between the federal and California rules. This was done to simplify compliance on the part of the automakers and avoid them having to build a different car to meet the requirements of each state. States that have adopted the California standards are known as "Section 177 states".

There is a long history of state/federal interaction on vehicle emissions standards, but I will fast forward to 2012. In that year California adopted an updated package of tailpipe standards and zero emission vehicle sales requirements. This package of standards was granted a waiver by the EPA and shortly thereafter the automakers, EPA and California reached agreement on a "unified national program." This agreement covered the tailpipe standards for GHGs and other air pollutants but did not include any ZEV requirement at the national level. My understanding is that EPA has concluded it does have the authority under the Clean Air Act to directly require ZEVs.

Fast forward again to 2019. In that year the Trump administration revoked California's waiver, which meant that California and the Section 177 states could no longer enforce the California regulations. In 2020 the Trump administration then adopted less stringent GHG tailpipe standards for model years 2021 through 2026.

Those less stringent standards remained in place until last year, when the Biden administration adopted more stringent standards to govern model years 2023 through 2026. Then earlier this year the Biden administration reinstated California's waiver.

So there now are two sets of regulations in play—the newly adopted Biden standards, and the California standards. They are largely similar but not identical, and the differences are what will determine the impact of the Clean Car Rule before you today. The bottom line is that whichever regulation is most stringent on a particular aspect is what will take effect in New Mexico. I will discuss each of the several pieces of the rules and outline how they interact.

Both federal and California rules establish limits on tailpipe emissions. For GHGs, the federal standards for Model Year 2026 (the first effective year of this Clean Car Rule) are more stringent than California's requirements and under both federal and New Mexico law the federal standards will take priority. Therefore, this Clean Car Rule does not change the GHG tailpipe limits. You should be aware, however, that the federal GHG rules have been challenged in court. If those rules are overturned, this Clean Car Rule would then be more stringent and would set the GHG standards. Thus, this Clean Car Rule provides a backstop against court challenges or potential rollbacks by a future federal administration.

For particulate matter, the California regulation puts in place more stringent tailpipe standards than federal law. Therefore, the California rules will take effect in this Clean Car Rule, and that will result in particulate emission reductions beyond those under the federal standards.

For the remaining pollutants, such as smog-forming pollutants or carbon monoxide, the federal and California tailpipe standards are basically the same. Therefore, adopting this Clean Car Rule will make no changes.

Last but not least, this Clean Car Rule puts in place a requirement for manufacturers to offer for sale in New Mexico specified numbers of Zero Emission Vehicles. This requirement has no counterpart in federal law, and therefore, this ZEV requirement will make New Mexico's requirements more stringent.

Both the EPA and California have started updates to their regulations, which would take effect in future Model Years. You may wish to address those updated requirements in a future rulemaking, but they have no impact on the decision before you now.

I should also note that the impacts analysis that I prepared for the original petition to your boards was prepared before the new federal standards were released. The adoption of those standards changed the context within which this Clean Car Rule will be implemented. My presentation today updates that original impacts analysis to take into account the recent federal action.

With all of that as background, I will now address the projected New Mexico impacts of this Clean Car Rule. I will present my findings on emissions, public health impacts, and costs and savings. My full report, *The New Mexico Clean Car Rule: An Analysis of Feasibility and Impact on Consumers and the Environment (***NMED-EHD Exhibit 26**) looks at two additional scenarios—one in which the federal rules are overturned, and one that models the impact of the more aggressive ZEV requirements under consideration in California. I will not discuss those findings today, however, but am happy to answer any questions you may have.

Emission Impacts--Statewide

Turning first to emissions, there are three components to the net impact of the rule:

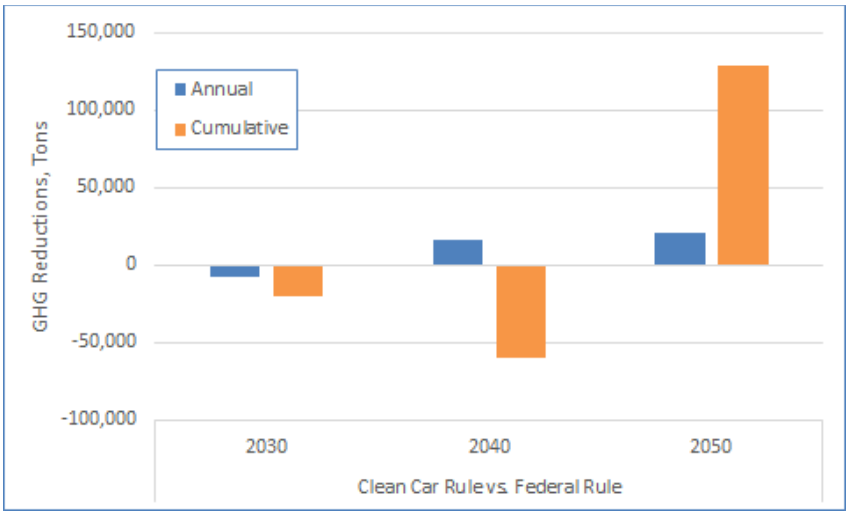
- Reductions in tailpipe emissions
- Reductions in what are known as "upstream" emissions from internal combustion engine vehicles. These are emissions associated with the production and distribution of the fuel used by those engines.
- Increases in "upstream" emissions from ZEVs. These are emissions from the generation of the electricity needed to charge those vehicles.

These three components interact in complicated ways and assessing their combined impact necessarily requires a number of assumptions. My report discusses those interactions and assumptions, and here, I will present summary results. I first provide statewide results, and then will separately summarize the impacts for Bernalillo County.

Greenhouse Gases

For GHGs, Figure 1 shows the annual and cumulative GHG emission impacts from this Clean Car Rule for calendar years 2030, 2040, and 2050. GHG impacts are the sum of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) emissions, with the latter two weighted by their global warming potential.

Figure 1: Projected GHG Reductions, Tons

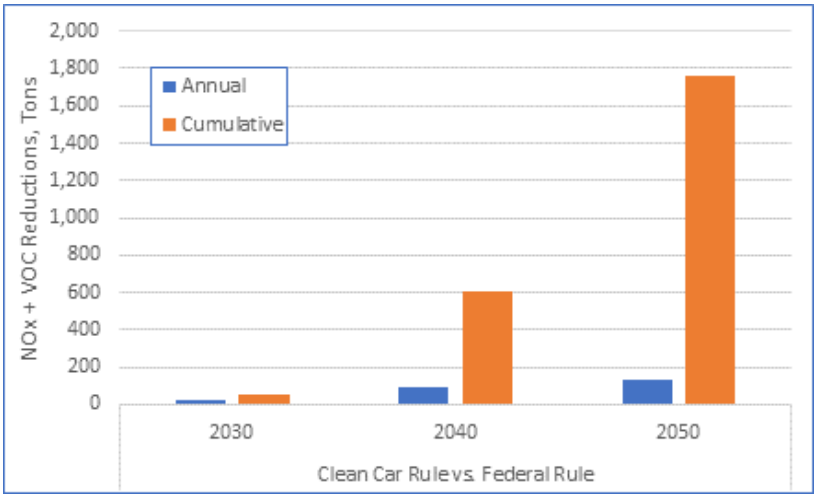


As Figure 1 shows, annual and cumulative GHG emissions are slightly increased in 2030, but annual emissions are reduced by 2040 and cumulative emissions, which turn negative shortly thereafter, are substantially reduced by 2050. Because the climate-altering impacts of GHGs are driven by total emissions over time, this Clean Car Rule will achieve positive climate benefits.

Smog Precursors

Next to be considered are the pollutants that contribute to smog. Figure 2 shows this Clean Car Rule's combined emission reductions of the two most significant ozone-forming pollutants, nitrogen oxides (NOx) and volatile organic compounds (VOCs).

Figure 2: NOx Plus VOC Reductions, Tons



Other Pollutants

This Clean Car Rule will also reduce other criteria pollutant emissions and emissions of toxic air pollutants. Table 1 shows the net statewide reductions for the criteria pollutants carbon monoxide (CO), sulfur oxides (SOx), and fine particulate matter ($PM_{2.5}$), and for the toxic air pollutants benzene and formaldehyde. Results are given for annual and cumulative reductions in calendar years 2030, 2040, and 2050.

Table 1: Other Pollutant Reductions, All Scenarios, Tons

		Carbon Monoxide		SOx		PM 2.5		Benzene		Formaldehyde	
		Annual	Cumulative	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
Clean Car	2030	-207	-538	-0.4	-1.3	-6.2	-14.5	-0.4	-1.1	-0.1	-0.3
Rule vs.	2040	-909	-6,464	-5.9	-23.2	-35.1	-222.7	-1.6	-11.6	-0.5	-3.4
Federal Rule	2050	-1,253	-17,742	-7.4	-91.7	-50.8	-671.5	-2.2	-31.8	-0.6	-9.0

While upstream emissions from electricity generation typically occur in more remote areas, the tailpipe emissions from internal combustion vehicles are concentrated in urban areas and near highways, which often impact low-income or disproportionately-impacted communities. Thus, in addition to achieving statewide reductions, this Clean Car Rule will reduce health impacts in these impacted areas.

Emission Impacts, Bernalillo County

The emission impacts shown here are derived by attributing 21 percent of the projected statewide reductions to Bernalillo County. This fraction was chosen based on (1) Bernalillo County's share of statewide vehicle miles travelled for calendar years 2016 through 2020, as provided by the New Mexico Department of Transportation (21.1 percent), and (2) the EPA Co-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA) projection of Bernalillo County's share of statewide tailpipe criteria pollutant emissions and electricity generation emissions for calendar year 2028 (17 to 23 percent depending on the pollutant). Applying that factor to the statewide impacts shown above, Table 2 shows projected Bernalillo

County annual and cumulative impacts for calendar years 2030, 2040 and 2050. They parallel the results for New Mexico as a whole.

Table 2: Emission Reductions, Bernalillo County, Tons

		GHGs		NOx + VOC	
		Annual	Cumulative	Annual	Cumulative
Clean Car	2030	-1,246	-3,262	4	11
Rule vs.	2040	2,922	-10,061	20	127
Federal Rule	2050	3,675	23,900	27	371

		Carbon Monoxide		SOx		PM 2.5		Benzene		Formaldehyde	
		Annual	Cumulative	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
Clean Car	2030	33	82	0.1	0.2	1.2	2.7	0.1	0.2	0.0	0.1
Rule vs.	2040	157	1,085	1.1	4.1	6.7	42.5	0.3	2.0	0.1	0.6
Federal Rule	2050	220	3,051	1.3	16.4	9.8	128.6	0.4	5.5	0.1	1.6

Public Health

I conducted a screening analysis of this rule's impacts using the EPA Co-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA). That screening analysis projects that this Clean Car Rule will provide health benefits to New Mexico citizens. COBRA projects the impact of user-specified emission reductions on ambient particulate matter concentrations, provides low and high estimates of the health impacts of reduced ambient particulate matter, and monetizes the results. Health impacts from particulate matter exposure include mortality, heart attacks, chronic lung disease, bronchitis, and asthma.

COBRA results are only available for 2028. The health benefits from this Clean Car Rule will increase over time as the number of ZEVS and the resulting emission reductions increase, but those additional benefits cannot be quantified for this report.

The monetized health benefits in 2028 in New Mexico and in Bernalillo County, as calculated by COBRA, are shown in Table 3. The COBRA modeling tool breaks out health impacts by county, so the results shown below are directly modeled Bernalillo County results rather than a scaled fraction of statewide impacts. Bernalillo County accounts for about 76 percent of statewide monetized health benefits in 2028, much larger than its 21 percent share of emission reductions. This difference is due to the fact that population density is a key factor in COBRA's health impact estimates, and a given ambient particulate matter level has more significant health impacts in an area with greater population density. The monetized health benefits statewide and in Bernalillo County as calculated by COBRA are:

Table 3: Monetized Health Impacts, Dollars

	2028	
	Low	High
Statewide	$135,000	$303,000
Bernalillo Cou	$102,000	$231,000

Cost

This Clean Car Rule will lead to cost savings for individual vehicle purchasers and for the state as a whole. Manufacturers will comply with the Clean Car Rule by selling more ZEVs and reducing particulate matter tailpipe emissions from their internal combustion vehicle fleet. This affects three aspects of consumer cost, which together result in a net savings over the life of the vehicle:

- Up-front cost of the vehicle, including tax.
- Lifetime insurance and maintenance cost.
- Lifetime fuel savings.

The per vehicle cost factors are the same statewide as for Bernalillo County so the resulting cost savings are also the same.

New Vehicle Cash Purchase

The most straightforward case is the cash purchase of a new "fleet average" passenger vehicle (the weighted average of all new vehicles sold in that year) in Model Years 2026 and 2030. Costs and savings are calculated over the lifetime of the vehicle, assumed in EPA modeling to be about 190,000 miles for a Model Year 2026 vehicle. Lifetime maintenance, insurance, and fuel costs are discounted at 3 percent per year, again consistent with EPA methodology. The individual cost elements for each vehicle type are detailed in the Appendix of **NMED-EHD Exhibit 26**. In the first affected model year (MY 2026) there is a small fleetwide average net savings of about $17, which increases to $234 in MY 2030 as technology cost declines.

New Vehicle Financed Purchase

About 85 percent of new passenger vehicle purchases are financed with a loan. Financing the "fleet average" vehicle that meets this Clean Car Rule will yield immediate monthly savings for Model Year 2026 and subsequent vehicles. The net impact follows the same pattern as a cash purchase—a minor increase in the monthly loan payment offset by a reduction in monthly fuel expenditures. The average impact is minimal—monthly out-of-pocket costs are essentially unchanged. This calculation is based on a consumer financing a vehicle with a standard six-year auto loan, with all future costs discounted at 3 percent per year.

Impact on Low-Income Purchasers

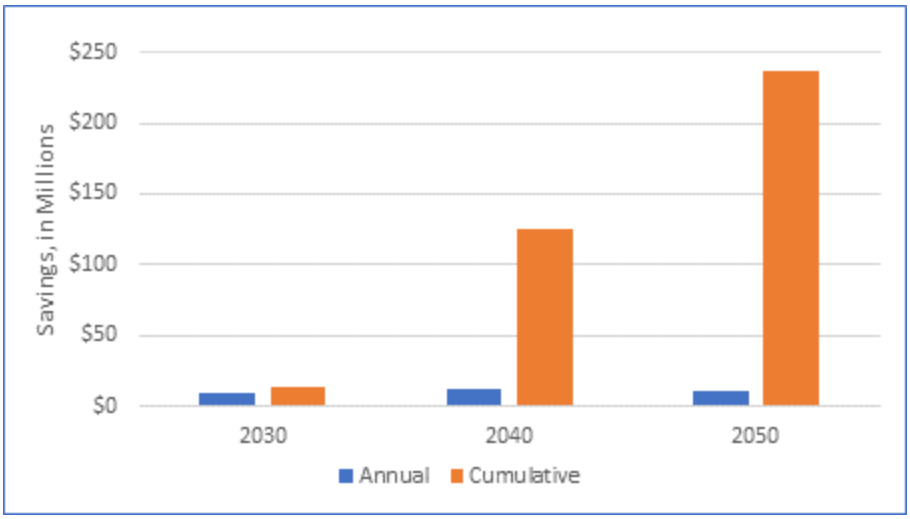
Low-income purchasers will also benefit from cost savings under this Clean Car Rule. Operating cost savings provide a greater benefit to low-income consumers because they tend to spend a larger proportion of their income on fuel than do higher-income consumers. Moreover,

lower-income consumers disproportionately buy used vehicles. For used vehicles, most of the incremental costs for improved technology have been absorbed by the first owners but the fuel savings from that improved technology persist for the life of the vehicle. As new clean cars become used clean cars, those operational cost savings will be passed on to subsequent owners and continue to yield benefits to drivers.

Fleetwide Savings

The savings to purchasers of individual vehicles, when multiplied across the roughly 88,000 vehicles sold in New Mexico each year, result in statewide savings. The societal savings increase over time as larger numbers of the more efficient vehicles are added to the fleet. Figure 3 shows results for the on-road vehicle fleet in calendar years 2030 and 2040, again using a discount rate of 3 percent. The incremental cost of the vehicles is more than offset by the lifetime fuel savings. The result is (present value) annual savings for New Mexico of $9.5 million in 2030, $11.8 million in 2040, and $10.5 million in 2050. Cumulative statewide savings in those years are $14.1 million, $125.0 million, and $237 million, respectively.

Figure 3: Statewide Savings by Calendar Year (Dollars, in Millions)



I do not have data on Bernalillo County car sales as a fraction of the statewide total. Using the same 21 percent scaling factor noted above, the present value of annual savings for Bernalillo County will be $2.0 million in 2030, $2.5 million in 2040, and $2.2 million in 2050. Cumulative savings in those years will be $3.0 million $26.3 million, and $49.8 million.

Feasibility

When the Advanced Clean Cars rule was adopted in California in 2012, the CARB staff report provided thorough analyses of the cost-effectiveness and technical feasibility of the Low Emission Vehicle and Zero Emission Vehicle requirements. At that time CARB also committed to conduct a comprehensive review of the program by 2017 to determine if the standards for 2022 and later model years were still appropriate. That Midterm Review concluded that the standards

remained technically and economically feasible, and the Board affirmed staff's recommendations at its March 2017 Board hearing.

Since that time technology has continued to advance and costs have declined. It is clear that the Clean Car Rule is both technically practical and economically reasonable. In addition, the other factors noted below reinforce the fact that manufacturers will readily be able to meet the Clean Car rule.

Manufacturer Lead Time

The Clean Air Act requires that state standards be adopted at least two years before commencement of the applicable model year. A "model year" begins on January 2 of the previous calendar year. So, for example, the 2022 model year began on January 2, 2021. Therefore, if New Mexico adopts the Clean Cars standards before January 2, 2023 (that is, before the start of the 2024 model year), the standards will first apply to MY 2026 vehicles. Manufacturers can use that time to adjust their product and sales planning and take other necessary steps to meet the requirements.

ZEVs Becoming Mainstream

The ongoing trend toward electrification is being driven by major forces operating at a global level. Regulations in China and the European Union, along with carmakers' need to keep pace with their competitors, are driving substantial manufacturer investment. This in turn brings about cost reduction, technology improvement, and increased model availability. Given these developments, ZEV sales are increasing. Although the COVID-19 outbreak is having an adverse impact on global auto manufacturing, the long-term commitment to electrification remains firm. The *Zero-Emission Vehicles Factbook*, a BloombergNEF special report prepared for COP26 in November 2021, highlighted a number of trends that support increasing growth in ZEV sales:

- There are more than 500 zero-emission vehicle models available to buy globally, up 37% since 2019
- Proposed and confirmed rules in the US, EU and China imply that EVs will be roughly 20-30% of car sales in those markets by 2025
- Automakers have collectively committed to sell around 40 million EVs per year by 2030, and automakers with planned phase-outs of combustion engines now account for 27% of the global auto market

ZEV-Focused Automakers

The ZEV regulation allows automakers to acquire ZEV credits from other car manufacturers. Tesla is already generating a large number of credits from its sales. Rivian is reported to have a large number of preorders for its R1T truck throughout the United States, and Lucid is beginning to offer vehicles. These credits will be available for sale to other manufacturers to cover any shortfall. Although future sales levels from ZEV-focused automakers are uncertain, these credits could dramatically affect how the ZEV regulation impacts other manufacturers. The

availability of credits from ZEV-focused automakers will give traditional manufacturers the option to reduce the number of ZEVs they must deliver while still meeting the ZEV credit requirements.

Suitability for New Mexico Conditions

Those unfamiliar with electric vehicle trends often raise concerns that truck purchasers will not be able to buy trucks under the Clean Car Rule. This is inaccurate. First, the Clean Car Rule applies to manufacturers, not to consumers. Second, while the regulation increases the availability of electric vehicles, it does not require replacing an internal combustion vehicle with a ZEV. Moreover, the Clean Car Rule only covers light-duty cars and trucks. The rule does not regulate other vehicles such as tractors, construction equipment, industrial equipment, and long-haul commercial vehicles.

For those who do want an electric truck, they are on the way. Recent announcements foreshadow an influx of models that will be available in advance of MY 2026, the first model year affected by the Clean Car Rule. Current and soon-to-be-released EV truck models include the Rivian R1T, Ford F-150, Chevy Silverado, GMC Hummer, and Tesla Cybertruck.

Thank you for the opportunity to testify. This concludes my written testimony.

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EDUCATION

1978 University of California, Berkeley
Master of Public Policy

1975 Georgetown University
Bachelor of Arts, Honors English

EXPERIENCE

2009-to date **Environmental and Climate Policy Consultant**

Self-employed consultant. Projects include:

- Technical support for proposed adoption of California's Low Emission Vehicle (LEV) and Zero Emission Vehicle (ZEV) standards in New Mexico (US Climate Alliance)
- Technical support for adoption of LEV and ZEV standards in Colorado, Minnesota, Virginia, Nevada, Washington and Pennsylvania, and development of Advanced Clean Cars II in California (Natural Resources Defense Council)
- Project oversight of a consultant report on Medium- and Heavy-Duty Electrification in California (California Electric Transportation Commission)
- Recommendations on future improvements to the California Zero Emission Vehicle Program, based on newly-developed technical analysis and a spreadsheet model of compliance outcome scenarios (Natural Resources Defense Council)
- Recommendations to the California Air Resources Board and the U.S. Environmental Protection Agency on passenger vehicle greenhouse gas regulations and zero emission vehicle policy (International Council on Clean Transportation)
- Support for modeling work regarding the transition to electric drive in California (International Council on Clean Transportation)
- Organization of workshops in the European Union and China on how best to incorporate upstream emissions from electricity generation in passenger vehicle greenhouse gas standards (International Council on Clean Transportation)
- Management of stakeholder review and input for the Transportation Electrification Assessment report prepared by a coalition of California electric utilities, and technical support for utility vehicle electrification policy initiatives (California Electric Transportation Coalition)

- Subject expert on light duty vehicle electrification for a report to the World Bank Transport Office in Beijing on the China New Energy Vehicles Program (subcontractor to PRTM Management Consultants)
- A series of reports on vehicle electrification policy (International Council on Clean Transportation)
- Evaluation of proposed expenditures of allowance auction revenues generated by the California greenhouse gas cap and trade program (Energy Foundation).

2007-2009 **Assistant Executive Officer**
California Air Resources Board

Member of CARB executive management team and lead for climate change issues. Established and directed the CARB Office of Climate Change, responsible for implementing the Global Warming Solutions Act of 2006 (AB 32). Managed development of the original AB 32 Scoping Plan, laying out first-in-the-nation recommendations to achieve significant greenhouse gas reductions. Prepared budget requests, identified needed expertise, set up organizational structure, recruited and hired staff, defined workflow, tasks and timing, worked closely with a wide range of stakeholders, and conducted extensive public participation process. Participated in fact-finding trips to England and the European Union and worked with their senior officials. Represented California at the multi-state Western Climate Initiative.

1998-2007 **Program Manager for Motor Vehicle Greenhouse Gas Reduction;**
Vehicle Program Specialist
California Air Resources Board

Project leader for successful implementation of AB 1493, which directed CARB to adopt regulations to reduce greenhouse gas emissions from passenger vehicles. Leader of the staff teams that prepared the 1998 Biennial Review of the Zero Emission Vehicle Program and the 2001 and 2003 regulatory amendments. Identified needed work products, managed rulemakings, worked extensively with multiple stakeholders, and helped defend adopted regulations against automaker litigation. Provided technical support for the adoption of similar regulations by other states and nations.

1994-1997 **Chief Deputy Director**
California Office of Environmental Health Hazard Assessment

Planned, organized and directed the activities of the office, which provides objective scientific information to policymakers regarding health risks posed by hazardous materials in the environment. Assigned tasks to staff, provided policy guidance, and monitored work progress through to timely completion. Represented the office in interactions with the administration, the legislature, and interest groups.

1991-1994 **Assistant Secretary**
California Environmental Protection Agency (Cal/EPA)

Senior advisor to Cabinet-level Secretary for Environmental Protection. Established and supervised internal budget, contract and administrative functions, and reviewed budgets for all Cal/EPA organizations. Served as Agency liaison to the air quality, health science and pesticide regulatory programs. Reviewed, edited and approved mandated reports. Represented the Agency on advisory groups at the state and national levels. Managed the development of the first Cal/EPA strategic plan.

1984-1991 **Assistant to the Secretary for Policy Development**
California Environmental Affairs Agency (predecessor to Cal/EPA)

Senior staff to the Secretary for Environmental Affairs. Managed internal Agency budget, contract and other administrative functions. Provided Agency oversight of Air Resources Board, Water Resources Control Board and Integrated Waste Management Board budgets. Team leader for development and implementation of Governor's Reorganization Plan Number 1 of 1991, which created Cal/EPA.

1978-1983 **Program Analyst**
Legislative Analyst's Office, California Legislature

Advised the legislature on fiscal aspects of California's air quality, solid waste management, pesticide, and toxic substances control programs. Analyzed budget requests and legislation, presented and defended recommendations before legislative committees, and responded to legislative requests for information.

AWARDS AND RECOGNITION

2004 CARB Lifetime Achievement Award
2004 CARB Gold Superior Accomplishment Award
2002 CARB Gold Superior Accomplishment Award

The New Mexico Clean Car Rule

An Analysis of Feasibility and Impact on Consumers and the Environment

Prepared by Shulock Consulting

with modeling support provided by Meszler Engineering Services

April 2022

About Shulock Consulting

Charles Shulock is an environmental and climate policy consultant. Before becoming a consultant, he spent 30 years working on environmental issues at California state agencies. He concluded his state career as assistant executive officer and director of climate programs at the California Air Resources Board, where he led the board's initial implementation of the California Global Warming Solutions Act. He also led the staff teams that prepared the 2001 and 2003 amendments to the Zero Emission Vehicle regulation and served as project leader for the board's 2004 adoption of tailpipe standards to reduce greenhouse gas emissions from light duty vehicles. He has been an independent consultant for the past 11 years, working primarily on regulatory and policy matters associated with a transition to zero emission vehicles.

https://www.shulockconsulting.com/

About Meszler Engineering Services

The cost and emission projections in this report are calculated using a spreadsheet tool developed by Dan Meszler, the sole proprietor of Meszler Engineering Services. Mr. Meszler is an independent contractor with more than 38 years of experience and expertise in a wide range of energy and air quality issues, with an emphasis on transportation sources. Before starting Meszler Engineering Services, he worked for Energy and Environmental Analysis (since acquired by ICF International) and the Maryland Department of the Environment.

Support for Report Preparation

This report was prepared with support from the U.S. Climate Alliance, a bipartisan coalition of governors committed to reducing greenhouse gas emissions consistent with the goals of the Paris Agreement. The U.S. Climate Alliance retained Mr. Shulock to provide technical assistance to New Mexico Environment Department and the City of Albuquerque in their petition to the New Mexico Environmental Improvement Board and the Albuquerque-Bernalillo County Air Quality Control Board for consideration of Clean Cars standards.

Development of the spreadsheet tool by Mr. Meszler was supported by the Natural Resources Defense Council, and the tool is used with its permission.

The conclusions and opinions expressed in this report are those of the author, Charles Shulock, and do not represent the views or positions of the US Climate Alliance or Mr. Meszler. Any and all errors are the responsibility of the author.

Table of Contents

Executive Summary

In January 2019 Governor Lujan Grisham issued Executive Order 2019-003 adopting the ambitious target to reduce New Mexico greenhouse gas (GHG) emissions by at least 45 percent by 2030 from 2005 levels, and adding New Mexico to the United States Climate Alliance. The City of Albuquerque has long been focused on climate issues, dating back to its 2009 *Climate Action Plan*. Reaching those targets will require a suite of climate actions including adopting California's light and medium duty vehicle standards ("Advanced Clean Cars" or "ACC"), herein called the Clean Car Rule. The Clean Car Rule will support New Mexico's electrification and decarbonization goals in the transportation sector by putting in place zero emission vehicle (ZEV) sales targets.

In December 2021 the United States Environmental Protection Agency (EPA) adopted revised GHG emission standards for passenger cars and light trucks for model years (MYs) 2023-2026. This report projects the impacts of the Clean Car Rule as compared to the newly adopted federal rule. Because the new EPA GHG tailpipe standards for MY 2026 are more stringent than the standards within the proposed Clean Car Rule, the new federal standards for GHG tailpipe emissions take precedence and will apply in that model year. But the Clean Car Rule will impose more stringent particulate matter tailpipe standards and require manufacturers to deliver for sale an increased number of ZEVs in the state.

This report evaluates three scenarios. The first (Clean Car Rule vs. Federal Rule) is based on manufacturer exact compliance with the Clean Car Rule, selling only the minimum required number of ZEVs (which we calculate to be about 7 percent of total passenger vehicle sales in 2026 and subsequent model years). The second (Clean Car Rule vs. SAFE Rule) shows the impacts of exact compliance with the Clean Car Rule if federal standards were to return to those in place under the recently replaced SAFE rule. The third (Greater ZEV Deployment) examines the potential benefits if future ZEV sales exceed the 2026 regulatory requirement. The Greater ZEV Deployment scenario charts an aggressive course consistent with the California Air Resources Board's current staff proposal to update the Advanced Clean Cars program (ACC II) to require that 100% of the new light-duty vehicles sold in MY 2035 in California must be ZEVs. The Greater ZEV Deployment scenario is not under consideration in New Mexico at this time and would require a separate rulemaking.

The Clean Car Rule Reduces Pollution

The results presented here demonstrate that both the low emission vehicle LEV and ZEV components of the Clean Car Rule will provide benefits to the state. We project long-term cumulative reductions in GHG emissions under the Clean Car Rule vs. Federal Standards scenario. We project much larger reductions if the federal SAFE rule is reinstated or if ZEV sales increase beyond the minimum required level. For GHGs, the Clean Car Rule vs. Federal Rule scenario results in slightly increased emissions in the first years (due to the regulation including ZEVs in the GHG fleet average) but achieves cumulative reductions of about 114,000 tons by 2050. The Clean Car Rule vs. SAFE Rule scenario results in 2050 cumulative reductions of 13.6 million tons, and the Greater ZEV Deployment nets 2050 cumulative reductions of 53.7 million tons.

There are also reductions in other regulated emissions, including ozone-forming pollutants (nitrogen oxides and volatile organic compounds), fine particulate matter, sulfur oxides, and toxic air contaminants including benzene and formaldehyde. Collectively these pollutants are linked to many adverse health effects, including decreases in lung function, inflammation of airways, aggravated

asthma, increased risk of cancer, and damage to the immune system, as well as neurological, reproductive, developmental, and other health problems.

The Clean Car Rule Saves Consumers Money

Purchasers of new passenger cars and trucks will save money because lower expenditures on fuel will outweigh the incrementally higher up-front cost of a vehicle. We estimate that under the Clean Car Rule vs. Federal Rule scenario, cash purchasers on average will save about $17 over the life of a MY 2026 vehicle, and about $230 for a MY 2030 vehicle. For those who finance their vehicles, we estimate that with a typical six-year loan the monthly out-of-pocket expenditure will be essentially unchanged.

These fuel cost savings will be particularly helpful for low-income purchasers because fuel costs typically make up a larger proportion of their income. Moreover, low-income purchasers often buy used vehicles. For used vehicles, much of the up-front cost for improved technology has already been absorbed by the first owner, but the fuel savings persist for the life of the vehicle.

These individual savings, multiplied by the more than 80,000 passenger vehicles sold in New Mexico each year, will result in cumulative statewide savings of about $237 million by calendar year 2050.

Additional Benefits

Consumer choice will be expanded as auto manufacturers make available the full range of electric vehicles available in other ZEV states. With managed charging of ZEVs, electric utility companies could increase electricity sales without increasing their fixed costs. This will allow utilities to spread their fixed costs across a larger base, which in turn reduces the cost per kilowatt-hour for their ratepayers.

Automobile Dealer and State Agency Implementation

Automobile dealers in other states have argued that the Clean Car Rule will limit their ability to trade cars between states or buy vehicles out of state. There has been no evidence of any systemic problems associated with LEV or ZEV adoption in other states, and a thorough investigation during the Colorado LEV rulemaking concluded that any purported problems relating to those issues are not supported by data. The 12 states that are already implementing one or both of the LEV and ZEV regulations are doing so within the expected level of state agency staff and resources needs, and 4 more states have recently adopted Clean Cars requirements.

Feasibility for Auto Manufacturers

A number of factors suggest that manufacturers will be able to meet the ZEV requirement. Under federal law manufacturers are granted lead time to plan for compliance and the Clean Car Rule cannot take effect until MY 2026. Once the regulation is adopted, manufacturers can buy, sell, and trade “ZEV credits” to flexibly meet their compliance obligation. ZEVs are in the process of becoming mainstream as costs decline and performance increases. As manufacturers continue to invest in future electrification, propelled by growing consumer demand and policies such as the Clean Car Rule, there will be an ever-increasing number of ZEVs on the market, including the pickups, sport utility vehicles, and crossovers favored by many drivers in New Mexico. About 165 models of battery electric vehicles--three times more than in 2020--are expected to be available by 2025.

I. Introduction

This report presents the impacts that likely will result from the adoption of the Clean Car Rule. It describes the regulatory requirements and their projected effect on anticipated sales of ZEVs. It then outlines expected changes in GHG, criteria pollutant, and toxic air contaminant emissions and related health impacts, and the cost savings and other benefits to New Mexico consumers who purchase or finance new passenger vehicles and to the state as a whole. It addresses the how the program will affect automobile dealers, utility companies, and the New Mexico Environment Department (NMED), then examines the ability of auto manufacturers to meet the requirements.

New Mexico is unique among states in that legal authority for air quality regulation on non-tribal lands is divided between the Air Quality Bureau of the New Mexico Environment Department (which has jurisdiction over all non-tribal areas of New Mexico other than the City of Albuquerque and Bernalillo County) and the Albuquerque-Bernalillo County Air Quality Program.[1] This report first presents results for the entire state, then separately provides summary results for Albuquerque/Bernalillo County.

II. Current Situation

A. State and Local Goals

In January 2019 Governor Lujan Grisham issued Executive Order 2019-003 committing New Mexico to reduce its GHG emissions by at least 45 percent by 2030 from 2005 levels and adding New Mexico to the United States Climate Alliance, a coalition of states and cities committed to reaching the goals of the Paris Climate Agreement.[2]. The Executive Order established an interagency Climate Change Task Force, which was tasked with evaluating policies and regulatory strategies including adoption of LEV and ZEV performance standards. In September 2019 Governor Grisham announced that New Mexico would propose, adopt, and implement those standards.[3] In June 2021 the Climate Change Task Force released its *New Mexico Climate Strategy*, with improved estimates of baseline emissions and recommendations for further action.[4]

The City of Albuquerque has long been focused on climate issues, dating back to its 2009 *Climate Action Plan*.[5] In 2019 the City Council declared a climate emergency[6]. On Earth Day 2021 the city released an updated plan created by its Climate Action Plan Task Force, with an emphasis on engagement with frontline communities that have been and will be heavily impacted.[7] Albuquerque has likewise committed to fulfilling the greenhouse gas reduction goals of the Paris Climate Agreement.[8]

B. Progress Toward Goals

Following the Governor's Executive Order, new polices and regulations have been adopted and more are anticipated. Foremost among them are the Energy Transition Act of 2019, which requires New Mexico utilities to use at least 50% renewable energy by 2030, and proposed rules on regulating ozone precursor emissions and reducing waste from the oil and gas sector, which will have the co-benefit of reducing methane emissions. Nonetheless, the *New Mexico Climate Strategy* concluded that "Our current and proposed climate strategies will make a significant dent in our greenhouse gas emissions profile by 2030—but reaching our targets will require renewed ambition and additional action".[9] The Clean Car Rule will support New Mexico's electrification and decarbonization goals for the transportation sector.

C. Related Federal and California Regulatory Actions

Vehicle emission standards in New Mexico are currently governed by federal law and—should New Mexico adopt the California mobile source emission standards that underpin the Clean Car Rule—the regulations must be consistent with California regulations. Following the 2019 New Mexico commitment to adopt Advanced Clean Cars there have been new developments at both the federal and state levels.

In December 2021 the EPA finalized revised national GHG emission standards for passenger cars and light trucks for MYs 2023-2026.[10] These standards replace the weaker Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule that was issued by the EPA under the Trump Administration. The projected impacts of the Clean Car Rule cited in NMED's rulemaking petition to the Environmental Improvement Board and the Albuquerque Environmental Health Department's petition to the Albuquerque Bernalillo County Air Quality Control Board were based on a comparison of the Clean Car Rule versus the SAFE rule, which was operative at the time the original analysis was prepared. This report provides an updated analysis of the impacts of the Clean Car Rule as compared to the newly adopted federal rule.[11] Because the new EPA GHG tailpipe standards for MY 2026 are more stringent than the equivalent standard within the proposed Clean Car Rule the new federal standards for the GHG tailpipe component take precedence and will apply in that model year. In addition, the criteria pollutant standards in the federal rule (aside from particulate matter [PM]) are the same as in the proposed Clean Car Rule. Thus the impact of the Clean Car rule as compared to current federal standards is driven by the particulate matter standards and the ZEV requirement.

At the state level, California Air Resources Board (CARB) staff have released a staff proposal for the "ACC II" regulation, which will govern MYs 2026 and beyond.[12] California's adoption of ACC II will not automatically affect New Mexico; rather, state and local regulatory agencies must consider ACC II in a separate rulemaking and adopt the course of action deemed appropriate at that time. The projected impacts in this report are based on compliance with the existing ACC I regulation.

III. The Clean Car Rule

Section 177 of the federal Clean Air Act authorizes states to adopt stricter-than-federal emission standards for passenger vehicles, so long as they are identical to those of California and do not result in a "third vehicle" (a vehicle that must meet standards that differ from both the federal and the California requirements). In 2012 CARB updated its regulations to control emissions from passenger vehicles, with the revised directives collectively referred to as Advanced Clean Cars.[13] The goal of those regulations is to guide the development of environmentally advanced cars that continue to deliver the performance, utility, and safety that car owners have come to expect.

The regulations combine the control of GHG and criteria pollutant emissions into a single, coordinated package of regulations—the LEV tailpipe standards for GHGs and criteria pollutants, and a ZEV requirement.[14] The suite of regulations is designed to work as an integrated whole, with the LEV, GHG and criteria pollutant tailpipe standards providing significant near-term emission reductions and the ZEV requirement enabling a longer-term transition to electric drive and even larger emission reductions in the future. These elements are described in more detail in the Appendix to this report.

To date 14 states have adopted these stricter-than-federal regulations in their entirety (LEV, GHG and criteria pollutant, and ZEV), and 2 other states and the District of Columbia have adopted the LEV, GHG

and criteria pollutant portions but not ZEV. The proposed Clean Car Rule includes all components, keeping intact the comprehensive regulatory structure and maximizing benefits to New Mexico.

A. What The Clean Car Rule Will Require, and What It Will Not

The Clean Car Rule will require auto manufacturers to meet more stringent particulate matter (PM) tailpipe emission standards than the current federal rule and will also require that manufacturers earn a specified number of "ZEV credits" by delivering for sale in New Mexico increased numbers of ZEVs. [15]

As noted above, under the current federal regulations the GHG and criteria pollutant tailpipe standards (other than PM) supersede the Clean Car Rule. However one of the scenarios in this report projects the impact of the Clean Car Rule as a backstop if the federal standards are again rolled back, as was the case under the Trump administration. We therefore discuss the operation of the entire suite of standards.

The GHG standards are performance-based rather than prescriptive—manufacturers can use any desired mix of technologies, applied as they wish across their various models, so long as the average emissions from all vehicles sold in a given model year achieve the standard. The GHG standards account for the size ("footprint") of the vehicle, so that a manufacturer selling mostly light-duty trucks will have a different, less stringent fleet average standard than one selling mostly passenger cars.

The criteria pollutant standards (aside from PM) define a set of pollution "bins" to which vehicles can certify, with the fleet as a whole required to meet a regulatorily defined fleet average.[16] For example, to be certified as meeting "Bin 30," a vehicle can emit no more than 30 micrograms per mile of non-methane organic gases plus nitrogen oxides and must also meet specified limits for other pollutants. Manufacturers must produce a mix of vehicles, each certified to one of the bins, which when averaged together meet the fleet average standard.

The Clean Car Rule ZEV regulation seeks to expand the availability of electric-drive vehicles and continue the transformation of the light-duty vehicle fleet to zero emissions. The California ZEV regulation, first adopted in 1990, has been a catalyst for manufacturer investment and innovation. It has worked as intended, with multiple manufacturers bringing new ZEV models to the market, new entrants competing for market share, continual improvements in electric vehicle performance, and significant cost reductions.

The Clean Car Rule ZEV regulation does not require manufacturers to reach specific sales levels, but rather requires that they annually earn a specified number of ZEV credits. The credit obligation is calculated as a percentage of the average annual passenger vehicle sales by an automaker over a defined three-year period.[17] ZEV credits are earned when automakers deliver battery electric vehicles (BEVs), fuel cell vehicles (FCEVs), or plug-in hybrid electric vehicles (PHEVs) for sale. The number of ZEV credits earned is based primarily on the all-electric range of the vehicle sold.[18] Because under the Clean Car Rule each ZEV typically earns more than one credit, the credit requirement is approximately three times higher than the percentage of ZEV sales needed to comply. The ZEV credit requirement of 22 percent in MY 2026 means that about 7 percent of total passenger vehicle sales in that year must be ZEVs. The Clean Car Rule allows manufacturers to earn ZEV credit for vehicles placed in advance of the MY 2026 effective date. Any such "early credits" earned could be applied against the MY 2026 requirement, reducing the number of vehicles needed.

Manufacturers have flexibility to determine how to configure their fleet to earn the required number of ZEV credits. Auto manufacturers can also purchase credits from and sell credits to other manufacturers, such that an automaker delivering more ZEVs than needed can sell credits to those with a slower rate of product introduction.

It is critical to understand that the Clean Car Rule only imposes ZEV requirements on auto manufacturers, not on auto dealers or vehicle purchasers. The regulation does not require individual dealers to meet specific ZEV sales goals. Rather, the manufacturer must determine the product offerings across its affiliated dealerships, such that on a statewide basis the requirements are met. Similarly, the regulation does not require consumers to purchase any particular type of vehicle. Drivers are free to buy whatever vehicle type and powertrain best meets their needs.

The Clean Car Rule only regulates passenger vehicles, such as cars, crossover vehicles, sport utility vehicles, and pickup trucks. It does not apply to other types of vehicles such as larger trucks or farming equipment.

B. Anticipated Changes to the Vehicle Fleet

To allow manufacturers ample time to plan, federal law dictates that if Clean Car Rule regulations are adopted in 2022, the earliest that the standards can apply will be MY 2026.[19] As noted above, the new federal GHG tailpipe standards for MY 2026 and the criteria pollutant standards other than for PM will take precedence in New Mexico even if the Clean Car Rule is adopted. By adding the ZEV requirement and the more stringent PM standards to the federal baseline, the proposed Clean Car Rule puts in place the most stringent requirements available in each category.

The ZEV component of the Clean Car Rule, which is not superseded by the new federal standards, will put in place a ZEV regulation that requires manufacturers to deliver for sale an increased number of such vehicles in the state. Electric vehicle adoption has been steadily increasing in New Mexico, but the ZEV requirement can have an important incremental effect. Based on what we have seen in other states, auto manufacturers will bring in models currently available in ZEV states but not in New Mexico, increase consumer advertising and dealership incentives, provide additional dealership education and outreach, and in general do what is needed to move ZEVs into the mainstream.

Depending on the types of vehicles that manufacturers choose to produce, under the Clean Car Rule there can be a wide variation in the number of vehicles they must deliver to meet the credit requirement. The precise mix of vehicle technologies employed—e.g., BEVs and PHEVs—is uncertain, as is the exact impact of the Clean Car Rule on ZEV sales. As shown below, however, the impact can be estimated using reasonable assumptions.

C. Scenarios

The Meszler Engineering spreadsheet tool projects cost and emission impacts for the new car fleet as a whole—the ICE component and the ZEV component—taking into account how these two components of the fleet interact. The underlying engineering-based cost and emission calculations for each vehicle type are the same in all cases. What varies are the assumptions made about other factors, including:

- ZEV sales, range, and cost
- The price of gasoline and electricity

- The generation mix of the electricity grid (the percentage contribution of each source of electricity used to charge ZEVs)

A set of assumptions defines a scenario. We examine three scenarios. The first is based on exact compliance with the Clean Car Rule requirement of 22 percent ZEV credits for MYs 2026 and beyond. The second shows the impact of the Clean Car Rule if federal standards were to return to those in place under the recently replaced SAFE rule. The third scenario examines the potential benefits if future ZEV sales exceed the MY 2026 regulatory requirement of the Clean Car Rule, either through market-driven growth in ZEV penetration or New Mexico adoption of a strengthened ZEV regulation as proposed in ACC II. For all scenarios, we account only for the impact of incremental ZEV sales above business-as-usual. Details are provided in the Appendix. The scenarios are:

Scenario 1: Clean Car Rule vs. Federal Rule. This scenario assumes manufacturers produce no more than the minimum number of ZEVs needed to comply. Under this scenario, ZEV sales are about 7 percent of total sales in MY 2026, then stay at that level.

Scenario 2: Clean Car Rule vs. SAFE Rule. The newly-adopted federal standards are under review by the courts.[20] If the newly-adopted standards are found to be invalid the federal standards would revert to the less-stringent SAFE rule adopted during the Trump administration. This scenario examines the impact of exact compliance with the Clean Car Rule as compared to the SAFE rule.

Scenario 3: Greater ZEV Deployment. This scenario illustrates the emission reductions possible with greatly increased ZEV sales. It reflects the most recent information available on the staff proposal for the California ACC II rulemaking, which increases the ZEV requirement beginning with Model Year 2026 . This scenario results in annual ZEV sales of 55 percent in 2030 and reaches 100 percent in 2035. The Greater ZEV Deployment scenario is not under consideration in New Mexico at this time and would require a separate rulemaking. It is included here to provide additional background information. The year-by-year ZEV sales and ZEV sales percent are provided in the Appendix.

This report presents emission impact results for all scenarios for New Mexico as a whole and separate Clean Car Rule emission impact results for Albuquerque/Bernalillo County. It then presents statewide cost and health impact results for the Clean Car Rule.

IV. Methodology

All emission and cost results given in this report are based on the impact of incremental ZEV sales above "business-as-usual" (sales in the absence of a ZEV regulation). The quantitative results presented in this analysis are derived from two spreadsheet tools. Details on these tools and the calculation methodology are provided in the Appendix.

The projected number of ZEVs is calculated using a spreadsheet developed by Shulock Consulting, building on the 2017 California ZEV Regulatory Calculator released by CARB.[21] The Shulock Consulting spreadsheet can be used to project ACC I impacts in states other than California, allows additional flexibility in the scenarios considered, and provides a wider range of outputs. The spreadsheet has been used to assess the impacts of Clean Cars adoption for regulatory proceedings in Colorado, Minnesota and Nevada and has been verified to replicate the results of the CARB calculator when using identical assumptions.

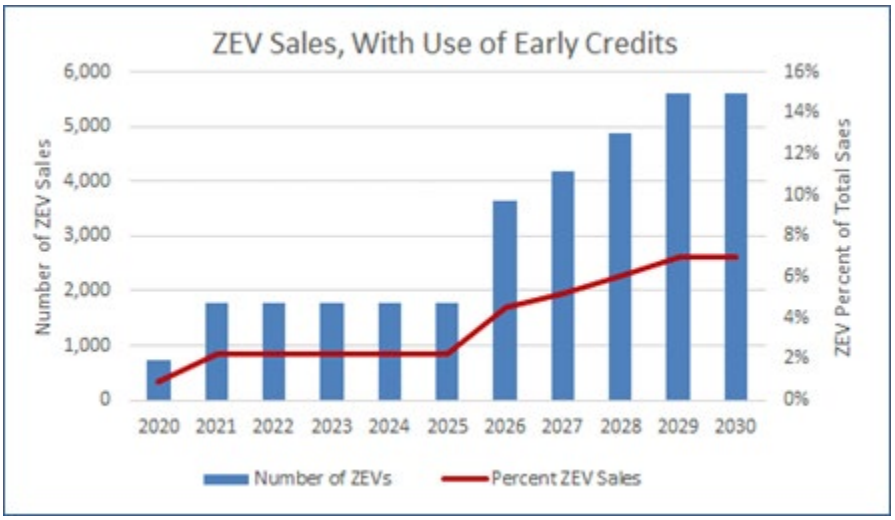
The cost and emission impact components of this analysis employ a spreadsheet tool developed by Meszler Engineering Services. This tool allows the user to scale the results of a comprehensive national model developed by the EPA in a simplified fashion to apply to state-level rule adoption. This capability had previously not been available at the state level. It was used to estimate impacts for the Minnesota and Nevada rulemakings and enhances our ability to quantify the impacts of changes to the standards.

V. ZEV Sales

The first step in projecting the impact of the proposed Clean Car Rule is to determine the overall makeup of the new car fleet, including the number of ZEVs. The number of ZEVs sold is then used as an input to the cost and emission impact calculations for the entire fleet.

Figure 1 shows projected statewide ZEV sales for the Clean Car Rule scenario. This estimate assumes that manufacturers earn and use "early action credits" for sales prior to MY 2026, as authorized under the proposed rule.[22]

Figure 1: ZEV Annual Sales and Percentage of Annual Total Sales



VI. Emission Impacts

As noted above, if the Clean Car Rule is adopted some aspects of vehicle emissions will be governed by the recently adopted federal rule and some will be governed by the Clean Car Rule. Table 1 shows the various requirements and which rule takes precedence in each case.

Table 1: Federal and Clean Car Rule Requirements

Requirement	Governing Regulation
Fleet average GHG tailpipe emissions	Federal Rule
Per vehicle particulate matter tailpipe emissions	Clean Car Rule
Fleet average emissions of criteria pollutants other than particulate matter	Federal Rule
ZEV deliveries for sale	Clean Car Rule

Given this regulatory framework, the Clean Car Rule will affect the New Mexico new vehicle fleet in two ways:

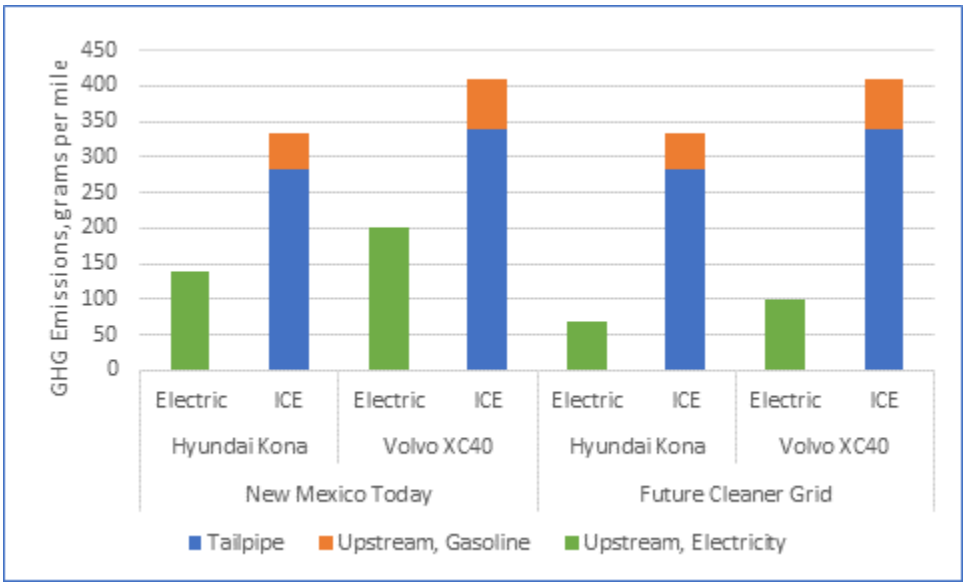
- Internal combustion engine (ICE) vehicles will have reduced tailpipe emissions of particulate matter.
- Increased ZEVs will replace what would otherwise have been ICEs.

For an individual vehicle, each ZEV has significantly lower emissions than the ICE vehicle it replaces. There are three elements to this comparison:

- The elimination of tailpipe emissions from the ICE,
- The elimination of upstream (fuel production and distribution) emissions from the ICE due to reduced demand for fossil fuel, and
- Increased upstream (fuel production and power generation) emissions from electric utilities, due to the additional electricity needed to charge the ZEV.

The combined impact of these three factors results in reduced emissions from an individual ZEV as compared to an ICE. Two examples of the GHG emission impact of a ZEV versus an ICE are shown in Figure 2, taken from the FuelEconomy.gov website.[23] The Kona and XC40 were chosen because they have identical ICE and ZEV versions. Both are small vehicles; the emission reduction from larger ZEVs such as the forthcoming Ford F150 Lightning are not yet available on FuelEconomy.gov but will be greater than shown here.

Figure 2: ZEV versus ICE, GHG Emissions Per Vehicle



Rather than directly controlling emissions from each individual vehicle, however, the Clean Car Rule and the federal regulations are enforced at the fleet level (all sales by a given manufacturer). Each manufacturer is required to meet a "fleet average" emission level for all pollutants other than particulate matter. This provides flexibility to the manufacturer as to how to best meet the requirements—for example, higher emissions from one model can be offset by lower emissions from another.

One consequence of the emission averaging approach for GHGs is that adding a ZEV to the fleet does not reduce fleetwide GHG tailpipe emissions.[24] Rather, manufacturers generally use the GHG fleet average "headroom" afforded by ZEVs, which have zero tailpipe emissions, to offset increased emissions from other vehicles. The initial rationale for including ZEVs in the fleet average was to provide an incentive for manufacturers to sell additional ZEVs—doing so allowed them to reduce costs elsewhere. As ZEV technology advances, however, there is less need for such incentives and the emission impact of including ZEVs in the fleet average grows. Thus CARB staff have indicated that the inclusion of ZEVs in the fleet average will be phased out in ACC II.[25]

Our emission impact projections include ZEVs in the GHG fleet average for the Clean Car Rule scenario and the SAFE scenario, consistent with the existing regulatory structure. This means that additional ZEV deployment does not result in any GHG tailpipe reductions. For the Greater ZEV Deployment scenario we phase out the inclusion of ZEVs, consistent with the proposed approach in ACC II. Table 2 outlines the structure of each scenario.

Table 2: Scenario Elements

			GHG Emission Impacts Included		
Scenario	**Baseline for Comparison**	**ZEV Requirement**	**EV Upstream**	**ICE Upstream**	**ICE Tailpipe**
1. Clean Car Rule vs. Federal Rule	New Federal Rule	ACC I	✓	✓	
2. Clean Car Rule vs. SAFE Rule	SAFE Rule	ACC I	✓	✓	
3. Greater ZEV Deployment	New Federal Rule	ACC II	✓	✓	✓

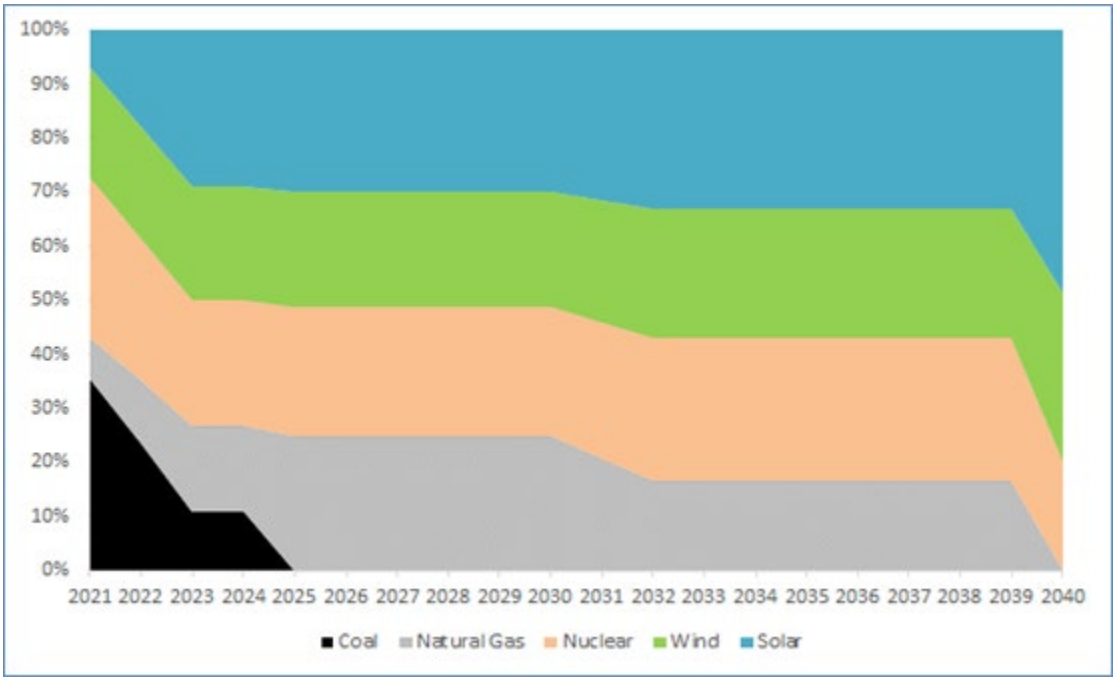
A. Electricity Generation Mix

The amount of ZEV-related upstream emissions will vary depending on the resources used to generate the electricity needed to charge the vehicles. The LEV/ZEV tool employed for this report quantifies emissions from feedstock (fuel) production and electricity generation for each source, using emission factors obtained from the GREET model.[26] For example, natural gas power has emissions from both fuel production and electricity generation, nuclear power has emissions associated with fuel production but not with electricity generation, and solar and wind power have neither fuel production nor electricity generation emissions.

Unlike ICEs, whose emission controls deteriorate over time, ZEVs sold today will produce lower levels of emissions in the future as the electricity grid becomes cleaner. A 100 percent renewable grid will result in zero emissions from ZEV operation. The prospect of emissions eventually being reduced to zero is a central justification for policies that encourage ZEV adoption.

Figure 3 shows the assumed composition of the electricity generation mix for all scenarios, based on the "Technology Neutral" portfolio outlined in the *PNM 2020-2040 Integrated Resource Plan*.[27] The PNM resource plan is used as a proxy for statewide New Mexico generation. The generation source fractions are shown in the Appendix.

Figure 3: Assumed Electricity Generation Mix, All Scenarios



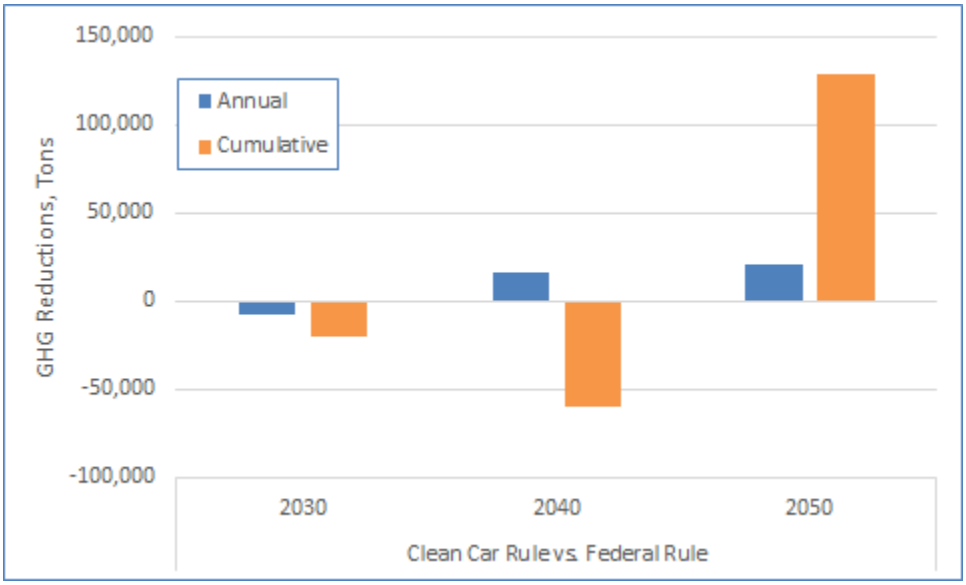
B. Results, Statewide

The Clean Car Rule will reduce emissions of health-threatening pollutants beginning in MY 2026, the first enforceable model year. It will result in long-term cumulative reductions in GHG emissions. Because the climate-altering impacts of GHGs are driven by total emissions over time, the Clean Car Rule will achieve climate benefits as well. It also will help accelerate New Mexico's transition to electric mobility and position New Mexico to be fully included in manufacturers vehicle electrification strategies.

1. Greenhouse Gas Emissions

Figure 4 shows annual and cumulative projected net GHG emission impacts from the Clean Car Rule for calendar years 2030, 2040, and 2050. GHG impacts are the sum of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) emissions, with the latter two weighted by their global warming potential.[28]

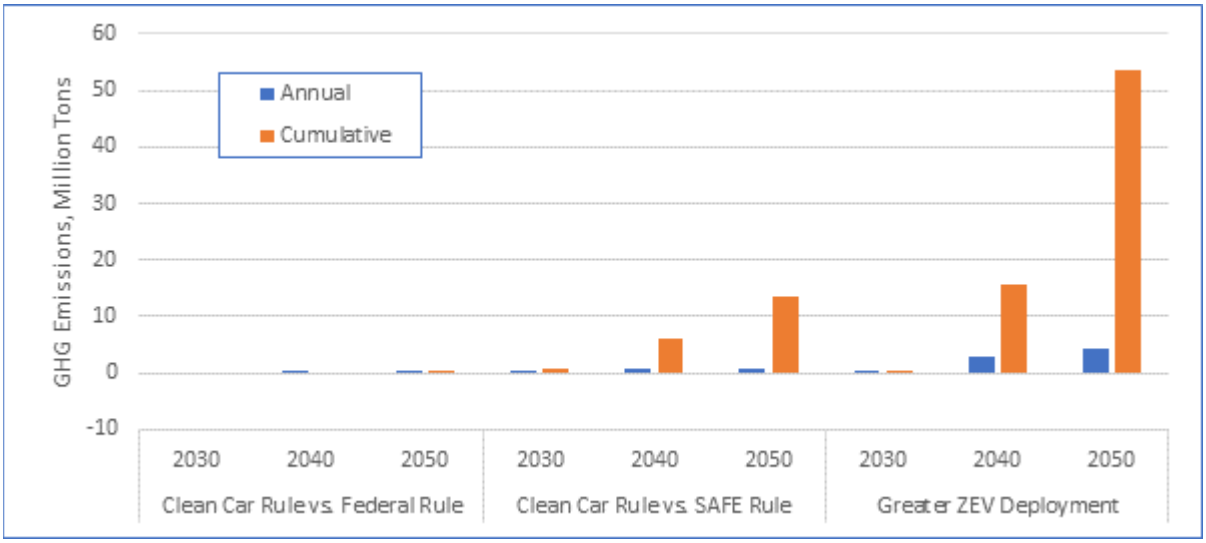
Figure 4: Projected GHG Reductions, Scenario 1,Tons



As Figure 4 shows, annual and cumulative GHG emissions are slightly increased in 2030, primarily due to out-of-state fuel production emissions associated with nuclear power. But annual emissions decrease by 2040 and cumulative emissions are reduced in 2050. Because these projections include ZEVs in the GHG fleet average, there is no tailpipe GHG reduction--the net impact is the sum of EV upstream increases minus ICE upstream decreases. In the early years the EV upstream emissions are greater than the ICE upstream reductions. Note, however, that in 2030 the 7,300 ton GHG increase from the proposed Clean Car Rule is a small fraction of one percent of the state's projected emissions of 57.9 million metric tons.[29] In later years as the electricity grid reduces its carbon output the electricity generation emissions decrease and eventually are outweighed by the foregone ICE upstream emissions. As noted above, in all cases ZEVs in New Mexico have lower emissions than their gasoline counterparts on a per vehicle basis, but those benefits are not fully captured by the regulation so long as manufacturers can use ZEV reductions to offset increased GHG emissions from gasoline vehicles in their fleet average. Details for each component of the impact are provided in the Appendix.

Figure 5 shows the GHG emission impacts from all scenarios. Note that Figure 3 impacts are in millions of tons, as opposed to tons as in Figure 2. This is necessary in order to show the reductions achieved by Scenarios 2 and 3. The larger reductions in Scenario 2 are due to the stricter tailpipe GHG standards in the Clean Car Rule as opposed to the SAFE rule. The even larger reductions in Scenario 3 are due to the greatly increased number of ZEVs combined with the removal of ZEVs from the GHG fleet average.

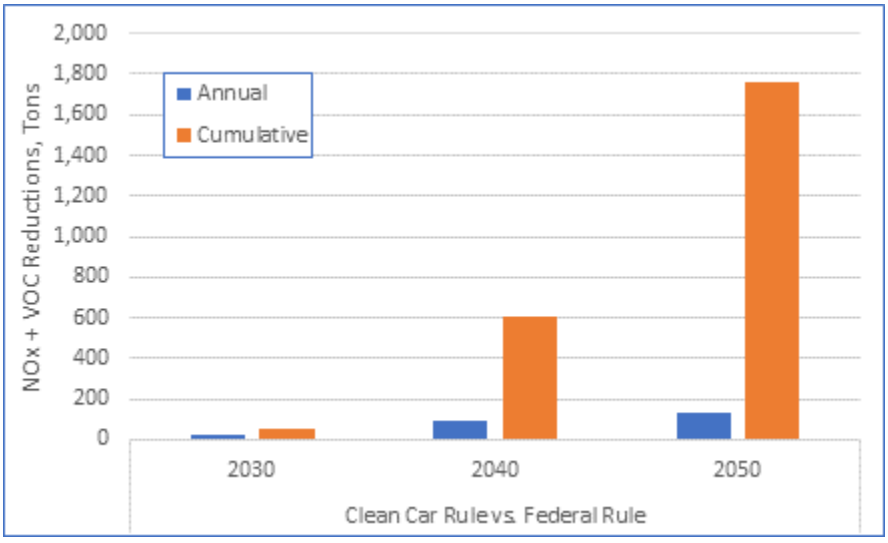
Figure 5: GHG Impacts, All Scenarios, Million Tons



2. Ozone-Forming Pollutants

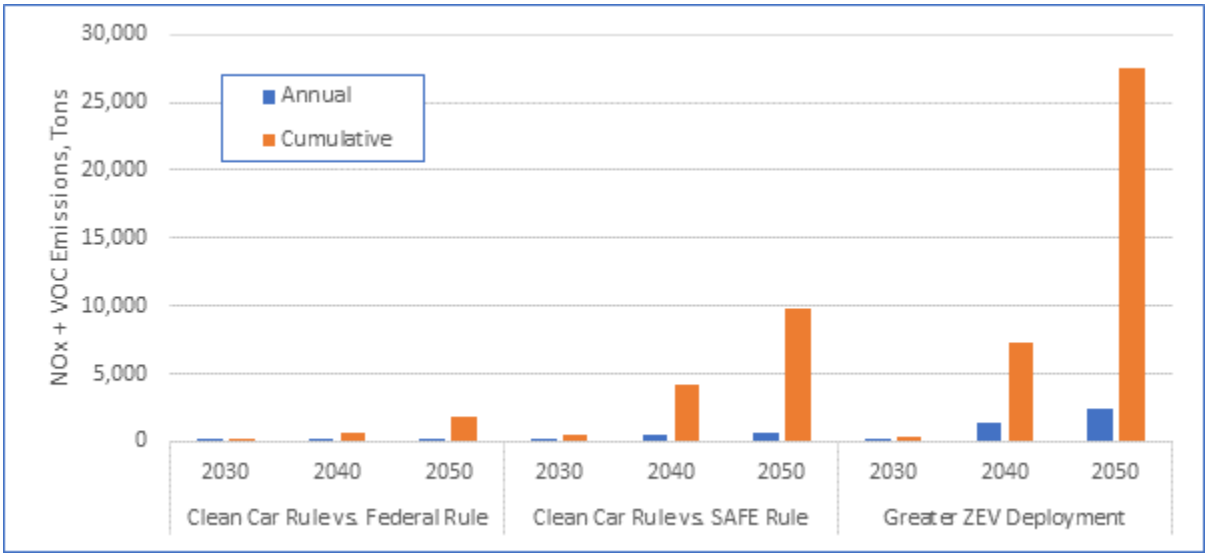
The Clean Car Rule reduces ozone-forming pollutants. The EPA has concluded that "breathing ground-level ozone can result in a number of health effects that are observed in broad segments of the population," including respiratory symptoms, decreases in lung function, and inflammation of airways.[30] Figure 6 shows the Clean Car Rule combined emission reductions of the two most significant ozone-forming pollutants, nitrogen oxides (NOx) and volatile organic compounds (VOCs). As Figure 6 shows, NOx and VOC emissions are reduced in all years.

Figure 6: NOx Plus VOC Reductions, Scenario 1,Tons



As was the case with GHGs, Scenario 2 and Scenario 3 achieve much greater NOx + VOC reductions. Figure 7 shows the reductions for all scenarios. Here the larger reductions in Scenario 2 are not due to stricter tailpipe standards, but rather are due to decreased ICE upstream emissions associated with reduced fuel consumption driven by the tighter GHG standards.

Figure 7: NOx + VOC Reductions, All Scenarios, Tons



3. Other Pollutants

The Clean Car Rule will also reduce other criteria pollutant emissions and emissions of toxic air pollutants. Scientific studies have linked particulate matter exposure to a variety of health effects, including premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms.[31] People exposed to toxic air pollutants may have an increased risk of cancer or other serious health effects, including damage to the immune system as well as neurological, reproductive, developmental, respiratory, and other health problems.[32]

Table 3 shows the net statewide reductions for all scenarios for the criteria pollutants carbon monoxide (CO), sulfur oxides (SOx), and fine particulate matter ($PM_{2.5}$) and for the toxic air pollutants benzene and formaldehyde. Results are given for annual and cumulative reductions in or calendar years 2030, 2040, and 2050. Similar to the NOx + VOC results, the Scenario 2 reductions are driven by decreased ICE fuel use and Scenario 3 reductions are driven by increased ZEV penetration.

Table 3: Other Pollutant Reductions, All Scenarios, Tons

		Carbon Monoxide		SOx		PM 2.5		Benzene		Formaldehyde	
		Annual	Cumulative	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
Clean Car	2030	157	389	0.3	1.0	5.6	12.8	0.3	0.8	0.1	0.2
Rule vs.	2040	747	5,165	5.0	19.5	31.9	202.4	1.3	9.3	0.4	2.7
Federal Rule	2050	1,045	14,529	6.4	78.2	46.5	612.2	1.9	26.2	0.5	7.4
Clean Car	2030	133	325	22.0	66.7	11.1	29.4	1.1	3.2	0.3	0.9
Rule vs.	2040	649	4,445	58.8	496.7	45.4	322.3	3.3	26.8	0.9	7.1
SAFE Rule	2050	911	12,599	71.7	1,166.8	62.8	884.9	4.2	65.6	1.1	17.3
	2030	1,445	3,210	-3.0	-6.2	-2.4	-4.9	2.6	5.9	0.8	1.8
Greater ZEV	2040	13,799	79,277	54.3	68.3	52.4	55.3	23.2	133.0	6.5	38.9
Deployment	2050	23,236	275,908	79.7	769.0	80.4	750.5	39.1	462.5	11.0	131.4

While upstream emissions from electricity generation typically occur in more remote areas, the tailpipe emissions from internal combustion vehicles are concentrated in urban areas and near highways, which often pass through low-income or disproportionately-impacted communities. Thus, in addition to

achieving statewide reductions, the program will reduce criteria pollutant health impacts in localized areas.

C. Emission Results, Bernalillo County

The emission impacts shown here are derived by attributing 21 percent of the projected statewide reductions to Bernalillo County. This fraction was chosen based on (1) Bernalillo County's share of statewide vehicle miles travelled for calendar years 2016 through 2020 as provided by the New Mexico Department of Transportation (21.1 percent), and (2) the EPA Co-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA) projection of Bernalillo County's share of statewide tailpipe criteria pollutant emissions and electricity generation emissions for calendar year 2028 (17 to 23 percent depending on the pollutant). Applying that factor to the statewide impacts shown above, Table 4 shows projected Bernalillo County annual and cumulative impacts for calendar years 2030, 2040 and 2050.

Table 4: Emission Reductions, Bernalillo County, Tons

		GHGs		NOx + VOC	
		Annual	Cumulative	Annual	Cumulative
Clean Car Rule vs. Federal Rule	2030	-1,246	-3,262	4	11
	2040	2,922	-10,061	20	127
	2050	3,675	23,900	27	371

		Carbon Monoxide		SOx		PM 2.5		Benzene		Formaldehyde	
		Annual	Cumulative	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
Clean Car Rule vs. Federal Rule	2030	33	82	0.1	0.2	1.2	2.7	0.1	0.2	0.0	0.1
	2040	157	1,085	1.1	4.1	6.7	42.5	0.3	2.0	0.1	0.6
	2050	220	3,051	1.3	16.4	9.8	128.6	0.4	5.5	0.1	1.6

VII. Cost Savings

The Clean Car Rule will lead to cost savings for individual vehicle purchasers and for the state as a whole. The assumed energy prices are taken from the Energy Policy Simulator and are shown in Table 5. The calculation methodology and additional assumptions are detailed in the Appendix.

Table 5: Assumed Gasoline and Electricity Prices

		Calendar Year						
		2020	2025	2030	2035	2040	2045	2050
Gasoline ($/gallon)	Retail	$3.03	$3.10	$3.29	$3.42	$3.59	$3.63	$3.68
	PreTax	$2.68	$2.75	$2.94	$3.07	$3.24	$3.28	$3.33
	Tax	$0.35	$0.35	$0.35	$0.35	$0.35	$0.35	$0.35
Electricity ($/kWh)	Retail	$0.095	$0.105	$0.103	$0.101	$0.098	$0.097	$0.098

1. Consumer Savings

Manufacturers will comply with the Clean Car Rule by selling more ZEVs and reducing particulate matter tailpipe emissions from their internal combustion vehicle fleet. This affects three aspects of consumer cost, which together result in a net savings over the life of the vehicle:

- Up-front cost of the vehicle, including tax.
- Lifetime insurance and maintenance cost.
- Lifetime fuel savings.

The per vehicle cost factors are the same statewide as for Bernalillo County so the resulting cost savings

are also the same.

a. New Vehicle Cash Purchase

The most straightforward case is the cash purchase of a new "fleet average" passenger vehicle in MYs 2026 and 2030.[33] Costs and savings are calculated over the lifetime of the vehicle, assumed in EPA modeling to be about 190,000 miles for a MY 2026 vehicle. Lifetime maintenance, insurance, and fuel costs are discounted at 3 percent per year, again consistent with EPA methodology. The individual cost elements for each vehicle type are detailed in the Appendix. In the first affected model year (MY 2026) there is a small fleetwide average net savings of about $17, which increases to $234 in MY 2030 as technology cost declines.

b. New Vehicle Financed Purchase

About 85 percent of new passenger vehicle purchases are financed with a loan.[34] Financing the fleet average vehicle that meets the Clean Car Rule will yield immediate monthly savings for MY 2026 and subsequent vehicles. The net impact follows the same pattern as a cash purchase—a minor increase in the monthly loan payment offset by a reduction in monthly fuel expenditures. The average impact is minimal—monthly out-of-pocket costs are essentially unchanged. This calculation is based on a consumer financing a vehicle with a standard six-year auto loan, with all future costs discounted at 3 percent per year.

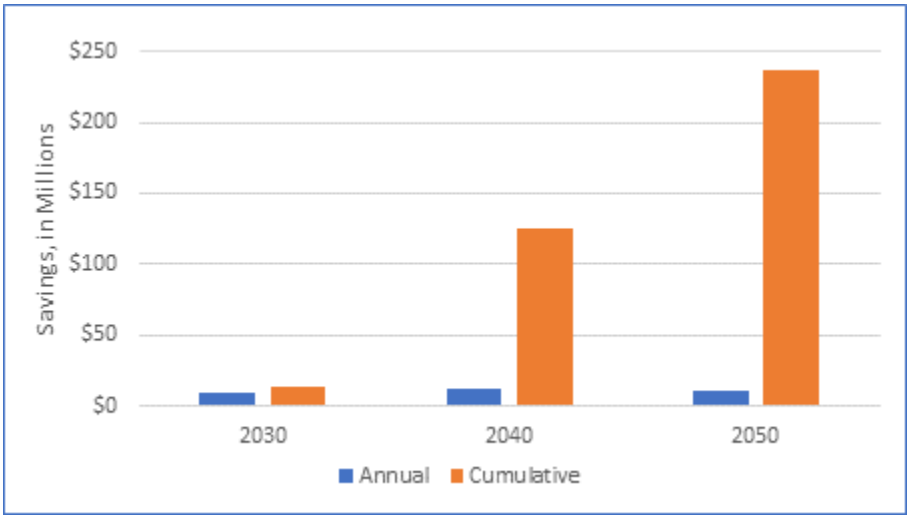
c. Impact on Low-Income Purchasers

Low-income purchasers will also benefit from cost savings under the Clean Car Rule. Operating cost savings provide a greater benefit to low-income consumers because they tend to spend a larger proportion of their income on fuel than do higher-income consumers.[35] Moreover, lower-income consumers disproportionately buy used vehicles. For used vehicles, most of the incremental costs for improved technology have been absorbed by the first owners but the fuel savings from that improved technology persist for the life of the vehicle. As new clean cars become used clean cars, those operational cost savings will be passed on to subsequent owners and continue to yield benefits to drivers.

2. Fleetwide Savings

The savings to purchasers of individual vehicles, when multiplied across the roughly 80,000 vehicles sold in New Mexico each year, result in statewide savings. The societal savings increase over time as larger numbers of the more efficient vehicles are added to the fleet. Figure 8 shows results for the on-road vehicle fleet in calendar years 2030 and 2040, again using a discount rate of 3 percent. The incremental cost of the vehicles is more than offset by the lifetime fuel savings. The result is (present value) annual savings for New Mexico of $9.5 million in 2030, $11.8 million in 2040, and $10.5 million in 2050. Cumulative statewide savings in those years are $14.1 million, $125.0 million, and $237 million respectively.

Figure 8: Statewide Savings by Calendar Year (Dollars, in Millions)



We do not have data on Bernalillo County car sales as a fraction of the statewide total. Using the same 21 percent scaling factor noted above, the present value of annual savings for Bernalillo County will be $2.0 million in 2030, $2.5 million in 2040, and $2.2 million in 2050. Cumulative savings in those years will be $3.0 million $26.3 million, and $49.8 million.

VIII. Public Health

A screening analysis conducted by Shulock Consulting using the EPA Co-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA) projects that the Clean Car Rule will provide health benefits to New Mexico citizens. COBRA projects the impact of user-specified emission reductions on ambient particulate matter concentrations, provides low and high estimates of the health impacts of reduced ambient particulate matter, and monetizes the results. Health impacts from particulate matter exposure include mortality, heart attacks, chronic lung disease, bronchitis, and asthma.

COBRA results are only available for 2028. The health benefits from the Clean Car Rule will increase over time as the number of ZEVs in the fleet and the resulting emission reductions grow, but those additional benefits cannot be quantified for this report.

The monetized health benefits in 2028 in New Mexico and in Bernalillo County, as calculated by COBRA, are shown in Table 6. The COBRA modeling tool breaks out health impacts by county, so the results shown below are directly modeled Bernalillo County results rather than a scaled fraction of statewide impacts. Bernalillo County accounts for about 76 percent of statewide monetized health benefits in 2028, much larger than its 21 percent share of emission reductions. This difference is due to the fact that population density is a key factor in COBRA's health impact estimates. (A given ambient particulate matter level has more significant health impacts in an area with greater population density). The monetized health benefits statewide and in Bernalillo County as calculated by COBRA are:

Table 6: Monetized Health Impacts, Dollars

	2028	
	Low	High
Statewide	$135,000	$303,000
Bernalillo Cou	$102,000	$231,000

IX. Other Issues

The adoption of the Clean Car Rule will result in a number of other impacts, detailed below.

A. Consumer Choice

The Clean Car Rule does not affect the availability of internal combustion engine vehicles. Consumers will remain free to purchase whatever vehicle meets their needs. For consumers interested in electric vehicles, however, implementation of a ZEV program will increase the number of models available.

ZEV model availability is currently limited in New Mexico. Using data from the Autotrader.com website, there are many more ZEV models offered in California than in New Mexico. Table 7 shows manufacturers with ZEV models offered in California as compared to New Mexico in December of 2021.[36] Of the 16 manufacturers offering ZEVs in California, only 6 offer such vehicles in New Mexico.

Table 7: EV Models Offered in California vs. New Mexico

	California	New Mexico
Audi	X	
BMW	X	
Chevrolet	X	X
Ford	X	X
Honda	X	
Hyundai	X	
Jaguar	X	
Kia	X	
Mazda	X	
Mercedes-Benz	X	
Mini	X	X
Nissan	X	X
Porsche	X	
Toyota	X	
Volkswagen	X	X
Volvo	X	X

The above data shows that relatively few ZEV models are currently offered in New Mexico. Upon closer inspection, availability is even more limited than it first appears. Using the Chevrolet Bolt and Bolt EUV as an example, Autotrader.com data accessed in December 2021 shows that the Bolt and Bolt EUV make up about 20% of the vehicles on Chevrolet lots in Los Angeles, San Jose, and Sacramento, but only 3.3%

of vehicles on Chevrolet lots in Albuquerque. No Bolts, and almost no ZEVs of any kind, were available in Santa Fe. Overall, across all manufacturers about 6% of vehicles on dealer lots in California were ZEVs, and fewer than 1% were ZEVs in New Mexico.

B. Utility Companies

Concerns have sometimes been raised regarding a possible negative impact of vehicle electrification on electric utilities and their customers. One such issue involves the ability of electric utilities to meet the increased electricity demand. Utilities are planning for the increased load from EVs, as demonstrated in the Public Service Company of New Mexico's (PNM) inclusion of the demand from transportation electrification in their 2020-2040 Integrated Resource Plan.[37] Short-term generation shortages possible for the summer of 2022 - as recently reported in the news - are expected to be ameliorated by 2025, the beginning of the first compliance year under the Clean Car Rule.

Studies of the issue, however, have found that increased ZEV deployment will actually benefit all utility customers. EVs can be charged during off-peak hours when there is spare capacity on the electric grid, which puts downward pressure on electricity rates to the benefit of all ratepayers. Off-peak charging can be encouraged through EV owner education, lower non-peak electricity rates, or incentivized by participation in a utility managed charging program.

A real-world benefit has been observed in utility service territories that already have hundreds of thousands of EV customers. A 2019 Synapse Energy Economics report analyzed the costs versus savings from 2012–2018 EV adoption for the two utilities with the highest deployment of EVs in the United States—Southern California Edison and Pacific Gas & Electric. The report concluded that during those six years, the revenue associated with sales of electricity for EV charging exceeded by more than $584 million the utilities' costs to support EV charging and deploy charging infrastructure.[38] Increased adoption of EVs reduced bills for all electric ratepayers by increasing the pool of net utility revenue available to pay down system costs.

C. Automobile Dealers

In the Advanced Clean Cars rulemaking in Colorado, automobile dealers argued that imposing stricter regulations would create hardships for dealers due to Colorado's shared borders with states that follow the federal requirements. The dealers raised concerns that the regulations would limit their ability to trade cars between states or buy cars from out of state. Dealers did not supply any evidence of problems associated with LEV or ZEV adoption in other states, and a thorough investigation of such issues was provided in the Rebuttal Statement filed by the Environmental Coalition during the Colorado rulemaking.[39] That review noted that cross-border trade and registration can still occur, as they do for other states that have adopted LEV and/or ZEV, and that out-of-state leakage issues (residents purchasing vehicles from adjacent states) are overstated. The Environmental Coalition concluded overall that "any purported problems relating to these arguments are overstated and not supported."

Looking more broadly at potential impacts on dealership sales, a 2018 study conducted by Shulock Consulting compared revenue for dealers in ZEV states and non-ZEV states.[40] It found that:

- From 2012 through 2017, growth in the total dollar value of vehicle sales in ZEV states was more rapid than in non-ZEV states.

- ZEV states also had more rapid growth in personal income, but at a slower rate than the rate of vehicle dollar sales growth. Thus, income growth alone does not explain the higher rate of dollar sales growth.
- Comparing ZEV states versus neighboring non-ZEV states, the growth in the dollar value of sales in Arizona and Nevada (non-ZEV) was slightly greater than in California (ZEV), while growth in New York (ZEV) was substantially greater than in Pennsylvania (non-ZEV). There was no consistent pattern across ZEV and non-ZEV states.
- If adoption of the ZEV program does have a negative impact on dealers, which was not observable in the 2018 study due to other factors that were not examined, any such impact must be small given that no negative impact was discernible in the data.

D. State Implementation

The Clean Car Rule can be implemented without imposing an undue burden on state staff. Mechanisms for monitoring and reporting compliance are well defined in the states that administer the LEV III and ZEV programs, and a spreadsheet tool is available for tracking auto manufacturer credit totals and ZEV compliance. Those states have implemented the rules with limited staffing. Expertise on LEV III and ZEV adoption is provided to member states by the Northeast States for Coordinated Air Use Management (NESCAUM), a nonprofit association that offers scientific, technical, analytical, and policy support to the air quality programs of the eight Northeast states.[41] NESCAUM staff are a resource for state implementation. NMED has indicated that the auto manufacturer's combined registration fee of $200,000 in the Clean Car Rule will be adequate to support the state's implementation of the program.

X. Feasibility

When the Advanced Clean Cars rule was adopted in California in 2012, the CARB staff report provided thorough analyses of the cost-effectiveness and technical feasibility of the Low Emission Vehicle and Zero Emission Vehicle requirements.[42] At that time CARB also committed to conduct a comprehensive review of the program by 2017 to determine if the standards for 2022 and later model years were still appropriate. That Midterm Review concluded that the standards remained technically and economically feasible, and the Board affirmed staff's recommendations at its March 2017 Board hearing.[43]

Since that time technology has continued to advance and costs have declined. It is clear that the Clean Car Rule is both technically practical and economically reasonable. In addition, the other factors noted below reinforce the fact that manufacturers will readily be able to meet the Clean Car rule.

A. Manufacturer Lead Time

Section 177 of the Clean Air Act gives states the option to adopt emission standards that are equivalent to the standards adopted in California. The Clean Air Act requires that state standards be adopted at least two years before commencement of the applicable model year.[44] A "model year" begins on January 2 of the previous calendar year. So, for example, the 2022 model year began on January 2, 2021. Therefore, if New Mexico adopts the Clean Cars standards before January 2, 2023 (that is, before the start of the 2024 model year), the standards will first apply to MY 2026 vehicles. Manufacturers can use that time to adjust their product and sales planning and take other necessary steps to meet the requirements.

B. Credit Banking and Trading

Manufacturers can bank credits that are earned but not needed to comply in a particular model year. This can smooth out the credit requirement as manufacturers retire and introduce models. Credits can also be purchased, sold, and traded across manufacturers. In California, for example, during the 2016 through 2019 model years, Tesla, General Motors, Fiat Chrysler, Honda, Toyota, Mazda, and Subaru all engaged in credit transfers.[45] This gives manufacturers facing a credit deficit an opportunity to comply without upsetting their product strategy, and it financially rewards market leaders. The Clean Car Rule as proposed allows manufacturers to bank early action credits as of July 1, 2022. This would allow manufacturers two and a half years to earn credits before the compliance period begins.

C. ZEVs Becoming Mainstream

The ongoing trend toward electrification is being driven by major forces operating at a global level. Regulations in China and the European Union, along with carmakers' need to keep pace with their competitors, are driving substantial manufacturer investment. This in turn brings about cost reduction, technology improvement, and increased model availability. Given these developments, ZEV sales are increasing. A recent summary by EV Volumes.com found that "Global EV sales reached 6.75 million units in 2021, 108% more than in 2020, [and] the global share of EVs in light vehicle sales was 8.3% compared to 4.2% in 2020".[46]

Although the COVID-19 outbreak is having an adverse impact on global auto manufacturing, the long-term commitment to electrification remains firm. The *Zero-Emission Vehicles Factbook*, a BloombergNEF special report prepared for COP26 in November 2021, highlights a number of trends that support increasing growth in ZEV sales[47]:

- There are more than 500 zero-emission vehicle models available to buy globally, up 37% since 2019
- Proposed and confirmed rules in the US, EU and China imply that EVs will be roughly 20-30% of car sales in those markets by 2025
- Automakers have collectively committed to sell around 40 million EVs per year by 2030, and automakers with planned phase-outs of combustion engines now account for 27% of the global auto market
- Leading automakers are 45% more committed to EVs than they were in 2019, as measured by EV sales, EV revenue, and EV model count.
- Major manufacturers' investment plans match their growing EV ambitions
- Clean transport investment will exceed $240 billion in 2021

In further support of BloombergNEF's finding that manufacturers are aggressively pursuing electrification, *evadoption* recently determined that about 165 models of battery electric vehicles--three times more than in 2020--are expected to be available by 2025.[48]

D. ZEV-Focused Automakers

The ZEV regulation allows automakers to acquire ZEV credits from other car manufacturers. Tesla is already generating a large number of credits from its sales. Rivian is reported to have a large number of preorders for its R1T truck throughout the United States, and Lucid is beginning to offer vehicles. These credits will be available for sale to other manufacturers to cover any shortfall. Although future sales levels from ZEV-focused automakers are uncertain, these credits could dramatically affect how the ZEV regulation impacts other manufacturers. The availability of credits from ZEV-focused automakers will

give traditional manufacturers the option to reduce the number of ZEVs they must deliver while still meeting the ZEV credit requirements.

E. Suitability for New Mexico Conditions

Those unfamiliar with electric vehicle trends often raise concerns that truck purchasers will not be able to buy trucks under the Clean Car Rule. This is inaccurate. First, the Clean Car Rule applies to manufacturers, not to consumers. Second, while the regulation increases the availability of electric vehicles, it does not require replacing an internal combustion vehicle with a ZEV. Moreover, the Clean Car Rule only covers light-duty cars and trucks. The rule does not regulate other vehicles such as tractors, construction equipment, industrial equipment, and long-haul commercial vehicles.

For those who do want an electric truck, they are on the way. Recent announcements foreshadow an influx of models that will be available in advance of MY 2026, the first model year affected by the Clean Car Rule. Current and soon-to-be-released EV truck models include the Rivian R1T, Ford F-150, Chevy Silverado, GMC Hummer, and Tesla Cybertruck.[49]

Finally, opponents of electrification argue that vehicle performance and utility suffer in cold weather. It is true that temperature affects battery performance and capacity, and heating an electric vehicle requires additional energy. (Internal combustion engines produce waste heat that can be used to warm the vehicle's interior—which is why they are inefficient.) But the impact of cold weather is mitigated by the increasingly large batteries now provided in long-range vehicles. Moreover, electric vehicles avoid many of the cold-weather challenges posed by internal combustion vehicles, such as drivers' outdoor exposure while fueling vehicles and wasted fuel and excess emissions from vehicles idling prior to use on cold mornings.

XI. Appendix

This Appendix describes the California Advanced Clean Cars program, provides background information on the modeling tools, methodology and assumptions used to develop the report's emission and cost projections, and gives the detailed results underlying the summary results presented in the text.

A. Elements of the Advanced Clean Cars Program

The California Advanced Clean Cars program comprises three interrelated components:

LEV III Criteria: Reducing Smog-Forming Pollution

Cars today are significantly cleaner than they were just a decade ago, but there are more than 1.9 million vehicles on New Mexico roads now, and that number will continue to increase. Drivers also cover more miles now than in previous years. In order to continue to improve air quality, the LEV III criteria pollutant standards reduce smog-forming emissions. In MY 2025, cars will emit 75 percent less of this pollution than the average car sold in MY 2012.

LEV III GHG: Reducing Greenhouse Gas Emissions

The GHG regulations are projected to reduce GHG emissions from new vehicles by approximately 40 percent in 2025 (relative to MY 2012 vehicles). Technologies to achieve the new standards include engine and emission control advancements, wider application of advanced hybrid technology, and greater use of stronger and lighter materials.

Zero Emission Vehicle Regulation: Promoting the Cleanest Cars

The ZEV regulation achieves long-term emission reduction goals by requiring auto manufacturers to deliver for sale specific numbers of the very cleanest cars available. These vehicle technologies include full battery-electric, hydrogen fuel cell, and plug-in hybrid-electric vehicles. The ZEV program at its inception employed a "technology forcing" approach to vehicle regulation. Throughout the history of the mobile source control program, regulators have imposed requirements that manufacturers initially viewed as infeasible but that spurred research and development and resulted in well-engineered, cost-effective advancements, from adoption of the catalytic converter to development of low-NOx engine technologies. This phenomenon continues today, as illustrated by the rapid improvement in ZEV technology.

B. Assumptions

Total Sales

The projected emission reductions from the Clean Car Rule are a direct function of assumed total vehicle sales. All vehicles sold are subject to the LEV particulate matter standards, and the ZEV credit requirement for a manufacturer in a given model year is a percentage of that manufacturer's average total sales over a specified prior three-year period. Therefore, emission reductions and the required number of ZEVs each will increase or decrease in proportion to total sales. Our sales data, as shown in Table 8, are based on Alliance for Automotive Innovation 2021 data, carried forward into future years.[50]

Table 8: Assumed New Mexico Total Vehicle Sales

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Car	33,021	33,021	33,021	33,021	33,021	33,021	33,021	33,021	33,021	33,021	33,021	33,021	33,021
Truck	47,519	47,519	47,519	47,519	47,519	47,519	47,519	47,519	47,519	47,519	47,519	47,519	47,519
Total	80,540	80,540	80,540	80,540	80,540	80,540	80,540	80,540	80,540	80,540	80,540	80,540	80,540

Business-as-Usual ZEV Sales

Some ZEVs are being sold in New Mexico today, and ZEVs will continue to be sold even in the absence of a ZEV regulation. The projected number of such business-as-usual sales has an important impact on ZEV compliance, including the number of early credits earned for ZEV sales in 2023, 2024 and 2025, and the baseline number of sales in MYs 2026 and beyond. Our estimate of business-as-usual sales, as shown in Table 9: Projected New Mexico Annual ZEV Sales, by Scenario, also comes from Alliance for Automotive Innovation 2021 data carried forward. Manufacturers would earn credit for the 2.2% ZEV sales for Model Years 2023, 2024 and 2025 that could be applied to future compliance.

Table 9: Projected New Mexico Annual ZEV Sales, by Scenario

		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
ZEV Sales, Number	Business as Usual	1,788	1,788	1,788	1,788	1,788	1,788	1,788	1,788	1,788	1,788	1,788	1,788	1,788
	Clean Car Rule vs. Federal Rule	1,788	1,788	1,788	3,630	4,175	4,882	5,622	5,622	5,622	5,622	5,622	5,622	5,622
	Clean Car Rule vs. SAFE Rule	1,788	1,788	1,788	3,630	4,175	4,882	5,622	5,622	5,622	5,622	5,622	5,622	5,622
	Increased ZEV Deployment	1,788	1,788	1,788	5,622	20,514	25,509	35,815	43,951	61,210	66,043	70,875	75,708	80,540
ZEV Sales, Percent	Clean Car Rule vs. Federal Rule	2.2%	2.2%	2.2%	4.5%	5.2%	6.1%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
	Clean Car Rule vs. SAFE Rule	2.2%	2.2%	2.2%	4.5%	5.2%	6.1%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
	Increased ZEV Deployment	2.2%	2.2%	2.2%	7.0%	25.5%	31.7%	44.5%	54.6%	76.0%	82.0%	88.0%	94.0%	100.0%

ZEV Range

The ZEV cost information used in the LEV/ZEV tool was supplied by the International Council on Clean Transportation (ICCT). The ICCT estimates apply to a discrete set of ZEV ranges: 150, 200, and 250 miles for BEVs and 40, 50, and 60 miles of all-electric range for PHEVs. To maintain internal consistency between our ZEV compliance and ZEV cost calculations, we assume vehicles with a constant range equal to one of the ICCT-defined examples. For BEVs we use 150- and 250-mile vehicles, with the share of 250-mile vehicles increasing over time. For PHEVs we use 50-mile vehicles.

Electricity Grid Mix for Electricity Used to Charge EVs

Table 10 shows the assumed grid mix, based on the "Technology Neutral" portfolio outlined in the *PNM 2020-2040 Integrated Resource Plan*

Table 10: Electricity Grid Mix

	2020	2025	2030	2035	2040	2045	2050
Coal	35.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Natural Gas	8.0%	25.0%	25.0%	16.7%	0.0%	0.0%	0.0%
Nuclear	29.5%	23.8%	23.8%	26.5%	20.2%	20.2%	20.2%
Wind	20.5%	21.4%	21.4%	23.8%	31.0%	31.0%	31.0%
Solar	6.8%	29.8%	29.8%	33.1%	48.8%	48.8%	48.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

C. Derivation of Projected ZEV Sales in New Mexico

The ZEV regulation requires automakers to generate an increased number of ZEV credits, calculated as a percentage of their total annual sales in the relevant state. Large-volume manufacturers (LVMs) must

meet a specified fraction of the requirement with credits from ZEVs, while intermediate-volume manufacturers (IVMs) can meet their entire requirement with credits from PHEVs.[51]

Vehicles earn between 0.7 and 4.0 credits each, depending on their characteristics (PHEV, BEV, or FCEV; all-electric range). To calculate the number of vehicles required, it therefore is necessary to project the characteristics of the future ZEV fleet.

This section of the Appendix provides an overview of the construction and operation of the ZEV compliance spreadsheet and the assumptions used. The spreadsheet is a modified version of the 2017 CARB ZEV Regulatory Calculator. The user must assign values to a number of variables. The spreadsheet then performs a series of calculations using those values to arrive at the expected number of ZEVs, by year, for 2018 through 2030. To provide inputs to the cost and emission calculations (performed by the Low Emission Vehicle/Zero Emission Vehicle Impact Tool described in the next section), the 2030 values are increased as needed through 2035, then continued at that level through 2050.

Variables

The primary variables employed are shown in Table 12. The spreadsheet includes other variables, not listed here, that control more detailed aspects of the calculation but are not modified from case to case.

Table 11: Variables Specified to Calculate the ZEV Credit Requirement

Variable	Values	Comments
Percentage requirements	Per current regulation or specified by user	User can vary total requirement as well as individual components.
BEV and PHEV business-as-usual sales	Zero or per user projection	User can specify any initial sales level and rate of increase.
FCEV business-as-usual sales	Zero or derived from CARB fuel cell and infrastructure deployment report[52]	User can specify any fraction of the projection or can flatline sales at 2015 level.
BEV range	Specified by user	User can define two BEV types. Range can stay constant or increase in any desired pattern.
PHEV range	Specified by user	User can define two PHEV types. Range can stay constant or increase in any desired pattern.
PHEV US06 capability	Yes or no	US06 capability means that the vehicle can meet the US06 test cycle, which includes higher acceleration and higher speeds.
Early credits	Include or do not include	User can specify the number of years for which early credits can be earned.
Proportional credits	Include or do not include	Proportional credits are calculated on the basis of New Mexico sales as a fraction of California sales. User can specify what fraction of the obligation can be met using proportional credits.
One-time award	Include or do not include	This is set to equal first compliance obligation.
LVM vehicle mix	Specified by user	User can specify LVM mix of vehicle types, by year.
IVM vehicle mix	Specified by user	User can specify IVM mix of vehicle types, by year.

Calculation Methodology

The starting point for the calculation is projected total manufacturer sales, separated into LVM and IVM. For purposes of these calculations, manufacturers are treated as a group rather than as individual entities, reflecting the fact that credits can be traded. For the next steps in the calculation, the spreadsheet does the following:

1. Derives annual sales for ZEV compliance purposes by applying the regulatory rules (e.g., average of specified prior years).
2. Multiplies annual sales for compliance purposes by the percentage requirements to determine the ZEV credit requirement, by year.
3. Determines the per-vehicle credit generated by each vehicle type based on the user-specified values for vehicle range.
4. Multiplies business-as-usual ZEV and PHEV sales (i.e., vehicles that manufacturers will produce regardless of their compliance requirement) by the credit earned per vehicle (step 3) to determine the number of credits generated.
5. Subtracts the credits earned via baseline sales (step 4) from the annual compliance requirement (step 2) to determine the interim remaining requirement.
6. If the case being run allows use of banked/proportional/one-time credits, determines if credits are available to fulfill the interim remaining requirement, then subtracts the banked credits used from the interim remaining requirement (step 5) to determine the final remaining requirement.
7. Using the assumed per-vehicle credit (step 3), determines the number of additional vehicles needed to satisfy the final remaining requirement (step 6).
8. Adds the number of baseline vehicles (step 4) and additional vehicles needed (step 7) to determine the total number of vehicles produced, by year.

The outputs of the model are reasonable scenarios but should not be viewed as firm predictions.

D. Design and Methodologies Employed in the LEV/ZEV Impact Tool

The Low Emission Vehicle/Zero Emission Vehicle Impact Tool (hereafter the LEV/ZEV Tool) is designed to help estimate the emission, fuel consumption, and economic impacts associated with the adoption of California LEV and ZEV program requirements, either in conjunction with or independent of the original GHG standards adopted by the U.S. EPA and, in equivalent form, by CARB.[53] The EPA maintains a set of modeling tools, generally referred to as the OMEGA model, that allow the estimation of impacts from such programs.[54] The EPA tools actually consist of a series of "preprocessors" (spreadsheets, Python scripts, Matlab executables), the OMEGA model itself, and spreadsheet-based post-processors denoted as the Inventory, Cost and Benefits Tool (ICBT). Adapting these tools to accurately model the impacts of local (i.e., state-level rather than national-level) LEV and ZEV program implementation is resource intensive and quite complex. The LEV/ZEV Tool is designed to produce impact estimates consistent with those of the OMEGA process but with substantially fewer and less complex resource demands.

The LEV/ZEV Tool accomplishes this by using the outputs of the EPA modeling undertaken for the original Obama 2025 GHG standards as a benchmark database, from which the impacts associated with similar emissions-influencing programs can be derived. Detailed emission, fuel consumption, and economic estimates derived through the EPA modeling serve as standardized inputs to the LEV/ZEV Tool. The LEV/ZEV Tool accomplishes such derivation by developing emission, fuel consumption, and

economic scaling factors for various parameters of influence (e.g., vehicle sales populations, vehicle miles of travel, incremental vehicle prices, fuel prices) and applying these factors as appropriate to tailor impacts estimated through the EPA benchmark modeling to accurately reflect local conditions. This process mimics what the EPA model would estimate if it were run explicitly for the same set of local conditions. In effect, the model estimates emission, fuel consumption, and economic impacts from the top down (starting with impact estimates derived for a set of national inputs and adjusting them, as appropriate, to a local level) rather than from the bottom up (building emission, fuel consumption, and economic impacts from a first-principles analysis of local conditions, emission factors, and travel estimates). Implemented properly, the two approaches will yield equivalent results.

The LEV/ZEV Tool implements a detailed set of algorithms to produce five comprehensive estimates: (1) consumer cost impacts, (2) societal cost impacts, (3) vehicle tailpipe emission impacts, (4) upstream emission impacts for vehicles with internal combustion engines (ICEs), and (5) upstream emission impacts for ZEVs. These impacts are derived from the benchmark EPA modeling estimates that serve as standardized inputs to the LEV/ZEV Tool but fully reflect the impacts associated with a set of local modeling parameters as specified by the LEV/ZEV Tool user.

Local Input Parameters: To estimate local LEV/ZEV program impacts, the LEV/ZEV Tool requires the following inputs to be defined:

- Annual national sales estimates for cars and light trucks (separately) from MYs 2024 through 2050. Generally these data are set at the values utilized in the EPA benchmark modeling, but the LEV/ZEV Tool allows alteration if forecasts evolve or the user has another reason to make a change.
- Annual local total sales estimates for cars and light trucks (separately) from MYs 2024 through 2050. These data serve as the basis for developing vehicle population–based scalers.
- Annual local ZEV sales estimates for cars and light trucks (separately) from MYs 2024 through 2035. These data serve as the basis for developing ZEV impact scalers. Inputs are allowed for five specific ZEV configurations: BEV150, BEV200, BEV250, PHEV20, and PHEV50.[55] ZEV sales shares in MYs after 2035 are held constant at MY 2035 values.
- The per-vehicle incremental ZEV cost relative to a 2015 ICE vehicle. These costs are specified for MYs 2024 through 2035 and are specified for the same five ZEV configurations for which sales estimates are provided. Costs can be set at user-specified values or at the values used for the benchmark EPA modeling. Costs are specified as incremental to a 2015 ICE vehicle because 2015 is the "zero cost" baseline year reflected in the benchmark EPA modeling data. Costs for model years after 2035 are held constant at MY 2035 values (i.e., no additional cost reduction due to learning is implemented for ZEVs after 2035).
- Fuel prices for gasoline and electricity in five-year intervals between 2020 and 2050. These prices can be set at user-specified values or at the values used for the benchmark EPA modeling. Fuel prices for intervening years are interpolated.
- The tax rate to be applied to ZEV purchases.
- A series of economic inputs defining such parameters as the discount rate to be applied to future cash flows, the period (term) associated with vehicle finance purchases, the interest rate associated with vehicle finance purchases, and the dollar year in which economic outputs are expressed.

- The baseline program assumed to be in effect locally, either (1) the EPA/CARB 2025 GHG standards, (2) the EPA 2020 GHG standards as proposed in the initial SAFE rule, or (3) the 2021–2026 GHG standards adopted in the final EPA SAFE rule (the rollback standards). In either case, a ZEV program is assumed not to be in effect under baseline conditions.
- The alternative program for which LEV/ZEV impacts are to be evaluated, again either the EPA/CARB 2025 GHG standards, the initial SAFE proposal, or the final SAFE rule. The user must also specify whether ZEV costs should be spread over all national vehicles or all local vehicles.
- A series of inputs defining the distribution of upstream sources of electricity used to power ZEVs. These inputs are defined in five-year intervals from 2020 to 2050 and specify the percentage of power generated from coal, natural gas, nuclear, residual oil, biomass, hydroelectric, geothermal, wind, solar, and other feedstocks. The distribution for intervening years is determined through interpolation. These data ideally should reflect not the current source distribution for the electric grid but rather the distribution for the additional power demand associated with ZEV use. The data can be set at user-specified values or at the values used for the benchmark EPA modeling.
- Inputs specifying whether the impacts of California Tier 4 emission standards should be estimated and whether vehicle manufacturers should be assumed to offset any ZEV-driven criteria pollutant reductions. Tier 4 emission standards reflect a potential future tightening of emission standards applicable to the California Low Emissions Vehicle program, under which California ZEV program requirements are codified.
- A series of inputs defining the stringency of California Tier 4 emission standards. These can be set at user-specified values or at default values included with the LEV/ZEV Tool.
- A set of inputs defining the format and units associated with LEV/ZEV Tool outputs.
- A set of parameters to allow the exclusion of all or part of the emission impact estimates. These parameters can, for example, be used to exclude upstream emission impacts that occur outside the local area.

Outputs: The LEV/ZEV Tool produces a series of outputs defining program impacts as follows:

- Per-vehicle incremental costs due to program adoption.
- Payback period and lifetime cash flow impacts associated with program adoption.
- Societal cost impacts for vehicle model years from 2024 through 2035 and calendar years 2024 through 2050. Calendar year–specific data for MYs 2036 and later are reported, but since these model years are not fully retired by the 2065 sunset date of the LEV/ZEV Tool, lifetime impacts for model years after 2035 are not reported. Similarly, data for MYs 2024 through 2050 in calendar years 2051 through 2065 are reported, but since model years after 2050 are not modeled, total impacts for calendar years after 2050 are not reported.
- Upstream electricity emission impacts for vehicle model years from 2024 through 2035 and calendar years 2024 through 2050. The same limitations regarding model years after 2035 and calendar years after 2050 (as described above for societal cost impacts) apply to reported totals. Impacts are estimated for volatile organic compounds (VOCs), carbon monoxide (CO), oxides of nitrogen (NOx), particulate matter smaller than 2.5 microns ($PM_{2.5}$), oxides of sulfur (SOx), carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), 1,3-butadiene, acetaldehyde, acrolein, benzene, and formaldehyde.

- Upstream ICE emission impacts for vehicle model years from 2024 through 2035 and calendar years 2024 through 2050. The same limitations regarding model years after 2035 and calendar years after 2050 (as described above for societal cost impacts) apply to reported totals. Impacts are estimated for the same emissions species as listed above for upstream electricity emissions, plus naphthalene.
- Vehicle tailpipe emission impacts for vehicle model years from 2024 through 2035 and calendar years 2024 through 2050. The same limitations regarding model years after 2035 and calendar years after 2050 (as described above for societal cost impacts) apply to reported totals. Impacts are estimated for the same emissions species as listed above for upstream electricity emissions.

Cost Impact Estimation: The cost impacts of LEV/ZEV adoption include several influences: (1) the incremental purchase price of ZEVs, (2) the incremental purchase price of ICEs if more stringent GHG standards apply, (3) incremental taxes associated with the change in vehicle purchase price, (4) incremental insurance costs associated with the change in vehicle purchase price, (5) incremental finance costs associated with the change in vehicle purchase price, (6) incremental maintenance costs associated with the change in vehicle technology, and (7) incremental fuel costs associated with the change in vehicle technology.

Given sensitivity to rapid developments in electric power train and battery technology, the incremental purchase price of ZEVs (per vehicle) is a LEV/ZEV Tool input, but users may specify the price assumptions employed in the EPA benchmark modeling at their discretion. Incremental ICE price impacts (per vehicle) are taken from EPA benchmark modeling. Per-vehicle taxes are scaled from EPA benchmark modeling impacts using purchase price and tax rate ratios. Per-vehicle insurance impacts are scaled from EPA benchmark modeling impacts using purchase price ratios. Per-vehicle finance cost impacts are calculated from purchase price impacts and user-input finance rate and length of loan. Per-vehicle maintenance cost impacts are scaled from EPA benchmark modeling using ratios developed for the local vehicle technology mix relative to the EPA benchmark modeling technology mix. Per-vehicle fuel cost impacts are scaled from those of the EPA benchmark modeling using ratios developed to reflect changes in GHG standards, changes in the ICE and ZEV population shares, and changes in local gasoline and electricity prices relative to those assumed in the EPA benchmark modeling. Cost impacts are aggregated from per-vehicle to local totals using local sales data. Impacts are estimated annually and by age, and future cash flows are discounted in accordance with user-specified inputs. Cost impacts are estimated from two vantage points: that of an individual consumer, and that of society at large.

Upstream Electricity Impact Estimation: Upstream electric grid emission impacts are a function of ZEV mileage and ZEV energy consumption per mile. The LEV/ZEV Tool calculates grid emissions by scaling EPA benchmark modeling estimates in accordance with local-to-EPA benchmark ratios of ZEV populations, aggregate energy consumption rates for the pool of ZEVs, and the distribution of feedstocks used to produce electricity. The per-vehicle mileage of ZEVs is assumed to be the same as that assumed in the EPA benchmark modeling. ZEV efficiency is assumed to be constant over the forecast period, so the LEV/ZEV Tool does not adjust ZEV mileage in response to the elasticity of vehicle miles of travel (VMT) with efficiency—in other words, VMT rebound is assumed to be zero for ZEVs.[56] This assumption is consistent with the benchmark EPA modeling. Note, however, that per-vehicle mileage does increase over time (independent of ZEV efficiency) in accordance with the time-based assumptions of the benchmark EPA modeling, so that upstream emissions will increase proportionally, even if the subject ZEV population is held constant.

Upstream ICE Impact Estimation: Upstream ICE emission impact estimation is more complex than upstream electricity impact estimation, as upstream ICE impacts are driven by four influences: (1) applicable GHG standards, (2) ICE VMT displaced by ZEVs, (3) ZEV effects on ICE fuel consumption, and (4) VMT rebound. Changes in fuel demand due to changes in vehicle fuel efficiency alter upstream emissions proportionally. ZEV sales displace travel that would otherwise be undertaken by ICE vehicles, thereby reducing upstream ICE emissions (and increasing upstream electricity-generation emissions). ZEVs have a lower GHG profile than ICEs, so increased ZEV sales provides a fleet average GHG benefit that is assumed to be "consumed" through higher ICE GHG emissions (and associated upstream emissions) elsewhere in the fleet than would otherwise be the case. Finally, the LEV/ZEV Tool assumes the same level of VMT rebound for changes in ICE fuel efficiency as is assumed in the EPA benchmark modeling. The net effect of all four influences is reflected in the upstream emission impacts estimated by the LEV/ZEV Tool. As with all emission impact estimates, the LEV/ZEV Tool calculates upstream ICE impacts by scaling EPA benchmark modeling estimates. Scaling ratios are developed for changes in ICE fuel efficiency (due to GHG standards and ZEV displacement), changes in the ICE population (due to ZEV displacement), and changes in ICE VMT profiles (due to VMT rebound and ZEV displacement).

Vehicle Tailpipe Emission Impact Estimation: ZEV tailpipe emissions are zero by design.[57] While ICE tailpipe emissions are subject to the same four influences as discussed for upstream ICE impacts (changes in standards, ICE VMT displacement, ZEV effects on fuel consumption, and VMT rebound), there are nuances that do not come into play for upstream emission impacts that must be addressed. GHG standards are based on fleet average emissions, but compliance with criteria emission standards is per-vehicle based. Thus, while vehicle manufacturers are able to compensate for the reduced GHG emissions of ZEVs by adjusting fleet mixes or altering vehicle fuel consumption profiles (referred to elsewhere as emission averaging), they generally cannot do the same with regard to criteria emissions. As a result, the LEV/ZEV Tool assumes that fleetwide criteria emissions change in accordance with ZEV displacement (while GHG emissions do not).[58] Additionally, the LEV/ZEV Tool allows the user to estimate the impacts of California Tier 4 emission standards on vehicle tailpipe emissions. Impacts can be estimated for VOCs, CO, NOx, $PM_{2.5}$, benzene, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein, CH_4, N_2O, and SOx. As with all emission impact estimates, the LEV/ZEV Tool calculates tailpipe emission impacts by scaling EPA benchmark modeling estimates. Scaling ratios are developed for changes in ICE fuel efficiency (due to GHG standards and ZEV displacement), changes in the ICE population (due to ZEV displacement), changes in ICE VMT profiles (due to VMT rebound and ZEV displacement), and changes in criteria pollutant emission standards (due to California Tier 4 standard adoption).

E. Detailed Results

This section provides additional supporting detail for summary results presented in the text.

Table 12: Annual and Cumulative Net GHG Impacts, by Scenario, Million Tons

		Annual	Cumulative
Clean Car Rule vs. Federal Rule	2030	-0.01	-0.02
	2040	0.01	-0.05
	2050	0.02	0.11
Clean Car Rule vs. SAFE Rule	2030	0.27	0.82
	2040	0.68	5.89
	2050	0.82	13.56
Greater ZEV Deployment	2030	0.27	0.53
	2040	2.84	15.46
	2050	4.37	53.68

Table 13: Detailed Annual and Cumulative GHG Impacts, Clean Car Rule

		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Tailpipe	Annual	-0.03	-0.07	-0.13	-0.20	-0.27	-0.34	-0.41	-0.48	-0.54	-0.61
	Cumulative	-0.03	-0.10	-0.22	-0.42	-0.70	-1.04	-1.45	-1.93	-2.47	-3.08
ICE Upstream	Annual	-0.71	-1.55	-2.65	-3.76	-4.85	-5.91	-6.94	-7.92	-8.87	-9.77
	Cumulative	-0.71	-2.26	-4.91	-8.67	-13.51	-19.42	-26.36	-34.28	-43.15	-52.92
EV Upstream	Annual	1.44	3.29	5.60	8.36	11.05	11.43	10.88	12.50	14.04	15.50
	Cumulative	1.44	4.74	10.34	18.69	29.74	41.17	52.05	64.55	78.59	94.09
Total	Annual	0.71	1.67	2.82	4.40	5.93	5.18	3.53	4.10	4.63	5.12
	Cumulative	0.71	2.38	5.20	9.60	15.53	20.71	24.24	28.34	32.97	38.09

		2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Tailpipe	Annual	-0.67	-0.73	-0.78	-0.83	-0.88	-0.93	-0.96	-1.00	-1.03	-1.06
	Cumulative	-3.75	-4.47	-5.26	-6.09	-6.97	-7.90	-8.86	-9.86	-10.89	-11.95
ICE Upstream	Annual	-10.61	-11.40	-12.12	-12.78	-13.36	-13.88	-14.33	-14.73	-15.08	-15.39
	Cumulative	-63.54	-74.94	-87.06	-99.84	-113.20	-127.08	-141.41	-156.14	-171.22	-186.61
EV Upstream	Annual	16.82	18.01	19.02	19.81	0.33	0.33	0.34	0.33	0.32	0.31
	Cumulative	110.92	128.92	147.94	167.75	168.08	168.41	168.75	169.08	169.41	169.72
Total	Annual	5.54	5.88	6.11	6.20	-13.91	-14.47	-14.96	-15.40	-15.79	-16.14
	Cumulative	43.63	49.51	55.63	61.82	47.91	33.44	18.48	3.08	-12.71	-28.84

		2046	2047	2048	2049	2050
Tailpipe	Annual	-1.09	-1.11	-1.13	-1.15	-1.17
	Cumulative	-13.04	-14.15	-15.29	-16.44	-17.61
ICE Upstream	Annual	-15.67	-15.91	-16.14	-16.34	-16.53
	Cumulative	-202.28	-218.19	-234.33	-250.67	-267.21
EV Upstream	Annual	0.30	0.28	0.26	0.23	0.21
	Cumulative	170.02	170.31	170.56	170.80	171.00
Total	Annual	-16.45	-16.74	-17.01	-17.26	-17.50
	Cumulative	-45.30	-62.04	-79.05	-96.31	-113.81

Table 14: Annual and Cumulative NOx Plus VOC Reductions, by Scenario, Tons

		Annual	Cumulative
Clean Car Rule vs. Federal Rule	2030	19	51
	2040	95	607
	2050	128	1,765
Clean Car Rule vs. SAFE Rule	2030	181	541
	2040	493	4,149
	2050	610	9,824
Greater ZEV Deployment	2030	128	290
	2040	1,440	7,355
	2050	2,366	27,498

Table 15: Net Lifetime Savings Per Vehicle, Cash Purchase

Incremental Per-Vehicle Costs--Purchase	MY 2026			MY 2030		
	Car	Truck	Fleet	Car	Truck	Fleet
Vehicle (Purchase + Tax)	$47	$52	$50	-$106	-$90	-$97
Lifetime Insurance + Maintenance	-$30	-$24	-$27	-$86	-$75	-$79
Lifetime Fuel	-$8	-$4	-$6	-$47	-$66	-$58
Lifetime Net Cost	$9	$23	$17	-$238	-$231	-$234

Table 16: Net Monthly Savings Per Vehicle—Financed

Net Change in Monthly Cost over Life of Loan	MY 2026			MY 2030		
	Car	Truck	Fleet	Car	Truck	Fleet
Loan Payment, Insurance, Maintenance	$1	$1	$1	-$2	-$2	-$2
Fuel	$0	$0	$0	$0	$0	$0
Net Cost	$1	$1	$1	-$2	-$2	-$2

XII. Endnotes

[1] https://www.env.nm.gov/air-quality/

[2].Executive Order 2019-003

[3] Press Release, LEV and ZEV Adoption

[4] New Mexico Climate Strategy--2020 Progress and Recommendations

[5] https://www.cabq.gov/sustainability/documents/2009-climate-action-plan.pdf

[6] City Resolution R-19-187

[7] https://www.cabq.gov/sustainability/documents/2021-climate-action-plan.pdf

[8] https://www.cabq.gov/mayor/news/mayor-tim-keller-pledges-to-meet-paris-climate-agreement-goals

[9] Climate Action Plan 2021, op. cit., p. 8.

[10] Regulations for Greenhouse Gas Emissions

[11] Because the stricter federal standards will supersede the MY 2026 ACC I standards in New Mexico, ACC I will have no GHG tailpipe impact (unlike the case when ACC I was compared to the SAFE rule). The federal standards assume some ZEV penetration but do not have a ZEV requirement, so the ZEV portion of ACC I remains operative and this report quantifies those benefits.

[12] https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-ii The Clean Car Rule rulemaking is adopting the ACC I rule, the ZEV component of which currently applies to model years 2018 through "2025 and subsequent model years" but will be cut off at model year 2025 when ACC II is finalized in California. Due to lead time constraints New Mexico's ACC I ZEV sales requirements cannot be enforced until model year 2026, but regulatory incentives for early ZEV placements in model years 2023 through 2025 will be in force. Discussions are underway as to the operation of the ZEV program in model year 2026 in New Mexico and a number of other states in similar circumstances, and the issue will be resolved as part of California's ACC II adoption.

[13] The program descriptions provided here and in the Appendix are adapted from the California Air Resources Board (hereinafter CARB), "Advanced Clean Cars Program," https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/about (accessed March 10, 2020).

[14] The EPA has identified six pollutants as "criteria" air pollutants, so named because the agency regulates them by developing human health–based and/or environment-based criteria (science-based guidelines) for setting permissible levels. These six pollutants are carbon monoxide, lead, nitrogen oxides, ground-level ozone, particle pollution (often referred to as particulate matter), and sulfur oxides. Centers for Disease Control and Prevention, "Air Quality: Air Pollutants," last reviewed September 4, 2019, https://www.cdc.gov/air/pollutants.htm.

[15] The regulation requires that manufacturers "deliver for sale" the required number of vehicles. The projected impacts shown in this report assume that all ZEVs delivered for sale are purchased by consumers and enter the New Mexico vehicle fleet. This is consistent with how the regulation has been implemented in other states.

[16] For particulate matter, the impacts of which occur in the immediate vicinity of the tailpipe, there are specific per-vehicle emission standards.

[17] The sales total used to determine the credit requirement is the average of total sales over a three-year period beginning four years before the applicable model year. So, for example, the sales total used for the model year 2026 credit requirement will be the average of total sales in the 2022, 2023, and 2024 model years.

[18] BEVs must have a minimum electric range of 50 miles to earn credit. For BEVs, ZEV credit = 0.01 x Urban Dynamometer Driving Schedule (city cycle) range, plus 0.5, up to a maximum value of 4.0. PHEVs (referred to as TZEVs in the regulation) must have a minimum electric range of 10 miles. For PHEVs, ZEV credit = 0.01 x all electric range + 0.3, up to a maximum value of 1.1. PHEVs can earn an additional 0.2 credit if they are able to meet the

US06 test cycle, which includes higher acceleration and higher speeds. See California Code of Regulations, *Zero-Emission Vehicle Standards for 2018 and Subsequent Model Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles*, 13 CCR § 1962.2, https://govt.westlaw.com/calregs/Document/I505CA51BB0AD454499B57FC8B03D7856?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)

[19] As noted in footnote 12, the status of MY 2026 in New Mexico and other states that will not have ACC II in place in that year will be determined during the California ACC II rulemaking.

[20] The current cases are summarized at http://climatecasechart.com/climate-change-litigation/case/texas-v-epa-2/

[21] CARB, "ZEV Regulatory Calculator," https://ww2.arb.ca.gov/resources/documents/zev-regulatory-calculator (accessed March 10, 2020).

[22] Early action credits are credits earned by manufacturers for ZEV placements in MYs 2023 (partial year), 2024 and 2025, prior to the first enforcement date of the rule.

[23] Results shown for New Mexico today based on Zip Code 87101 (Albuquerque). Results shown for Future Cleaner Grid taken from Zip Code 95818 (Sacramento). https://www.fueleconomy.gov/

[24] For technical reasons manufacturers generally take advantage of including ZEVs in the fleet average for GHG tailpipe emissions but not for other pollutants.

[25] The CARB staff proposal for ACC II criteria pollutants phases out emission averaging during model years 2026-2029. Manufacturers are able to include 60% of ZEVs and TZEVs in the fleet average in MY 2026, 30% in MY 2027, and 15% in MY 2028. We expect that the LEV IV GHG standards, when released, will do the same. Those percentages are applied in this analysis. https://ww2.arb.ca.gov/sites/default/files/2021-12/draft%20low%20emission%20vehicle%20regulation1961.4%20posted.pdf

[26] https://greet.es.anl.gov/

[27] PNM 2020-2040 Integrated Resource Plan Full Report, https://www.pnm.com/documents/28767612/31146374/PNM-2020-2040-IRP-REPORT-corrected-Nov-4-2021.pdf/7f2f46c4-f0a9-b936-715c-4b02e3586ce9?t=1648479305606

[28] Global warming potential values for methane and nitrous oxide are taken from Greenhouse Gas Protocol, "Global Warming Potential Values," https://www.ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf (accessed March 20, 2020).

[29] New Mexico Greenhouse Gas Emissions Inventory and Forecast, Energy and Environmental Economics, Inc. (E3), October 27, 2020, https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjY-JuCqo33AhUCDkQIHQ0iAMAQFnoECAYQAQ&url=https%3A%2F%2Fcnee.colostate.edu%2Fwp-content%2Fuploads%2F2020%2F10%2FNew-Mexico-GHG-Inventory-and-Forecast-Report_2020-10-27_final.pdf&usg=AOvVaw3ycG9zyA44lEbeRcgNVMHE

[30] U.S. Environmental Protection Agency (hereinafter EPA), "Health Effects of Ozone in the General Population," https://www.epa.gov/ozone-pollution-and-your-patients-health/health-effects-ozone-general-population (accessed March 31, 2020).

[31] EPA, "Health and Environmental Effects of Particulate Matter (PM)," https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm (accessed March 31, 2020).

[32] EPA, "Health and Environmental Effects of Hazardous Air Pollutants," https://www.epa.gov/haps/health-and-environmental-effects-hazardous-air-pollutants (accessed March 31, 2020).

[33] For the fleet average cost calculation all costs and savings are spread across total new car sales in New Mexico. The costs and savings experienced on specific individual vehicles will vary.

[34] Melinda Zabritski, *Automotive Industry Insights Finance Market Report Q3 2020*, Experian, November 23, 2020, https://www.experian.com/content/dam/marketing/na/automotive/quarterly-webinars/credit-trends/q3-2020-safm.pdf.

[35] David L. Greene and Jilleah G. Welch, *The Impact of Increased Fuel Economy for Light-Duty Vehicles on the Distribution of Income in the United States*, Baker Center for Public Policy, September 2016, http://bakercenter.utk.edu/wp-content/uploads/2016/09/Equity-Impacts-of-Fuel-Economy-Report_final.pdf.

[36] Data from Autotrader.com search of dealerships in Los Angeles, San Jose, Sacramento, Albuquerque, and Santa Fe. Accessed on February 20, 2022.

[37] PNM 2020-2040 Integrated Resource Plan Full Report, op. cit.

[38] Jason Frost, Melissa Whited, and Avi Allison, *Electric Vehicles Are Driving Electric Rates Down*, Synapse Energy Economics, updated June 2019, 3, https://www.synapse-energy.com/sites/default/files/EV-Impacts-June-2019-18-122.pdf.

[39] Environmental Coalition, *Rebuttal Prehearing Statement in the Matter Regarding Proposed Addition of Regulation Number 20*, 2018, 26–30.

[40] Charles M. Shulock, *Comparison of Automobile Sales in States That Have Adopted a Zero Emission Vehicle Regulation Versus States That Have Not Adopted*, Shulock Consulting, May 7, 2018, 2, Shulock Consulting Reports, Comparison of Auto Sales.

[41] Northeast States for Coordinated Air Use Management, "Mobile Sources," https://www.nescaum.org/focus-areas/mobile-sources (accessed March 20, 2020).

[42] The LEV analysis can be found at https://www.arb.ca.gov/regact/2012/leviiighg2012/leviiighg2012.htm and the ZEV analysis at https://www.arb.ca.gov/regact/2012/zev2012/zev2012.htm

[43] The Midterm Review Report can be found at https://ww2.arb.ca.gov/resources/documents/2017-midterm-review-report

[44] 42. U.S.C. § 7505, "New Motor Vehicle Emission Standards in Nonattainment Areas," 2010, https://www.law.cornell.edu/uscode/text/42/7507.

[45] For 2016 transfers, see CARB, "2016 Zero Emission Vehicle Credits," https://ww2.arb.ca.gov/sites/default/files/2019-03/2016-zev-credits.pdf (accessed March 15, 2020). For 2017 transfers, see CARB, "2017 Zero Emission Vehicle Credits," https://ww2.arb.ca.gov/sites/default/files/2020-01/2017_zev_credits_ac.pdf (accessed March 15, 2020). For 2018 transfers, see CARB, "2018 Zero Emission Vehicle Credits," https://ww2.arb.ca.gov/sites/default/files/2020-01/2018%20ZEV%20Credits_ac.pdf (accessed March 15, 2020). For 2019 transfers see CARB, "2019 Zero Emission Vehicle Credits," https://ww2.arb.ca.gov/sites/default/files/2020-10/2019_zev_credit_annual_disclosure.pdf (accessed January 20, 2021).

[46] https://www.ev-volumes.com/

[47] https://assets.bbhub.io/professional/sites/24/BNEF-Zero-Emission-Vehicles-Factbook_FINAL.pdf

[48] https://evstatistics.com/2021/03/number-of-ev-models-available-in-the-us-to-triple-by-2025/

[49] Peter Valdes-Dapena, "The Electric Pickup Wars Are About to Begin," CNN Business, last updated February 14, 2020, https://www.cnn.com/2020/02/14/cars/electric-pickup-truck-wars/index.html.

[50] ZEV and PHEV sales numbers taken from https://www.autosinnovate.org/resources/electric-vehicle-sales-dashboard ; ZEV and PHEV market share taken from https://www.autosinnovate.org/posts/papers-reports/Get%20Connected%20EV%20Quarterly%20Report%20Q4.pdf

[51] Large-volume manufacturers are BMW, Fiat Chrysler, Ford, General Motors, Honda, Hyundai, Kia, Mercedes, Nissan, Toyota, and Volkswagen. Intermediate-volume manufacturers are Jaguar Land Rover, Mazda, Subaru, and Volvo. CARB, "2018 Zero Emission Vehicle Credits."

[52] CARB, *2019 Annual Evaluation of Fuel Cell Electric Vehicle Deployment & Hydrogen Fuel Station Network Development*, July 2019, https://ww2.arb.ca.gov/sites/default/files/2019-07/AB8_report_2019_Final.pdf.

[53] EPA, "Final Determination on the Appropriateness of the Model Year 2022–2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards Under the Midterm Evaluation," January 2017, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100QQ91.pdf.

[54] OMEGA stands for Optimization Model for Reducing Emissions of Greenhouse Gases from Automobiles. See EPA, "Optimization Model for Reducing Emissions of Greenhouse Gases from Automobiles (OMEGA)," last revised November 30, 2010, https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=OTAQ&dirEntryID=215026.

[55] BEVxxx indicates a battery electric vehicle (a vehicle without an internal combustion engine) with a driving range of xxx miles. PHEVxx indicates a plug-in hybrid electric vehicle (an electric vehicle with a supplemental, range-extending internal combustion engine, whose battery can be recharged from off-board power sources) with an all-electric driving range of xx miles.

[56] This is a conservative assumption from an emission impact standpoint because decreases in upstream emissions due to improved ZEV efficiency will be greater than any offsetting emission increases due to any increase in travel resulting from that improved efficiency.

[57] From a greenhouse gas compliance standpoint, ZEV tailpipe emissions are not treated as zero. This is to account for upstream emissions that will otherwise not be recognized. Since ZEV-related upstream emissions are accounted for explicitly in both the LEV/ZEV Tool and the benchmark EPA modeling, tailpipe emissions are properly modeled as zero.

[58] The LEV/ZEV Tool provides users with an input switch to "turn off" the criteria emissions assumption if they so desire. If this switch is turned off, the LEV/ZEV Tool will estimate ICE tailpipe criteria emission impacts as if they were unchanged on a fleet-average basis.