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MEMORANDUM

TO: Theresa Smith
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THROUGH: Angela D. Marconi, P.E. *ADM*
Director

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Program Administrator

James Coverdale *JC*
Program Manager

FROM: Kyle Krall *KAK*
Responsible Staff Member

DATE: September 15, 2023

SUBJECT: Technical Response Memorandum - 7 DE Admin. Code 1140, Delaware Low
Emission Vehicle

You presided over a public hearing on Wednesday, April 26, 2023, beginning at 6:00 p.m. via the virtual ZOOM meeting format with an in-person viewing option located at the Kent County Levy Court Building in Dover, DE. The subject of the public hearing was to propose revisions to 7 DE Admin. Code 1140 – Low Emission Vehicle Program.

The Department of Natural Resources and Environmental Control (Department) accepted formal public comments on the regulatory proposal from April 1, 2023, through May 26, 2023. During this 56-day public comment period, formal comments were accepted through our online public comment tool, by mail, email, and by testimony provided at a public hearing held on April 26, 2023.

The Department received 2,469 comment submissions. The scope of the comments varied from support for the entire regulation to comments on specific aspects of the regulation. Comments received before the public comment period (April 1 – May 26) were submitted by the Department at the public hearing on April 26, 2023, as Exhibits 10-12. Responses to those comments were addressed in the Department’s Technical Support Document (Exhibit 15).

In this document, we have organized the comments into the following sections:

I. Support for Rulemaking

II. Opposition to Rulemaking

III. Process and Policy Concerns

IV. Modes of Transportation

V. Cost and Affordability

VI. Infrastructure Impacts

VII. Environmental Impacts

VIII. Economics and Security

IX. People and Employment

X. Zero Emission Vehicle Technology Concerns

XI. Rural Areas

I. Support for Rulemaking

Summary: A number of commenters expressed support for adopting 7 DE Admin. Code 1140 as proposed. Many of the commenters cited the regulation's role in reducing Delaware's climate impacts, as well as benefits to air quality and public health, especially for overburdened communities.

Response: Commentors supported the regulation because it reduces pollution and will improve air quality.

The Department's purpose in adopting the proposed regulations is to make progress towards its scientifically driven greenhouse gas emission goals¹ and to meet Delaware's obligations to attain the federal health-based ozone standards.

Criteria pollutants from mobile sources account for 75% of the NOx emissions in the state, and the structure of the Clean Air Act means that Delaware cannot regulate emissions from motor vehicles except by adopting standards for motor vehicles identical to standards adopted by California, for which California has received a waiver. Adopting this regulation is a critical step in reducing the mobile source pollution, which is necessary to achieving healthy air quality in Delaware.

This past legislative session, Delaware's General Assembly passed the Climate Change Solutions Act¹. The legislation establishes mid-range and long-range goals for reducing Greenhouse Gas emissions in Delaware by 2030 and 2050. Transportation is the nation's largest source of gases, accounting for 27 percent of emissions. Adoption of this regulation is an important step toward achieving these required greenhouse gas reductions in Delaware. The proposed regulation allows Delaware to meet our environmental goals while giving the market time to adjust and produce zero emission vehicles (ZEV) that will meet the needs of all of Delaware's residents.

See Technical Support Document Section 2 - Delaware's Air Quality and Section 10 – Health Benefits for more information:

<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

¹ The Delaware General Assembly adopted HB 99 – The Climate Solutions Act of 2023 on June 27, 2023. The Bill was signed into law by Governor Carney on August 3, 2023. See [Bill Detail - Delaware General Assembly](#)

II. Opposition to Rulemaking

Summary: Other commenters opposed adopting the proposed amendments to 7 DE Admin. Code 1140 expressing either broad based opposition or citing specific issues or concerns.

Response: Despite general opposition to Delaware adopting the motor vehicle rules, commentors did not point to any other equivalent mechanisms that the Department could use to reduce air pollution and greenhouse gas emissions. Specific issues and concerns raised by comments, are addressed below.

III. Process and Policy Concerns

1. Following California

Summary: Commenters objected to Delaware adopting California's Advance Clean Car II (ACC) vehicle emission standards. Some wondered why the Department did not create its own standards instead of adopting regulations from California. Some said alternative solutions would be better. Other commenters expressed concern about following regulations created by another state, while others expressed general opposition to following any regulation created by California's government.

Response: Delaware is adopting a regulation identical to California's because it is the only way that Delaware can adopt vehicle emissions standards. Section 177 of the federal Clean Air Act² requires states to either follow federal regulations or adopt an identical version of California's more stringent standards, provided the California standards have been approved by the U.S. Environmental Protection Agency (EPA) under Section 209 of the Clean Air Act. States are not allowed to create their own emission standards.

In March 2022, Delaware Governor John Carney directed the Department of Natural Resources and Environmental Control (Department) to begin the regulatory development process for the adoption of ZEV standards established by the California Air Resource Board (CARB) also known as the Advanced Clean Car Program (ACCII). In doing so, the Governor was acting on Delaware's Climate Action Plan³ recommendation to reduce greenhouse gas emissions from motor vehicles as well as further demonstrating Delaware's commitment to achieve a 26-28% reduction in emissions as part of our engagement with the U.S. Climate Alliance.⁴

There is no legal impediment to Delaware adopting a regulation identical to a regulation adopted in another state. To do so, Delaware just needs to follow its statutorily established process, including the Administrative Procedures Act as codified in 29 *Del. C.* Chapter 101, to propose and adopt the regulation. Indeed, over a dozen other states have also adopted California's standards under Section 177 of the Clean Air Act.

²42 U.S.C. §7507. <https://www.govinfo.gov/content/pkg/USCODE-2013-title42/html/USCODE-2013-title42-chap85-subchapIpartD-subpart1-sec7507.htm>

³ DNREC, Delaware's Climate Action Plan, <https://documents.dnrec.delaware.gov/energy/Documents/Climate/Plan/Delaware-Climate-Action-Plan-2021.pdf>

⁴ DNREC, Governor Carney Releases Plan Outlining Delaware's Path Forward on Climate Change, <https://news.delaware.gov/2021/11/04/governor-carney-releases-plan-outlining-delawares-path-forward-on-climate-change/#:~:text=Through%20Governor%20Carney's%20commitment%20to,and%20organizations%20from%20across%20Delaware.>

See Technical Support Document Section 3 – Overview of Department’s Regulatory Authority for more information:

<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

2. Opposition to a Zero Emission Vehicle (“ZEV”) Program

Summary: Commenters expressed opposition to the rulemaking, arguing that they should have the freedom to choose a vehicle that best suits their needs. Many expressed that the regulation is an overreach of government control and an imposition on freedom. Others claimed that any increase in ZEV sales should come through private markets, not government standards.

Response: The regulation as proposed would require automakers to deliver for sale 35% of new vehicles in model year 2027 that meet the ZEV standards, and the ZEV percentage increasing annually until it reaches 100% in 2035. However, the regulation does not require that anyone purchase an electric vehicle or force anyone to relinquish their gasoline or diesel-powered vehicle. We are aware that there has been public confusion on this point and offer the following points to clarify the facts on this regulation:

- No additional restrictions are placed on currently owned vehicles, and individuals will not be forced to purchase a ZEV or give up their current vehicle. The Department is proposing ZEVs to make up an increasing share of the new vehicle market over the next 12 years.
- New gasoline- and diesel-powered vehicles will continue to be legal for sale in Delaware through model year 2034. By this year, it is widely expected that advancements in technology, supply chains, and battery cost/performance will allow ZEVs to eclipse conventionally powered vehicles in affordability, range, and performance, even leaving their environmental benefits aside. Because of the increase in use of ZEV vehicles, there will also be a much broader network of charging stations.

See Technical Support Document Section 9 Complementary Policies for more information on charging: <https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

- While we expect battery-electric vehicles to make up the bulk of new light-duty vehicle sales, plug-in hybrids (PHEVs) and fuel cell electric vehicles (FCEVs) may better fit the needs of drivers that regularly drive extreme distances, need additional power for heavy towing, frequently drive off-road or in very remote areas, or have other unique use cases.
- This proposed regulation only applies to new light-duty vehicles weighing under 8,500 pounds and medium duty vehicles up to 14,000 pounds beginning with model year 2027.

Thus, drivers across the state will still have a variety of vehicle models to choose from that meet a diverse range of needs and preferences.

While ZEVs are gaining popularity through the private market, this rulemaking allows air quality to accelerate the transition in a way that is both convenient and affordable for residents and allows the state to meet its climate and environmental goals.

- First, it will keep Delaware on track to meet its scientifically driven greenhouse gas emission limits, which require the state to reach “net zero” emissions by 2050.⁵ It is critical that we take steps as soon as practical to reduce vehicle pollution, given that transportation is Delaware’s largest single source of greenhouse gas emissions and ozone pollution. Approximately 75% of ozone forming pollution is emitted by the transportation sector. Adopting this regulation allows Delaware to immediately begin reducing emissions while giving time for the market to adjust and produce ZEVs that will meet the needs of all of Delaware’s residents.
- Second, it will provide a market signal to manufacturers to further increase ZEV production and the types of ZEVs offered to potential buyers in Delaware. Since manufacturers will sell ZEVs to a more diverse group of buyers, they will be incentivized to produce models that are affordable and meet unique use cases, such as towing and long-range trips.

3. Public Voting

Summary: Commenters expressed frustration that the Department was implementing these regulations without a public vote or legislation and asked that the Department send the regulation to voters for final approval.

Response: The Department does not have the ability to authorize or implement a statewide vote on approval of this regulation, so this issue is outside the scope of the rulemaking. The Department has been granted authority to regulate and reduce air pollution and air contaminants from legislation passed by the Delaware General Assembly.

Statutes can be found in the Technical Support Document in Section 3 Overview of the Department’s Regulatory Authority:

<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

⁵ Climate Change Solutions Act,

<https://legis.delaware.gov/BillDetail/130272#:~:text=This%20Act%2C%20known%20as%20the,change%20due%20to%20anthropogenic%20greenhouse>

4. Department Lacks Authority to Adopt the California Vehicle Emission Standards (Legal Concerns)

Summary: Commenters raised various legal objections to this rulemaking. Most claimed that the proposed regulation violates the U.S. Constitution or claimed that it is illegal to mandate citizens to purchase a certain type of vehicle.

Response: Delaware has authority to adopt California's vehicle emission standards through Sections 177 and 209 of the Clean Air Act.⁶ Section 209 allows California to adopt its own vehicle emission standards, pending approval of a waiver from the EPA, and Section 177 allows states other than California to adopt the California motor vehicle standards approved by the EPA. As noted above, Delaware's General Assembly delegated the Department the authority to propose and adopt regulations to reduce air pollution in 7 *Del. C.* Chapter 60.

Comments were also heard that the Department's proposal was unconstitutional and required legislation to be adopted. Again, the Delaware Code as established by the General Assembly in Title 7 Chapters 60 and 67 provides the Department the responsibility of proposing and adopting measures via regulations to reduce air pollution from motor vehicles. The Department initially adopted the California Low Emission Vehicle regulations (7 *Del. Admin. Code* 1140) in 2010⁷ and further amended in 2013,⁸ 2018,⁹ and 2019.¹⁰

These proposed amendments are necessary to address the recent amendments California adopted to the Advance Clean Car vehicle emission standards. The Clean Air Act requires states who choose to adopt the stronger California emission standards over the federal vehicle standards, that the state's regulatory language be identical to California's for a given model year in order to not establish a third set of vehicle emission standards. The Department has proposed to adopt the California amendments by incorporating by reference the appropriate sections of the California Code of Regulations (see Table 1 of the proposed amendments to 7 *DE Admin. Code* 1140).

The EPA approved California's waiver for the Advanced Clean Cars I regulations on March 14, 2022. On May 25, 2023, CARB submitted a request that EPA grant a waiver of preemption for the Advanced Clean Cars II regulations. EPA must approve waivers before the ACC can be enforced.

5. EPA has no authority to regulate carbon dioxide emissions

Summary: One commenter suggested that U.S. Supreme Court decision in *West Virginia v. EPA* prohibits EPA from regulating carbon dioxide emissions without an express Act of Congress. The commenter infers that the federal courts decision also applies to Delaware and since there is

⁶ U.S. EPA Clean Air Act overview. <https://www.epa.gov/clean-air-act-overview/clean-air-act-title-i-air-pollution-prevention-and-control-parts-through-d>

⁷ Secretary's Order 2010-A-0039. Published in the Delaware Register on December 1, 2010.

⁸ Secretary's Order 2013-A-0055. Published in the Delaware Register on December 1, 2013.

⁹ Secretary's Order 2018-A-007. Published in the Delaware Register on March 1, 2018.

¹⁰ Secretary's Order 2019-A-0059. Published in the Delaware Register on May 1, 2019.

no federal law to comply with to regulate greenhouse gas emissions, there is no need for Delaware do so.

Response: On June 30, 2022, the United States Supreme Court¹¹ ruled that EPA's Clean Power Plan regulation of existing power plants under Section 7411(d) was subject to the major questions doctrine and that Congress did not grant the EPA authority to regulate emissions from existing plants in the manner EPA chose based on generation shifting mechanisms. The decision does not impact whether EPA may continue to regulate greenhouse gas emissions at existing power plants through emissions reduction technologies.¹² The Court's decision in this case was not whether or not EPA has the authority to regulate greenhouse gas emissions from power plants, but whether the mechanism EPA chose was within its established authority under Section 111(d) of the Clean Air Act. This case does not impact Delaware's ability to adopt the proposed regulation.

6. Unconstitutional Rulemaking that Requires Legislation or Legislative Approval (Legal Concerns)

Summary: Some commenters stated their belief that the Department's adoption of the California vehicle emission standards was unconstitutional.

Response: The Department maintains that nothing in the Constitution of the United States or Delaware's Constitution prohibits it from adopting the proposed vehicle emission standards.

Section 202 of the Clean Air Act requires EPA to prescribe and periodically update emissions standards applicable to air pollution from motor vehicles. Section 209 of the Clean Air Act allows California to adopt its own vehicle emission standards, pending approval of a waiver from the EPA. Once California has obtained a waiver from EPA, Section 177 of the Clean Air Act allows states other than California to enforce motor vehicle standards identical to those for which EPA granted the waiver.

Under their powers given by the Delaware Constitution, Delaware's General Assembly granted to the Department the authority to propose and adopt regulations to reduce air pollution and air contaminants. Air contaminant is defined in 7 *Del. C.* § 6002(3) and 7 *Del. C.* §6043(3) expressly states that carbon dioxide is an air contaminant as defined in §6002(3).

Comments were also received that the Department's proposal was unconstitutional and required legislation to be adopted. Again, the Delaware Code as established by the General Assembly in Title 7 Chapters 60 and 67 provides the Department the responsibility of proposing and adopting measures via regulations to reduce air pollution from motor vehicles. The Department initially

¹¹ West Virginia v. Environmental Protection Agency, 597 U.S. ____ (2022) Page 2-6
https://www.supremecourt.gov/opinions/21pdf/20-1530_new_1537.pdf

¹² Harvard, Supreme Court Embraces the Major Questions Doctrine as Limiting but Leaving the Door Open for Power Sector GHG Regulations - Environmental & Energy Law Program - Harvard Law School, 7/1/2022
<https://eelp.law.harvard.edu/2022/07/supreme-court-embraces-the-major-questions-doctrine-as-limiting-but-leaving-the-door-open-for-power-sector-ghg-regulations/>

adopted the California Low Emission Vehicle regulations (7 Del. Admin. Code 1140) in 2010¹³ and further amended in 2013,¹⁴ 2018,¹⁵ and 2019.¹⁶

7. 2035 Timeline

Summary: Many commenters expressed concerns about the 2035 target date for phasing out the sale of new gasoline- and diesel-powered cars due to a perceived lack of infrastructure planning and other factors. Some commenters also expressed significant concerns with the technology of Zero Emission Vehicles.

Response: The Department recognizes that this appears to be a short timeline for transitioning to new vehicle technologies. Based on the available evidence and industry trends, we believe that the 2035 timeline is achievable and will allow Delaware to meet its scientifically driven climate goals while still giving drivers the freedom to purchase and use vehicles that meet their transportation needs.

Department staff have planned for program implementation and expects to work with staff from the Northeast States for Coordinated Air Use Management (NESCAUM) and programmatic staff from other 177 states using tracking tools developed by CARB to assess and to confirm the delivery of compliant vehicles to Delaware. This information will be summarized in an annual report to demonstrate the status of compliance with the regulatory requirements. This compliance information will provide further evidence to indicate that the technology advancements are occurring in the automotive industry as anticipated. Review of this type of data has been successful in the past. For example, in 2017 California completed a mid-term program review for the first phase (model years 2015-2025) of this regulation. This extensive review determined that the technology was evolving as expected resulting in no recommended adjustment to the emission standards.

Section 177 limits the flexibilities that states have when adopting California standards, however, we note that some states have proposed to adopt the regulation only through model year 2032, based on concerns similarly expressed by these commentors. Delaware can consider this as well.

See Section X - Zero Emission Vehicle Technology Concerns for more on vehicle technology. <https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

¹³ Secretary's Order 2010-A-0039. Published in the Delaware Register on December 1, 2010.

¹⁴ Secretary's Order 2013-A-0055. Published in the Delaware Register on December 1, 2013.

¹⁵ Secretary's Order 2018-A-007. Published in the Delaware Register on March 1, 2018.

¹⁶ Secretary's Order 2019-A-0059. Published in the Delaware Register on May 1, 2019.

IV. Modes of Transportation

1. Fuel Cell Electric Vehicles

Summary: Commenters encouraged the Department to consider Fuel Cell Electric Vehicles (FCEVs) in its rulemaking and promoted them as a favorable alternative to battery-electric vehicles.

Response: The Department agrees with the comments that fuel cell electric vehicles can play an important role in our transition to cleaner transportation options.

FCEVs produce no tailpipe polluting emissions and are therefore considered a ZEV under the regulations the Department is proposing. Auto manufacturers will earn ZEV credits for selling FCEVs, and vehicles of this type can continue to be sold in Delaware after MY 2034. The regulations do not require that vehicles be powered by a certain type of technology, as long as the vehicle produces no tailpipe pollution during operation.

2. Hybrid Vehicles

Summary: Commenters asked why hybrid vehicles were not considered in Department's rulemaking and advocated that the Department push for more hybrid vehicles instead of electric vehicles and other ZEVs.

Response: The regulations as proposed by the Department allow for the continued sale of PHEVs through model year 2034. PHEVs will be permitted to make up a maximum of 20% of a manufacturer's ZEV credit compliance obligations in a model year.¹⁷

The Department will implement California's standards by incorporating them by reference, which do not consider hybrid vehicles without a plug-in option to be a ZEV. Therefore, adopting regulations to increase the purchase and use of conventional hybrid vehicles is outside the scope of this rulemaking.

However, new conventional hybrid vehicles can continue to be sold through model year 2034 and used hybrids can be sold in model year 2035 and thereafter. While hybrid vehicles have lower emissions during operation than internal combustion engine vehicles (ICEVs), they have higher lifecycle emissions than battery electric vehicles (EVs). EVs are also expected to become a more convenient and economical option than hybrids in the future due to lower battery costs, increased fuel savings, and other factors.

¹⁷ Section 1962.4, Title 13, California Code of Regulations,
<https://www2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/accii1962.4.pdf>

V. Cost and Affordability

1. Equity and Electric Vehicle Affordability

Summary: Commenters expressed concerns that electric vehicles would remain too expensive for many Delawareans, such as those with low- or middle-incomes, those on fixed incomes, and those who live in rural areas.

Response: The Department acknowledges commenters' concerns about the price of ZEVs, whether hydrogen or electric. Many Delawareans rely on their own automobile to move around daily between work, home, school, and other places and are familiar with a gasoline or diesel-powered vehicle. This regulation focuses on the emissions reductions necessary to achieve healthy air quality. However, affordability of the vehicles necessary to achieve the regulation have received significant public attention and are discussed below.

Indeed, CARB addressed affordability concerns in their Initial Statement of Reasons (ISOR), for their Advanced Clean Cars II regulation, section VI.E,¹⁸ when California's regulation was adopted.

Many ZEV models have been marketed as luxury vehicles which may have led to a public perception that ZEVs are not affordable for the average consumer. However, lower-cost models, including high-range models, are increasingly available and industry trends indicate that they will become more prevalent, offer extended battery range, and cost less.¹⁹

Modeling conducted by CARB²⁰ and the International Council on Clean Transportation (ICCT)²¹ both project decreasing ZEV costs over the next decade. This price decline is driven by falling battery costs and increased economies of scale as automakers increase production to meet market demand. Manufacturing and materials costs for lithium-ion batteries, the primary battery type used in current EV manufacturing, have also fallen significantly over the past decade.²²

¹⁸ California Air Resource Board, Initial Statement of Reasons, <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/isor.pdf>

¹⁹ Electric Vehicle Prices Plummet: 14 Percent Drop Compared To Last Year, <https://insideevs.com/news/672100/ev-prices-reduce-14-percent-tax-incentives/>

²⁰ California Air Resource Board, Initial Statement of Reasons, <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/isor.pdf>

²¹ Slowik, Peter, et al. "Assessment of light-duty electric vehicle costs and consumer benefits in the United States in the 2022–2035 time frame." International Council on Clean Transportation. Published October 18, 2022. <https://theicct.org/publication/ev-cost-benefits-2035-oct22/>

²² Ziegler, Micah and Trancik, Jessika. "Re-examining rates of lithium-ion battery technology improvement and cost decline". Energy & Environmental Science. 23 Mar 2021, <https://pubs.rsc.org/en/content/articlelanding/2021/EE/D0EE02681F>

According to the ICCT’s analysis, lower-range EVs (i.e., 150-mile ranges) are projected to be at price parity with comparable classes of ICEVs starting in 2024 while larger vehicles such as pickups with large ranges (e.g., 400-mile ranges) are projected to reach price parity around 2033. These cost estimates include the cost of installing home charging stations, such as Level 2 chargers. Note that this regulation requires that a new ZEV include a convenience charging cable that supports Level 1 charging in a 120v outlet and Level 2 charging in a 240v outlet.

The early action credits included in this proposed regulation are expected to slightly increase ZEV sales in 2023 and 2024. Increased ZEV sales will support a robust used ZEV market on an earlier timeline, offering even more ZEVs at lower prices for consumers. We expect the used ZEV market will expand over time and increase the availability of used ZEVs, which are more accessible to many households that cannot afford new vehicles. This regulation creates specific incentives for automakers to sell lower-cost ZEVs as they earn an additional 0.1 credit for each MY2026 – 2028 vehicle that is sold below \$20,275 (passenger car) or \$26,670 (light-duty truck).

Additionally, consumers will have other options to choose from besides a new or used ZEV. This proposed regulation does not prohibit the use of an ICEV in Delaware. New ICEVs will be available for sale through 2034, albeit in decreasing quantities over time. ICEVs will remain on the road and continue to be available in the used vehicle market. New PHEVs will continue to be legal for sale in Delaware after MY2035, although they can only represent a maximum of 20% of an automaker’s sales in the state.

The federal government offers many types of incentives to support ZEV purchases. Specifically, starting in 2023, the federal Inflation Reduction Act²³ (passed in August 2022) will offer consumers a tax credit of up to \$4,000 towards the purchase of a used ZEV and up to \$7,500 towards the cost of a new ZEV, PHEV, or commercial clean vehicle. The legislation also removes a production cap that had previously phased out high-volume ZEV manufacturers such as Tesla and General Motors, making these vehicles eligible for tax credits again. Starting in 2024, consumers will be able to claim the rebates/tax credits at the point of sale and not have to wait until they file their taxes, receiving savings immediately. This change in the federal tax incentive structure will especially help those who cannot wait for a tax credit, which was not previously received at the same time as the vehicle purchase.

Delaware also offers new and used vehicles rebates of up to \$2,500 for BEVs.²⁴

²³ HR 5376, Inflation Reduction Act. See <https://www.congress.gov/bill/117th-congress/house-bill/5376/text> .

²⁴ General Assembly adopted HB 12 – Electric Vehicle Rebate Program on June 27, 2023. Governor Carney signed the Act into law on August 3, 2023. See [Bill Detail - Delaware General Assembly](#) .

Finally, total cost of ownership (TCO) analyses from CARB and the ICCT have determined that first-owner savings will range from \$3,216 to \$9,000²⁵ when compared to an ICEV. This is due to lower maintenance, insurance, and fuel costs. How much is saved depends on when the vehicle is purchased because of changes to incentive programs. The lower cost of ownership helps to drive long-term affordability of ZEVs for consumers.

For more information, see section Technical Support Document Section 11 Economic Cost-Benefit Analysis on page 91:

<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

2. Home Charging Station Affordability

Summary: Commenters expressed that homeowners would not be able to afford to install a charging station in their homes and charging may increase electric bill costs.

Response: The Department appreciates the comments on home charging station affordability.

Home charging stations provide flexibility and reduced “fuel” costs over using public charging stations for those able to charge their vehicles at home. They do represent an additional upfront cost on top of the investment in the vehicle. All major cost projections for EVs, such as the CARB and ICCT analyses referenced in this technical response memorandum, include the cost of installing a Level 2 home charging station. Prices can range from \$300 for a replacement Level 1 charger to \$4,500 for a Level 2 charger (and requisite home wiring upgrades) for two vehicles. The average Level 2 charging station materials and installation cost is roughly \$1,300 but ranges from \$1,000-\$2,500 depending on the home’s needs. These prices are projected to slightly decline in the future as more electric vehicles hit the market.²⁶

Homeowners that already have three-prong 240-volt outlets located near where they park their vehicle will be able to easily plug in a Level 2 charging station or cord and charge their EV. This 240v outlet is the same that powers electric clothes dryers and electric ovens. Older homes may lack this outlet and not have the ability to add one to their electric panel. An electric panel upgrade can be expensive, but options exist to bypass the panel and provide a 240v outlet at a much lower cost (60 – 80%) than an electric panel.²⁷

²⁵ CARB - Initial Statement of Reasons, <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/isor.pdf> and ICCT analyses - Slowik, Peter, et al. “Assessment of light-duty electric vehicle costs and consumer benefits in the United States in the 2022–2035 time frame.” International Council on Clean Transportation. Published October 18, 2022. <https://theicct.org/publication/ev-cost-benefits-2035-oct22/>

²⁶ Nicholas, Michael. “Estimating electric vehicle charging infrastructure costs across major U.S. metropolitan areas.” International Council on Clean Transportation. August 2019, https://theicct.org/sites/default/files/publications/ICCT_EV_Charging_Cost_20190813.pdf

²⁷ Lewis, Michelle. Siemens' new home EV charger adapter ends need for electrical panel upgrades (electrek.co). July 27, 2022.

Even with a 240-volt outlet, some homeowners may not be able to afford a Level 2 charger, as these commenters noted. There are federal incentives for home charging stations that can help with this, including a tax credit of 30% of the cost of hardware and installation, up to \$1,000.²⁸ This tax credit is available through December 31, 2032. Beginning in 2023, the credit will also apply to bi-directional charges, which enable EVs to serve as grid-connected batteries typically earning bill credits from their utility for providing this service and providing backup power for the home during blackouts.

The Department notes that those not living in detached homes with off-street parking face additional barriers to home charging. However, legislation was passed that will improve the charging infrastructure in Delaware.^{29 30}

Delmarva Power³¹ has an electric vehicle program in which customers can receive a time-of-use rate specific to EV charging. The rate provides the benefit of reduced electric bills for customers when they charge their vehicle during off-peak hours. The Off Peak – Off Bill Rebate (OPOB) will provide Delmarva customers with a rebate based on how much electricity (kWh) they use each quarter to charge their EVs during off-peak hours. On-peak hours are defined as noon to 8 pm weekdays, excluding holidays, and all other hours are off-peak. Based on actual charging session data, Delmarva will calculate the rebate amount by subtracting any on-peak charging from total off-peak charging, at 3 cents per kWh.

Delaware Electric Cooperative³² has created a program for customers who install a ChargePoint Home Charger at their residence, in which they can receive a billing credit of \$200 plus a \$5 discount on their bill during months of peak energy usage. Through this program, the utility can help homeowners with energy management for EV charging as well as helping to inform the cooperative's preparations for greater EV adoption soon.

²⁸ Inflation Reduction Act – Alternative Fuel Vehicle Refueling Property Tax Credit. See <https://www.irs.gov/credits-deductions/alternative-fuel-vehicle-refueling-property-credit>

²⁹ Delaware General Assembly House Bill 13, Residential Electric Vehicle Infrastructure. See [Bill Detail - Delaware General Assembly](#).

³⁰ Senate Substitute 1 for Senate Bill 103, Electric Vehicle Charging Infrastructure For Residential Dwellings. <https://legis.delaware.gov/BillDetail?legislationId=140422>

³¹ Delmarva Power - an Exelon company. Electric Vehicle Program | Delmarva Power - An Exelon Company. (2019, July). Retrieved 2023, from <https://www.delmarva.com/SmartEnergy/InnovationTechnology/Pages/ElectricVehicles/DE/ElectricVehicleProgram.aspx>

³² Delaware, Beat the peak with electric vehicles. Delaware Electric Coop. Retrieved 2023, from <https://www.delaware.coop/btp/electric-vehicles>

For additional information see Technical Support Document Section 9 Complementary Policies on page 77: <https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

3. Maintenance and Battery Replacement Affordability

Summary: Commenters voiced concerns that the cost of replacement batteries and ongoing maintenance for electric vehicles will be prohibitively expensive for most consumers.

Response: Lifetime maintenance costs of an EV are significantly lower than ICEVs in analyses conducted by the Department of Energy,³³ ICCT,³⁴ and CARB.³⁵

The analyses find multiple factors contributing to lower maintenance costs. The first is that EVs do not need oil changes. They also have fewer automotive parts than their ICEV counterparts. This creates fewer points of failure for the vehicle. EVs also do not need the same amount of maintenance for the battery, motor, and electronics as an ICEV. Similarly, fewer fluids are needed for the engine. Finally, EVs have far less brake wear due to regenerative braking. This is a system that converts kinetic energy from the motion of the car into electric charge for the battery, reducing the need for brake pads in most circumstances and extending a battery's range. Tire wear is related to torque of vehicles and driving tendencies.

These lower maintenance costs are significant and can help EVs give first owners net financial benefits relative to a similar ICEV. These benefits are projected between \$3,216 and \$9,000³⁶ over the life of the car. Those savings are also inclusive of the cost of home-charging equipment.

This regulation as proposed also establishes durability and warranty requirements for EVs. Batteries must meet durability requirements of either 10 years or 150,000 miles, and warranties must be provided by the manufacturer to the buyer for 8 years or 100,000 miles.

Battery replacement costs currently range from \$5,000 – \$15,000 depending on the make, model, and type of battery. These costs have fallen significantly over the past decade and are expected

³³ U.S. Department of Energy. Alternative Fuels Data Center: Maintenance and Safety of Electric Vehicles (energy.gov).

³⁴ ICCT, Assessment Of Light-Duty Electric Vehicle Costs and Consumer Benefits In The United States In The 2022–2035 Time Frame, <https://theicct.org/publication/ev-cost-benefits-2035-oct22/>

³⁵ California Air Resource Board, Initial Statement of Reasons, <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/isor.pdf>

³⁶ These estimates are from the CARB and ICCT analyses cited elsewhere in this section.

to continue to fall to under \$100 per kWh by 2030, potentially as low as \$74 per kWh.³⁷ Cheaper batteries will reduce replacement and maintenance costs if they are incurred.

See Technical Support Document Section 9 Complementary Policies for more:
<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

4. Financial Incentives

Summary: Commenters expressed a desire for additional financial incentives in addition to the federal rebates and state tax exemptions currently available.

Response: There are various efforts at the state and federal level pursuing additional ZEV incentives. Nothing in this rulemaking precludes the ability for state and federal lawmakers to authorize additional incentives.

State Incentives for Zero-Emission Vehicles

The State of Delaware has made available consumer and business incentive for the purchase or lease of alternative fuel vehicles since 2015. Included in these incentives were electric, propane and natural gas fueled vehicles. Recently, the Sustainable Energy Utility launched a program to specifically assist municipal governments deploy electric vehicles.

DNREC Clean Vehicle Rebate Program

The Department's Clean Vehicle Rebate Program provides incentives for Delawareans and Delaware businesses to buy or lease new EVs or PHEVs. The vehicle rebate program encourages the deployment of EVs and PHEVs as a part of Delaware's commitment to innovation in the transportation sector reducing GHGs and improving Delaware's air quality.

Federal Incentives for Zero-Emissions

Vehicles Under the Inflation Reduction Act (IRA)¹⁴⁵, federal incentives for purchasing a new or used electric vehicle can provide consumers with up to \$7,500 or \$4,000 respectively in federal tax credits. Changes made to these incentives in 2023 allow all manufacturers to qualify without the previously limiting sales cap of 200,000 vehicles per manufacturer. The IRA restricts those making a gross income of greater than \$150,000 from receiving the credit, with higher income limits set for the head of household and joint filers.

Vehicle eligibility is primarily based on the Manufacturer's Suggested Retail Price (MSRP) (not including destination charges, taxes, and fees), setting an \$80,000 limit for vans, SUVs, and pickup trucks, and \$55,000 for other passenger vehicles. Credit eligibility is also decided based

³⁷ 2 Ziegler, Micah and Trancik, Jessika. "Re-examining rates of lithium-ion battery technology improvement and cost decline". Energy & Environmental Science. 23 Mar 2021,
<https://pubs.rsc.org/en/content/articlelanding/2021/EE/D0EE02681F>

on manufacturing requirements in the IRA designed to boost American manufacturing. Eligible vehicles require that the final assembly of the EV take place in North America, which includes the United States, Puerto Rico, Canada, and Mexico. Consumers can use the U.S. Department of Energy's "VIN Decoder" which ensures that the vehicle they are buying meet these requirements. In accordance with increasing domestic manufacturing, the IRA will also phase in rules requiring manufacturers to mine critical battery components in the U.S. or from major trade.

Until the Treasury Department and the IRS issue further guidance on critical mineral and battery components, the credit is calculated as a \$2,500 base amount, with additional credits available for battery capacity of at least 5 kilowatt hours (kWh). For each kilowatt hour of battery capacity beyond 5kWh, up to an additional \$5,000 beyond the base amount can be awarded. When in effect, the critical minerals requirement and battery component requirement will each offer \$3,750 in credit, for up to \$7,500 total. In 2024, car dealerships will be allowed to offer an upfront discount of up to \$7,500 for vehicles that meet new requirements.

Buyers who purchase previously owned electric vehicles can receive up to \$4,000 in tax credits if the vehicles are \$25,000 or less. These tax credits have more stringent income requirements than the limitations placed on new vehicle buyers.

As the regulations take effect and automakers produce more lower-priced ZEV models, we also anticipate that the total ownership costs of EVs and other ZEVs will gain cost parity with ICEVs. This trend should serve to decrease the need for additional financial incentives over time.

See Technical Support Document Section 9 Complementary Policies for more:
<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

VI. Infrastructure Impacts

1. General Infrastructure Concerns

Summary: Commenters here are concerned about infrastructure broadly defined, stating multiple concerns. These comments are bundled together as they do not specify which part of infrastructure (home chargers, public chargers, electric generation, transmission, hydrogen refueling centers, etc.) they are concerned with.

Comments include the following:

- That it will be “too expensive” for the state to build out the needed infrastructure for ZEVs.
- That infrastructure “isn’t ready” and this mandate should wait for it to be “ready.”
- That building infrastructure will take too long.
- That infrastructure can’t be built in certain parts of the state, with commenters listing places such as rural areas, and recreation areas.
- That infrastructure demand will outpace supply, and,
- Charging stations are not abundant or will not be added quickly enough.

Response: The following section covers a variety of topics related to infrastructure concerns, such as impacts to the electrical grid, the expansion of public and home charging, battery recycling efforts, and related topics.

While the focus of this regulation is in reducing air pollution, the availability of infrastructure will influence the willingness of consumers to purchase the EVs.

Currently, there are ongoing state, federal and private efforts to expand all parts of the infrastructure that impacts ZEVs. Electrify America, and the state of Delaware are committed to providing access to public charging stations across the state.³⁸ The state has submitted a plan³⁹ to the federal government to receive National Electric Vehicle Infrastructure (NEVI) funds which will expand public charging along all major transportation corridors.

These efforts are layered on top of existing private networks, such as Tesla’s Supercharger network, and efforts by businesses as diverse as fast-food chains and pharmacies to install chargers in parking lots. As demand increases, private enterprise will expand further into the market. Utilities are also being required to plan for the extra electrical generation needed and to ensure their power mix increasingly comes from emissions-free sources.

³⁸ Delaware General Assembly - Senate Bill 103: Electric Vehicle Charging Infrastructure for Residential Dwellings. <https://legis.delaware.gov/BillDetail/130282>

³⁹ Delaware Department of Transportation, Delaware’s Vehicle Electrification Future, <https://deldot.gov/Programs/NEVI/index.shtml>

For more information see Technical Support Document Section 8 Powering Zero Emitting Technology and Grid Reliability on page 66:

<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

2. General Electric Grid Concerns

Summary: Commenters expressed concern about the costs of upgrading the electric grid to meet EV charging needs, as well as the impact of EV charging on electricity costs. Many expressed opposition to removing nuclear power and fossil fuels from Delaware’s energy grid, or not considering new power generation using these sources. Some commenters also expressed opposition to closing certain electric generating facilities in the state.

Response: Delaware’s energy sources’ resource adequacy needs are governed by other regulations. This regulation, which governs motor vehicle emissions, does not affect these issues directly, but we acknowledge that energy resource adequacy is an important component of the overall success of transitioning to EVs.

Delaware’s electricity suppliers are committed to transitioning to renewable sources of energy and the use of nuclear power is not discouraged by this proposed regulation. While cost estimates for electric grid upgrade costs and the impacts of EV charging on electricity rates vary widely, electric utilities plan for changes in supply and demand. Notably, EV charging is expected to generate more utility revenue than associated costs and to put downward pressure on rates, making electricity cheaper for customers.⁴⁰ Peak demand is the highest driver of costs, and much of the EV charging is expected to take place outside of peak demand hours. Delaware is part of PJM, a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia. RTOs and utilities are planning for both near- and long-term EV charging impacts. Indeed, demand increases can be managed through time of use rates, load shifting, and other strategies that reduce impacts to electric grid reliability. Currently, PJM is also assessing vehicle to grid technology.⁴¹

For more information see Technical Support Document Section 8 Powering Zero Emitting Technology and Grid Reliability on page 66:

<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

⁴⁰ Frost, Jason. “Electric Vehicles are Driving Electric Rates Down.” Synapse Energy. June 2020. See https://www.synapse-energy.com/sites/default/files/EV_Impacts_June_2020_18-122.pdf

⁴¹ PJM, Plug-In Electric Vehicles, 2023, <https://learn.pjm.com/energy-innovations/plug-in-electric>

3. Electric Utility Monopolies

Summary: Commenters expressed concern that the regulation will place too much market authority with electric utilities, as drivers will have to pay their electric company to power their vehicle instead of fueling the vehicle from a choice of different of gas stations.

Response: Electric utilities are regulated by state's Public Utility Commission⁴² and Federal Energy Regulatory Commission⁴³ and must charge fair and reasonable prices for their service. Transitioning to EVs will likely decrease total energy expenditures, as electricity for EVs is more affordable and less prone to price fluctuations than gasoline.

4. Home Charging

Summary: Commenters expressed concerns over the cost of installing a charging station at their homes or the inability to do so without expensive electrical panel upgrades. Other commenters expressed concern about residents in multi-unit dwellings without access to a dedicated parking spot or a garage and the inability to install a charging station.

Response: Home charging can consist of a charging cable plugged into a standard 110-volt outlet, or it can involve a dedicated 240-volt Level 2 charger installed at the home. To help homeowners pay for the costs of installing a charger, many utilities offer rebates for the equipment, the installation costs, or both. According to the U.S. Department of Energy's Alternative Fuels Data Center, several utilities in Delaware offer home EV charger rebates.

Some automakers⁴⁴ have periodically included a home charger as a promotion with the purchase of an EV. This regulation ensures that all new EV sales will include a Level 1 and Level 2 convenience charging cord, although Level 2 charging will only work with an existing 240v outlet.⁴⁵

Many older homes may not have the electrical panel capacity to be able to add a new 240-volt circuit for an EV charger without costly panel upgrades or replacement. However, a cost-effective solution has been developed by Siemens and ConnectDER⁴⁶ that provides a connection

⁴² Delaware Public Utility Commission – Electricity Regulations. See [Electric Regulation - Delaware Public Service Commission \(PSC\) - State of Delaware](#)

⁴³ Federal Energy Regulatory Commission. [Home Page | Federal Energy Regulatory Commission \(ferc.gov\)](#)

⁴⁴ Electric For All, Charging Your Vehicle, 2023, <https://www.electricforall.org/how-can-i-fill-up/charging-your-vehicle/>

⁴⁵ Level 1 charging uses a typical household outlet and typically provides 3-5 miles of range per hour. Level 2 charging is the most common method of home charging and provides approximately 15-40 miles of driving range per hour, dependent on factors like amperage and efficiency of the vehicle. Direct current fast chargers, or DCFC, are the fastest method of charging EVs and are generally only available at public charging stations.

⁴⁶ Lewis, Michelle. "Siemens' new home EV charger adapter ends need for electrical panel upgrades." Electrek. July 27, 2022. <https://electrek.co/2022/07/27/siemens-home-ev-charger-adapter/>

behind the meter but in front of the panel, promising a 240-volt EV charger connection for a 60-80% cost savings over a panel upgrade. Other possible solutions involve splitting the 240-volt circuit that powers the home's oven or clothes dryer to provide an economical solution to home charger installation.

Providing charging accessibility for residents of multiple-unit dwellings (MUDs) and others without dedicated off-street parking requires additional consideration. As mentioned previously, Delaware recently passed legislation to ensure charging infrastructure for MUDs is sufficient in the state.⁴⁷ Options and solutions are emerging, including installing low-cost Level 2 chargers on utility and light poles, which is being piloted in some major cities. These chargers draw from the existing 240-volt electricity supply to the streetlight to power an EV charger mounted on the light pole. Delaware's Department of Transportation and Division of Climate, Coastal, and Energy are working together to establish a statewide electric vehicle charging network (see NEVI).⁴⁸

For more information see Technical Support Document Section 9 Complementary Policies on page 77: <https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

5. Public Charging

Summary: Commenters expressed concerns over an insufficient number of public charging stations, especially in rural areas, to support longer cross-state road trips. Some commenters expressed concerns about reliability of existing EV chargers and the length of time needed to return “an EV battery to sufficient charge to continue a trip and charging cost.”

Response: The Department recognizes commenters' concerns about the prevalence and functionality of public charging stations. Under the National Electric Vehicle Infrastructure (NEVI) Formula Funding, a program included in the Bipartisan Infrastructure Law, Delaware Department of Transportation will receive funding over fiscal years 2022 to 2026 for the installation of DC fast charging stations along the state's alternative fuel corridors (AFCs),

⁴⁷ Delaware General Assembly - Senate Bill 103: Electric Vehicle Charging Infrastructure for Residential Dwellings. <https://legis.delaware.gov/BillDetail/130282>

⁴⁸ Delaware Department of Transportation, Statewide Plan, <https://deldot.gov/Programs/NEVI/index.shtml?dc=statewidePlan>

including Routes 1, 13, 113, and I-95.⁴⁹ ⁵⁰ Companies such as Electrify America⁵¹ are also growing rapidly and installing charging stations in Delaware.

The U.S. Department of Transportation's Charging and Fueling Infrastructure (CFI) Discretionary Grant Program,⁵² established by the Bipartisan Infrastructure Law, will provide \$2.5 billion over five years to a wide range of applicants, including cities, counties, local governments, and Tribes. Additionally, \$700 million is available in fiscal years 2022 and 2023 to strategically deploy EV charging and other alternative vehicle-fueling infrastructure projects in publicly accessible locations in urban and rural communities, as well as along designated Alternative Fuel Corridors (AFCs).

For more information see Technical Support Document Section 9 Complementary Policies on page 77: <https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

⁴⁹ Delaware Department of Transportation, Delaware's Vehicle Electrification Future, <https://deldot.gov/Programs/NEVI/index.shtml>

⁵⁰ Delaware Department of Transportation, Statewide Plan, <https://deldot.gov/Programs/NEVI/index.shtml?dc=statewidePlan>

⁵¹ Electrify America, Charging With Electrify America, 2023, <https://www.electrifyamerica.com/what-to-expect/>

⁵² Federal Highway Administration, Charging and Fueling Infrastructure Discretionary Grant Program, <https://www.fhwa.dot.gov/environment/cfi/>

VII. Environmental Impacts

1. Climate Change

Summary: The commenters state that the Department’s rulemaking will have little impact on global climate change or the climate in Delaware. Others express alternative theories about anthropogenic (human-caused) climate change or deny the existence of it altogether. A few expressed that Delaware’s climate problems are caused by vehicles driving through the state. Some said the vehicles will have little to no impact on the environment and the data is inconclusive.

Response: Debating the existence and causes of anthropogenic climate change is outside the scope of this rulemaking. However, the link between human activity and rising global temperatures has been well-documented in numerous scientific studies and reports, such as the Intergovernmental Panel on Climate Change’s Sixth Assessment Report.⁵³

Delaware’s Climate Action Plan outlines the steps that must be taken to reduce emissions to improve the living quality of our state. Decreases in emissions will be highly unlikely without the implementation of vehicle emission standards that substantially limit future GHG emissions from on-road gas and diesel use. As mentioned earlier, Delaware also recently passed the Climate Change Solutions Act, further solidifying Delaware’s commitment to act on Climate Change.

Light-duty vehicle emissions are approximately 42% of Delaware’s NOx emissions. Because Delaware has already had to regulate most stationary sources of NOx in order to make progress towards attaining and maintaining the NAAQS, there are few other available sources from which to obtain reductions. Thus, reductions in emissions of NOx of this significance are highly unlikely to be obtained without the adoption of ACCII.

For more see Technical Support Document Section 2 Delaware’s Air Quality on page 2: <https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

2. Electric Generation Emissions

Summary: Commenters said that EVs will contribute to climate change by switching to carbon-intensive electricity, stating that the electric grid was already very carbon-intensive, that renewable energy technologies are carbon-intensive to produce, or that renewable energy would not be able to meet the increased demand and therefore fossil fuel sources (coal, natural gas) would be used to fill the gap – increasing overall greenhouse gas emissions.

⁵³ IPCC, Synthesis Report of the Sixth Assessment Report, 2023, <https://www.ipcc.ch/ar6-syr/>.

Response: The Department appreciates commenters' concerns about the impact this regulation will have on our climate. This regulation is intended to help limit climate-warming greenhouse gas and ozone precursor emissions from our state, as transportation is the single largest sector in the state contributing to climate change. Ozone precursor emissions—NO_x, CO, and VOCs—are more effectively controlled at power plants as well.

Analysis has indicated that even in scenarios where EVs are charged using coal-fired power or natural gas, they still produce fewer emissions than comparable ICEV over the same range in nearly all scenarios due to their increased energy efficiency.⁵⁴ ICEVs lose significant portions of their energy through heat and other inefficiencies.⁵⁵ Thus, this regulation will serve to reduce emissions from the transportation sector and help the state reach its climate and air quality goals.

For more information, see Section 8 Powering Zero Emitting Technology and Grid Reliability of the Technical Support Document:

<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

3. Battery Recycling and Disposal Impacts

Summary: Commenters expressed multiple worries about what will happen to the batteries in an EV when they have exceeded their useful life. Most who commented on this issue were worried about environmental issues, such as a proliferation of hazardous waste in soils and groundwater and a lack of biodegradability, saying that the issue of battery disposal would be a larger environmental problem than carbon emissions. Some commenters were concerned about the high costs and energy-intensive nature of recycling batteries, leading to low levels of recycling.

Response: The Department appreciates the concern of commenters about waste from the lithium-ion battery packs and other battery technology that EVs generate. Indeed, the market for EVs is growing and programs to manage batteries used in EVs will need to be developed whether or not Delaware adopts this regulation. This regulation is a motor vehicle emission standard. The Department is mindful that retired batteries can be reused, repurposed, recycled, or ultimately discarded in a hazardous waste landfill. Due to the multiple use cases for batteries, they are rarely completely disposed. Private companies, automakers, and others offer EV recycling services. Recycling and reuse of batteries lowers the cost of battery repairs and provides a more sustainable supply of raw materials for manufacturers.

These processes are rapidly changing as there is great interest in increasing recycling efforts. We are aware that numerous businesses, research universities, and other entities are researching

⁵⁴ U.S. Environmental Protection Agency. "Electric Vehicle Myths." <https://www.epa.gov/greenvehicles/electricvehicle-myths>

⁵⁵ Albatayneh, Aiman, et al. "Comparison of the Overall Energy Efficiency for Internal Combustion Engine Vehicles and Electric Vehicles." Environmental and Climate Technologies, 2020 Jan. <https://ui.adsabs.harvard.edu/abs/2020SJ RUE..24..669A/abstract>

methods of forming a circular economy for EV batteries, although there are numerous technological and economic hurdles to overcome before this might be feasible.⁵⁶

Both reuse and recycling efforts at the manufacturing level are increasingly being implemented. If batteries are manufactured with the intent of being reused, repurposed, or recycled, then costs during the transition between uses can be much lower. This proposed regulation also introduces battery labeling requirements to facilitate recycling efforts.

More information can be found in the Technical Support Document in Section 7 Vehicle Technology on page 44:

<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

4. Mining and Manufacturing Impacts

Summary: Commenters are concerned about the environmental impacts of mining and manufacturing EVs. Issues brought forward by these comments include the following claims:

- Mining rare earth materials for EVs and renewables damages local ecosystems and creates further emissions.
- Multiple comments stated specifically that 500,000 lbs. of material and gallons of water must be used to mine the materials to make one 1,000 lb. battery.
- Mining for EV materials is more harmful to the local environment than oil drilling.
- Mining will occur in countries with few environmental regulations and therefore cause unnecessary environmental harm.
- Environmental impacts of mining for materials are more damaging than climate change and,
- EV material mining emits enough greenhouse gases to be equal to an ICEV's lifetime emissions.

Response: The Department appreciates the concerns of commenters around the environmental impacts of sourcing raw materials such as lithium, cobalt, manganese, and aluminum for EVs. This proposal does not regulate the types of raw materials that are utilized in the making of EVs or their batteries, nor does the Department have regulations governing the process of mining.

Some commenters proposed the use of ICEVs instead of EV's based on concerns that mining for EV material damages local ecosystems. However, the mining may offset existing gasoline-powered vehicle manufacturing processes which have their own environmental impact. Further, ICEVs require similar materials such as aluminum alloys, magnesium, iron, and steel—all metals that are mined for vehicle production and which produce impacts on local ecosystems. While EVs emit slightly more carbon in their material sourcing and manufacturing phases than ICEVs due to the need for more metal refinement in the battery packs, life-cycle analyses indicate that

⁵⁶ U.S. Department of Energy, Batteries for Electric Vehicles, https://afdc.energy.gov/vehicles/electric_batteries.html

EVs produce far fewer emissions over their entire lifecycle, primarily due to drastic emission reductions in their operational stage (i.e., when the vehicle is in use).

Further, impacts from mining can also be mitigated by stricter environmental regulation as well as new technology and methods of sourcing materials. The 2022 federal Inflation Reduction Act incentivizes the supply chain transition by requiring EV battery minerals to come from North America or countries with a free trade agreement with the U.S. to receive federal tax credits.

For more information see Technical Support Document Section 7 Vehicle Technology on page 44: <https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

5. Air Quality and Pollution

Summary: Commenters expressed doubts that current vehicles have significant adverse effects on air quality. Commenters also expressed concerns with potential increased tire pollution from electric vehicles. Some expressed concerns with the vehicles' weight relating to tire wear.

Response: While the per-vehicle emissions of criteria pollutants have decreased since the passage of the Clean Air Act and the enforcement of tighter vehicle emission standards, transportation still has a significant impact on air quality. For example, operating ICEVS causes emissions of nitrogen oxide (NOx) and particulate matter (PM2.5). Prolonged exposure to these pollutants emissions from transportation can cause significant health complications such as asthma, heart disease, and lung cancer, among others. These health risks are particularly prominent for overburdened communities that live near transportation corridors and pose the highest risk to children and the elderly.

With respect to tire pollution, the Department recognizes that EVs can potentially cause more tire wear than comparable ICEVs due to their heavier average weight. However, CARB's environmental impact analysis⁵⁷ found that the ZEV regulation decreases fine particulate matter emissions, even accounting for projected vehicle brake wear and tire wear emissions associated with increased EV usage. Automakers can offset heavy EV components such as battery packs with weight reductions elsewhere in the vehicle body. Tire pollution is ultimately an issue with all vehicles, and companies are exploring methods of reducing tire pollution from both EVs and ICEVs through new tire designs and pollution capture devices.

⁵⁷ California Air Resource Board, Final Statement of Reasons, See pgs. 115-116 of <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/fsorappa.pdf>

VIII. Economics and Security

1. Motor Vehicle Fuel Tax

Summary: Commenters were concerned about infrastructure becoming underfunded as commuters switch over to electric vehicles and no longer pay the motor vehicle fuel tax, which is commonly referred to as the “gas tax.” Some also stated that this program would necessitate an increase in the “gas tax.” Finally, others said it was unfair to continue to tax fossil fuels while also attempting to phase them out.

Response: The Department appreciates commenters’ concerns about how Delaware’s road infrastructure will continue to be funded as drivers transition to gasoline and diesel-free vehicles that will not incur the motor vehicle fuel tax. Ultimately, any issue related to the motor vehicle fuel tax is outside the scope of this rulemaking. This rulemaking does not raise, lower, change, remove, or replace the motor vehicle fuel tax. The current Delaware motor vehicle fuel tax is \$0.23 per gallon of gasoline and \$0.22 for diesel and there are no current plans to replace this tax.⁵⁸

For more information see Technical Support Document Section 7 Vehicle Technology on page 44:

<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

2. General Economic Concerns

Summary: Commenters assert several concerns related to the economics of electric vehicles:

- EVs are an economically inefficient option compared to existing vehicles.
- The EV industry is being artificially supported by financial and tax-based incentives.
- This regulation will “crush the economy.”
- Worries about who will pay for the EV transition and how much it will cost.
- This regulation will cause prices for gasoline, diesel, and used ICEVs to increase by limiting supply.
- There should be a cost-benefit analysis conducted for the EV transition/this regulation and,
- Electric Bill Cost will increase.

Response: This proposed regulation of motor vehicle emissions will reduce pollution that will achieve healthy air quality and reduce greenhouse gas emissions. Most of these concerns are subsumed within concerns address above and have been addressed.

⁵⁸ Delaware DMV, Motor Fuel Special Fuel, [https://www.dmv.de.gov/TransServices/MFSF/index.shtml?dc=mfsfFAQ#:~:text=A%3A-,The%20excise%20tax%20rate%20for%20Motor%20Fuel%20\(Gasoline%2C%20Gasohol%20and,Delaware\)%20is%20%240.22%20per%20gallon.](https://www.dmv.de.gov/TransServices/MFSF/index.shtml?dc=mfsfFAQ#:~:text=A%3A-,The%20excise%20tax%20rate%20for%20Motor%20Fuel%20(Gasoline%2C%20Gasohol%20and,Delaware)%20is%20%240.22%20per%20gallon.)

Further, the Department notes that commenters have concerns about the nature of the EV market and industry but disagrees with their conclusion. There is ample evidence to show that the market is robust and growing, and it will continue to evolve whether or not Delaware adopts this regulation. While the technology for lower-priced EVs is still developing, EVs are projected to reach and exceed price parity with comparable ICEVs before the phase-out of new gasoline- and diesel-powered light-duty vehicles takes full effect in MY 2035.⁵⁹ These projections do not include government support, which is expected to accelerate existing timelines.

The price of EVs have fallen significantly in recent years and there are now many models available in various price ranges. High-mileage EVs are projected to be at price parity with comparable ICEV by 2030, with lower-mileage vehicles reaching price parity by 2024. The average first-owner of an EV is expected to save up to \$9,000 over the life of the vehicle, compared to an ICEV.

In respect to the claims that without subsidies the EV market would be smaller than it is today, the Department points to the fact that the EV market has grown substantially over the past decade, including in periods in which major EV manufacturers like Tesla and General Motors were ineligible for federal tax credits. During the pandemic, the global car market contracted while the market for ZEVs grew to 3 million. In 2021, this rose to 6.6 million, just shy of 9% of the global car market.⁶⁰ Furthermore, existing EV cost analyses such as those conducted by CARB and the ICCT do not include the value of subsidies into their total cost of ownership due to their uncertain nature.

A cost benefit analysis can be found in the Technical Support Document Section 11 Economic Cost-Benefit Analysis on page 91:

<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

3. Macroeconomic Conditions

Summary: Commenters are concerned about the timing of these requirements, given current high rates of inflation domestically and internationally and the discussion of a potential recession in the news.

Response: Many commenters overall were concerned about affordability of ZEVs, and this would understandably be worsened by inflating prices of ZEVs. However, these concerns are

⁵⁹ International Council on Clean Transportation. "Assessment of light-duty electric vehicle costs and consumer benefits in the United States in the 2022–2035 time frame." Published October 18, 2022. <https://theicct.org/publication/ev-cost-benefits-2035-oct22/>

⁶⁰ International Energy Agency. "Trends in electric light-duty vehicles: Global EV Outlook 2022". <https://www.iea.org/reports/global-ev-outlook-2022/trends-in-electric-light-duty-vehicles>

outside the scope of this regulation, which regulates motor vehicle emissions. Please see section V. Cost and Affordability for more information.

A cost benefit analysis can be found in the Technical Support Document Section 10 Health Benefits on page 88:

<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

IX. People and Employment

1. Employment Impacts

Summary: Commenters are concerned about job losses, both personally and economy-wide, related to this regulation. Commenters provide few specific reasons for the job losses, but they imply that customers will not be able to afford a vehicle to commute to work or that transitioning to ZEVs will eliminate jobs in the energy sector. Some commenters also mentioned a negative impact on small businesses and gas stations.

Response: The Department appreciates the concern of commenters. Many of the regulation's provisions provide flexibility for consumers and ensure a market transition that is already well under way. While the Department notes that all regulatory changes may have additional impacts, the evidence in the record does not demonstrate that any potential negative impacts will outweigh the substantial environmental benefits.

Under this regulation, existing ICEVs will remain on the road and available for purchase at used car dealers. This regulation only impacts the sale of new vehicles, requiring that an increasing percentage of ZEVs be sold starting in MY 2027. If affordability is a concern, federal programs offer tax credits and state programs offer incentives at the point of purchase for qualifying new and used ZEVs.

While jobs related to fossil fuel production will likely be impacted, this is a consequence of the larger, pre-existing market transition that is already underway. ZEVs have increased as a percentage of vehicles sold in the state over the past decade; this rulemaking guides transition to ZEVs to ensure the maximum feasible emissions reductions and standardizes the regulatory environment for automakers.

Importantly, the energy transition is creating many new jobs in battery research, manufacturing, maintenance, charging station construction and operation, and more. The U.S. Department of Energy⁶¹ reported that nearly 41,000 jobs were created in the ZEV sector in 2021, underscoring the extent to which the clean vehicle transition is creating economic growth and employment opportunities.

Deployment of electric vehicles, and other zero-emission vehicle technologies, represents a significant job and economic growth opportunity. Tens of thousands of electric vehicle charging stations will be installed by electricians in homes, businesses, shopping areas and tourist destinations in the next two decades. Mechanics with specialized training in electric vehicles will be in demand.

Automobile Service and repair businesses will continue to offer repair services to ICEV and develop expertise in ZEV technology. The Department is reaching out to Delaware's Technical

⁶¹ U.S. Department of Energy, U.S. ENERGY AND EMPLOYMENT REPORT, 2022 Fact Sheet, [https://www.energy.gov/sites/default/files/2022-06/USEER 2022 Fact Sheet_0.pdf](https://www.energy.gov/sites/default/files/2022-06/USEER%2022%20Fact%20Sheet_0.pdf)

College and Vocational Schools to develop training and curriculum for the next generation of automotive repair mechanics. The large automobile manufacturers have already begun training their dealer franchises to meet the needs of the ZEVs they sell.

Numerous technical colleges nationwide have implemented specialized certificate programs completed in conjunction with conventional automotive repair programs or through programs dedicated to nurturing specialists in the field. Implementing such programs in Delaware through partnerships with technical and vocational schools will facilitate job growth within the state while creating a highly qualified workforce that can work with electric vehicles and their charging infrastructure.

Through the Bipartisan Infrastructure Law and Inflation Reduction Act, the U.S. Department of Energy is administering over \$250 million in national grants to train a qualified and diverse clean energy workforce. The Delaware Department of Labor and Department of Education are already engaged in the planning process for electric vehicles and electric vehicle infrastructure and stand ready to assist in adapting training programs in Delaware to ensure adequate workforce capacity.

Furthermore, as more zero-emission vehicles hit Delaware roads, more trained technicians will be necessary, particularly for independent mechanics, small shops, and other businesses.

For more information see Technical Support Document Section 11 Economic Cost-Benefit Analysis on page 91:

<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

2. Repair Shops in Delaware

Summary: Some commenters expressed concern that repair shops are not ready or able to handle ZEVs.

Response: The Department heard concerns about the ability of our automotive repair sector to adapt and learn how to repair zero emitting vehicles as well as concerns about the impacts to traditional repair shops. The Big 3 Auto Makers (Ford, General Motors and Stellantis NV) have all developed and offered to their dealerships training for service professionals on the advancements in vehicle technology service and repairs.^{62 63 64} Across the nation, vocational-technical community colleges have been introducing new curriculum to prepare the next

⁶² Chevrolet, New Electric Vehicles Are Coming from Chevy. EV Dealers Are Ready.
<https://www.chevrolet.com/new-roads/electric/dealers-preparation>

⁶³ Ford Authority, FORD DEALERS GET ACCEPTED TO 'ELECTRIC UNIVERSITY' EV TRAINING SCHOOL,
<https://fordauthority.com/2022/03/ford-dealers-get-accepted-to-electric-university-ev-training-school/>

⁶⁴ Electrive, Stellantis tells U.S. dealers how to get ready to sell EVs,
<https://www.electrive.com/2022/12/05/stellantis-tells-us-dealers-to-get-ready-to-sell-evs/>

generation of repair technicians for electric vehicles. Delaware's Technical Community College is considering introducing curriculum for electric vehicle repair.⁶⁵

3. Environmental Justice

Summary: Commenters expressed several ways to improve environmental justice elements of the policy, as well as raised questions as to the Department's approach on environmental justice regarding this regulation. Topics included:

- Strategies to help low-income households afford ZEVs.
- Ensuring the cultural competence of the Department's outreach strategies and,
- Implementing consistent definitions of environmental justice terms such as "community based clean mobility program" and "financial assistance program" across the Department's programs.

Response: The Department appreciates the time and thoughtfulness put into these suggestions on how to make this regulation and its implementation create equitable outcomes for all residents of Delaware. While many of these suggestions are outside the scope of this rulemaking, the Department will continue to consider ways to improve environmental conditions for overburdened communities and vulnerable populations.

The Department agrees that increasing ZEV access to all income levels will be a large part of the clean energy transition. In the Cost and Affordability section above, we outline the number of ways ZEVs will become more affordable for Delaware residents. These include federal tax credits that are available for new and used ZEVs. Projections also indicate that given current long-term trends and market conditions, ZEVs should reach price parity with ICEVs over the next decade. All light-duty ZEVs are expected to reach price parity with new ICEVs before 2035. This will support a robust used ZEV market with vehicles available at price points that are more affordable for those with limited incomes.

The Department is considering additional policies and programs to help ensure the benefits of a transition to zero-emission vehicles are realized by all Delawareans, especially those who have been historically overburdened with transportation pollution.

See Technical Support Document Section 12 Environmental Justice for more information: <https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

⁶⁵ Bay to Bay News, "Vo-techs preparing for zero-emission vehicle mandate in Delaware." March 22, 2023. <https://baytobaynews.com/delaware/stories/vo-techs-preparing-forzero-emission-vehicle-mandate-in-delaware,103654>

X. Zero Emission Vehicle Technology Concerns

1. Battery Charging & Range

Summary: Commenters expressed concerns that the driving range of electric vehicles is not sufficient to meet their driving needs without stopping to recharge. Some commenters expressed specific concerns related to camping or other activities in remote areas with limited charging availability. Other commenters expressed concerns over the amount of time needed to recharge the electric vehicle battery during long distance travel.

Response: The Department recognizes commenters' concerns over vehicle range and battery charging times. Numerous studies recently reveal that on average, Americans drive less than 50 miles per day. There is considerable variability in consumers' driving habits, with some driving even less and others driving much farther. Many new EVs are being certified with around 250-300 miles of range, which should be sufficient for many drivers. Commercially available EVs in the U.S. have reached ranges up to 520 miles. Those with regular driving needs exceeding this range may consider opting for a PHEV, which can be refueled with gasoline for extended travel distances.

Battery capacity and range are highly dependent on the chemistry utilized in the battery cells. To increase a vehicle's range with today's lithium-ion battery chemistry requires larger, heavier, and more expensive battery packs. However, battery chemistry is advancing every year. Several exciting developments are being developed that will dramatically boost vehicle range with smaller, cheaper batteries. Solid state batteries, which are being readied for large-scale commercial deployment later this decade, offer the promise of double the power density, and thus vehicle range, and dramatically faster charging speeds when compared to today's lithium-ion batteries with liquid or gel-based electrolytes. Another recent development by EC Power, makes minor changes to the lithium-ion battery chemistry and cell design that has demonstrated fast charging times as low as 10 minutes. EC Power plans to begin mass-production of the new cells by 2024.⁶⁶

Continued improvements in driving range, battery technology, and the availability and speed of public charging infrastructure are making significant headway to address concerns about range. In the interim, PHEVs can enable consumers to drive even further with the use of gasoline. Finally, this regulation does not preclude the use of alternative fuel sources.

For more information see Technical Support Document Section 7 Vehicle Technology on page 44:

<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Documents.pdf>

⁶⁶ Green Car Congress, Penn State, EC Power use internal thermal modulation to enable stable fast charging, 3/11/2022, <https://www.greencarcongress.com/2022/11/20221103-psu.html>

2. Towing

Summary: Commenters expressed doubts about the towing capacity of electric trucks and the effect of towing on battery range including trailers and truck-mounted attenuators.

Response: The Department recognizes that towing can be challenging use case for vehicle electrification. While most electric trucks currently on the market have similar towing capacities as their gasoline and diesel-powered counterparts, towing decreases battery range to the point that it makes some medium- to long-distance towing trips difficult for electric truck users.

The Department does not expect that the ZEV regulations will constrain light and medium duty truck owners from purchasing vehicles that meet their towing needs. Many towing-capable gasoline and diesel trucks will remain on the new vehicle market until MY 2035, and the regulations place no restrictions on future sales of these trucks. Additionally, technology and engineering advancements will likely close the towing performance gap between electric and conventionally powered trucks over the next decade. Light and medium duty electric trucks with 400 miles of battery range – roughly like the range of many ICEV trucks on the market – are projected to hit price parity with ICEV trucks in 2033, two years before the phaseout of new gasoline and diesel-powered vehicle sales takes effect.⁶⁷

We expect many towing-capable trucks to continue being available on the new vehicle market, either as light-duty trucks sold within the manufacturer's permitted amount of gasoline and diesel-powered vehicle sales, as gasoline and diesel-powered Class 2b and 3 trucks, or as ZEV trucks sold for compliance with the proposed regulations.

Increased ZEV production and technology advancements are expected to close the gap between the towing capabilities of electric trucks and gasoline- and diesel-powered trucks. Electric trucks are in the beginning stages of entering the mainstream vehicle market and many more vehicle models, such as electric versions of the Ram and Chevy Silverado, are expected to enter the market in the next two years. Improvements in battery density can further decrease the performance gap, and the rollout of public fast charging stations across Delaware will further ease the convenience of long commutes and road trips.

Finally, the Department's proposed regulations also allow the sale of new PHEVs through 2034. PHEVs provide another option for rural residents, agricultural workers, and others who may need access to vehicles with long ranges and powerful towing capabilities. The Department's proposal also provides for the sale of FCEVs, which could serve a similar purpose.

⁶⁷ Slowik, Peter, et al. "Assessment of Light-Duty Electric Vehicle Costs and Consumer Benefits in the United States in 2022-2035 Time Frame." International Council on Clean Transportation. Published October 2022. <https://theicct.org/wp-content/uploads/2022/10/ev-cost-benefits-2035-oct22.pdf>

For more information see Technical Support Document Section 7 Vehicle Technology on page 44:

<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

3. Cold Weather

Summary: Commenters expressed concerns over the reliability of electric vehicles in cold weather. Some expressed concern with the cold weather effects on battery charging, while others were concerned about the loss of range during cold weather. Other commenters expressed concerns that using an electric vehicle's climate controls for cabin heating during the winter months would not be practicable during times of extended roadway delays, leading to battery depletion.

Response: While the Department disagrees with some commenters' assertions of EV unreliability during cold weather, we acknowledge and agree that cold weather does have effects on vehicle range and charging speeds. Cold temperatures, particularly those below freezing, slow down the chemical reactions in battery cells, which reduces vehicle range and increases charging times. Several studies on EV performance during cold weather have been produced in Norway, a Scandinavian country with long, very cold winters and a very high percentage (79.3%) of EV sales.⁶⁸ According to the Norwegian Automobile Federation,⁶⁹ EVs can lose up to 20% of their range in sub-freezing weather. Similar results were reported by Consumer Reports,⁷⁰ which urged EV buyers in cold weather areas to opt for larger batteries to compensate for the range reductions.

Note that some EVs do better in cold weather than others, especially those with more advanced battery thermal management systems that provide heating of the battery pack to reduce cold weather range reductions and increase charging speeds. Many of these vehicles also provide high efficiency heat pumps to provide cabin heating with less battery drain than conventional resistance heaters, along with seat and steering wheel heaters to more efficiently warm occupants with reduced battery impacts. According to an analysis of on-road EV data by Recurrent,⁷¹ EVs

⁶⁸ Norsk elbilforeng. "Norway celebrates another record-breaking year for electric vehicles." January 2023. <https://elbil.no/norway-celebrates-another-record-breaking-year-for-electric-vehicles/#:~:text=Electric%20car%20sales%20in%202022,breaking%20year%20for%20electric%20vehicles&text=In%202022%2C%2079.3%20percent%20of,percent%20battery%2Delectric%20powered%20vehicles.>

⁶⁹ NAF, "20 popular EVs tested in Norwegian winter conditions." Norwegian Automotive Federation. March 12, 2020. <https://www.naf.no/elbil/aktuelt/elbiltest/ev-winter-range-test-2020/>

⁷⁰ Pratt, David. "How Much Do Cold Temperatures Affect an Electric Vehicle's Driving Range?". Consumer Reports. December 19, 2021. <https://www.consumerreports.org/hybrids-evs/how-much-do-cold-temperatures-affectan-evs-driving-range-a5751769461/>

⁷¹ Witt, Jon. "Winter & Cold Weather EV Range Loss in 5,000 Cars." November 30, 2022. <https://www.recurrentauto.com/research/winter-ev-range-loss>

with advanced thermal management systems only lost about 5% – 10% of their range in freezing conditions, while those without those advanced systems lost 25 – 35% of their range in freezing conditions.

The Department believes that the market will provide EVs that will perform in a satisfactory manner despite cold weather. Sales of EVs worldwide are currently occurring in countries with long cold winters.

4. Battery Durability

Summary: Commenters were concerned about the durability of an electric vehicle battery.

Response: Under this proposed regulation, all EV makers must provide an 8-year or 100,000-mile warranty on their high-voltage batteries. Some automakers (Kia, Hyundai, and others) optionally provide a 10-year warranty on the battery.

The Department is also proposing battery durability requirements in this regulation. The durability requirements in model years (MY) 2026–2029 require 70% of the vehicles to retain 70% or more of original battery capacity for 10 years or 150,000 miles. These standards rise to 80% battery capacity in 2030 for all vehicles sold for 10 years or 150,000 miles.

5. Safety Concerns

Summary: Commenters mentioned various safety concerns with electric vehicles, such as lithium-ion battery fires, emissions from toxic fumes, vehicle collision risks, and impacts of exposing batteries to saltwater. A few commenters mentioned the vehicles are too quiet.

Response: Vehicle safety issues are regulated by the National Highway Traffic Safety Administration (NHTSA) and are beyond the scope of the Department’s ability to regulate. Nevertheless, we provide the following information to explain potential safety issues related to transitioning to EVs and other ZEVs.

While we recognize commenters’ concerns about switching to new and perhaps unfamiliar technologies, EVs must pass the same federal safety tests as other vehicles, which include numerous crash tests that assess their performance protecting occupants in front, side, and rollover crashes. Nine EVs achieved the NHTSA’s 5-Star safety rating in model year 2022, including affordably priced models like the Chevy Bolt, Hyundai Kona Electric, and Ford F-150 Lightning. The Ford Escape PHEV also received top ratings from the NHTSA.⁷²

Crash test results from the Insurance Institute for Highway Safety (IIHS), a nonprofit focused on vehicle safety, have also found EVs to be at least as safe as conventionally powered cars.⁷³ The IIHS also conducted a study that compared collision data and insurance claims for the electric

⁷² National Highway Traffic Safety Administration. “NHTSA Announces MY 2022 Vehicles for 5-Star Safety Ratings Tests.” October 14, 2021. <https://www.nhtsa.gov/press-releases/2022-5-star-safety-ratings-tests>

⁷³ Insurance Institute for Highway Safety. “With more electric vehicles comes more proof of safety”. April 22, 2021. <https://www.iihs.org/news/detail/with-more-electric-vehicles-comes-more-proof-of-safety>

and conventional versions of nine vehicle models; the electric versions had 40 percent lower driver and passenger injury claims on average than their identical gasoline-powered counterparts. The combination of EVs' heavier weights, quicker braking times on average, different vehicle designs, and other factors make direct comparisons in vehicle safety difficult; however, testing and insurance claim data suggests that EVs are, at the very least, no more dangerous than other vehicles. Additionally, EVs are required to make noise under 18.6 mph for safety reasons.⁷⁴

With respect to vehicle fires, data shows EV fires to be rare compared to fires in gasoline- and diesel-powered vehicles.⁷⁵ One caveat is that EV fires tend to burn longer and at a higher intensity, although this is being addressed through safer battery designs and new fire management techniques. Fire risks can be further mitigating by refraining from overcharging the battery,⁷⁶ which can place stress on the battery system. The NHTSA has also established the Battery Safety Initiative for Electric Vehicles to address safety risks related to EV batteries.⁷⁷

Toxic fume inhalation is a potential risk with being near lithium-ion battery fires. Evidence on this topic is relatively limited, but shows that fume inhalation is only a danger if an individual stands close to an ongoing fire. In the rare event of a vehicle fire, individuals should move away from the fire and call their local fire department. Some commentators specifically referenced media reports indicating that a small number of electric vehicles in Florida caught fire after being submerged in saltwater during Hurricane Ian.⁷⁸ While those reports indicate that fires happened to a very small proportion of EVs, there were no reports of injuries. Further, saltwater submersion also poses risks to gasoline- and diesel-powered vehicles.

For additional information, refer to page 60 of the Technical Support Document:
<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

⁷⁴ National Highway Traffic Safety Administration. "Minimum Sound Requirements for Hybrid and Electric Vehicles." December 14, 2016. 81 CFR 90416-90522.

⁷⁵ Gilmour, Dori Luzzo. "As more electric vehicles hit the road, researchers study EV fires, battery recycling". Argonne National Laboratory/TechExplore. <https://techxplore.com/news/2022-11-electric-vehicles-road-ev-battery.html>

⁷⁶ Ahrens, Marty. "Vehicle Fires". National Fire Protection Association (NFPA). March 2020. <https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/US-Fire-Problem/osvehiclefires.pdf>

⁷⁷ NHTSA, Battery Safety Initiative, <https://www.nhtsa.gov/battery-safety-initiative>

⁷⁸ Automotive News, Hurricane Ian results in multiple EV fires in Fla., 11/27/2022, <https://www.autonews.com/automakers-suppliers/saltwater-surge-hurricane-ian-causes-least-8-ev-fires#:~:text=Hurricane%20Ian%20results%20in%20multiple%20EV%20fires%20in%20Fla.&text=The%20surge%20of%20saltwater%20that%20pummeled%20Florida's%20Gulf%20Coast%20during,fire%2C%20according%20to%20s,tate%20officials.>

6. Emergency Vehicles

Summary: Commenters expressed concern that requiring police, firefighters, and other emergency services to utilize ZEVs would impair public safety and emergency response times.

Response: Emergency vehicles are currently exempt in 7 DE Admin Code 1140 and will continue to be exempt should this regulation be adopted.

7. Vehicle Use in Emergencies

Summary: Commenters expressed concerns that electric vehicles would not be available for use during storms or other emergencies when the electricity is out because they would not be able to charge their vehicles. Some commenters expressed concerns about using electric vehicles in emergency evacuations or their suitability during winter weather-related traffic backups.

Response: The Department recognizes the commenters' concerns. Electricity outages cause inconvenience and potential emergency situations. However, electricity outages affect all kinds of vehicles, as the pumps at a gasoline station do not work without electricity, making it difficult or impossible to fill up a gasoline- or diesel-powered vehicle after a storm or power outage.

It is important to note some distinctions in how EVs are fueled differently than ICEVs and how their performance in traffic differs. EVs are typically plugged in at home at night to maintain a near full charge. Most people with ICEVs do not refuel daily nor maintain a full fuel tank at all times. During an emergency evacuation situation with an electricity outage, a fully charged EV will likely have more range than an ICEV with only a half tank of fuel. Also, an EV uses very little energy when stuck in traffic, while an ICEV continues to consume fuel for as long as the engine is idling, effectively reducing the range of the ICEV.

During electricity outages where evacuations are not necessary, many EVs can power a home for days, using electric outlets in the vehicle or a bidirectional home charger. This suggests a potential benefit EVs have in the event of power outages that cannot be replicated with traditional ICEVs.

In 2022, motorists were stuck in a traffic jam on I-95 for more than 24 hours in sub-zero temperatures. While many ICE vehicles ran out of gasoline, an EV owner was able to wait out the jam with a quarter of the battery still charged.⁷⁹

Recently, several companies have begun offering mobile charging options for EV drivers.⁸⁰ These include trucks with large portable battery packs that can be used to fast charge an EV, even in areas without electricity service. These mobile chargers and other options will likely be

⁷⁹ Drive Tesla Canada, This Tesla Model 3 SR+ was caught in the Virginia I-95 traffic jam – here's how it actually fared, <https://driveteslacanada.ca/model-3/tesla-model-3-sr-virginia-i-95-traffic-jam/>

⁸⁰ Blink, Portable Level 2 Generator-Powered EV Charger, <https://blinkcharging.com/products/portable-level-2-ev-car-charger/>

deployed during emergencies and to aid in evacuations. They could also be deployed to winter-related closures and traffic jams.

For additional information, refer to page 60 of the Technical Support Document:

<https://documents.dnrec.delaware.gov/Admin/Hearings/2022-R-A-0011/Exhibits/Technical-Support-Document.pdf>

XI. Rural Areas

1. Farmers

Summary: Commenters were concerned about the impact of this regulation to farmers. Issues mentioned by commenters included the following:

- Some diesel equipment does not have a comparable electric counterpart.
- The time spent charging will hurt profitability of a farm.
- Equipment cannot charge in the middle of a field.
- Workers might be late to work due to the need for charging and,
- Crops can perish if the trucks cannot deliver them quickly enough.

Response: The Department appreciates the concern of commenters about impacts to farming, as these are important industries in the state's economy. However, farming equipment is not regulated by this regulation, as it focuses on light-duty on-road vehicles such as passenger cars, vans, SUVs, and light-duty pickups. This proposed regulation only applies to on-road light duty and medium duty vehicles.

Farmers will be able to use much of their equipment. New electric, hydrogen, biofuel, and fossil fuel powered off-road equipment may also be available in the future for sale, giving these users flexibility to choose what works best for their needs. Light and medium duty vehicles with Farm Truck "FT" tags are not exempt from this proposed regulation. Vehicles with Farm Vehicle "FV" tags are exempt. Furthermore, farm vehicles are already under a separate registration in Delaware:

Title 21 DE Code, Motor Vehicle, **Registration, Title and License**, Chapter 21.

Registration of Vehicles provides for the registration of farm vehicles, §2113, **Special farm vehicle registration**. Provides the Division of Motor Vehicle (DMV) the authority to register vehicles that are used exclusively for farm activities as a "Farm Vehicle" and issue an "FV" tag. Vehicles with an "FV" tag are currently exempt from inspections and emission testing, Vehicles, that are registered in Delaware, as a "Farm Vehicle" and having an "FV" tag are considered off highway and would not be subject to the requirements of this regulation.