The Nelson A. Rockefeller Center at Dartmouth College
The Center for Public Policy and the Social Sciences

## The Class of 1964 Policy Research Shop

# CONSIDERATIONS FOR THE IMPLEMENTATION OF THE CALIFORNIA CLEAN CARS PROGRAM IN NEW HAMPSHIRE: AN INTERIM REPORT

Presented to the New Hampshire House Committee on Science, Technology, and Energy

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## EXECUTIVE SUMMARY

As the state of New Hampshire considers adopting the California Clean Cars Program, the key outcomes and takeaways from the implementation of this program in other states provides critical lessons learned for New Hampshire. This report compiles information from five interviews conducted with regulatory officials overseeing the implementation of the California GHG, LEV, and ZEV programs as well as from key data and background analyses of the California Clean Cars Program.

## 1. BACKGROUND

Section 209 of the Clean Air Act (CAA, passed in 1967, amended in 1977) grants the State of California the ability to request a waiver from the Environmental Protection Agency (EPA) to implement air quality standards that are more stringent than federal standards (42 U.S.C. § 7507). The processes by which California can request a waiver, and by which states can set standards identical to those set by California, are described in 40 CFR part 1074, subpart B, § 1074.105.

Section 177 of the C.A.A. authorizes other states to adopt the same regulations as California:

> "Notwithstanding section 7543(a) of this title, any State which has plan provisions approved under this part may adopt and enforce for any model year standards relating to control of emissions from new motor vehicles or new motor vehicle engines and take such other actions as are referred to in section 7543(a) of this title respecting such vehicles if—
>
> (1) such standards are identical to the California standards for which a waiver has been granted for such model year, and
>
> (2) California and such State adopt such standards at least two years before commencement of such model year (as determined by regulations of the Administrator)." (42 U.S.C. § 7507)

The states that have adopted the California standards are referred to as "Section 177" states. There are currently thirteen of them, as listed in Table 1. This table, produced by the California Air Resources Board, breaks out the Advanced Clean Cars program by its constituent elements and specifies the year in which each was implemented in each of the states.

**Table 1**: **Section 177 States**

| State | Applicable MY | | | State's share (%) of U.S. New Light-Duty Vehicle Sales* |
|---|---|---|---|---|
| | LEV Regulations | | ZEV Program | |
| | Criteria Pollutant Regulation | GHG Regulation | | |
| California | 1992 | 2009 | 1990 | 11.7% |
| New York | 1993 | 2009 | 1993 | 6.0% |
| Massachusetts | 1995 | 2009 | 1995 | 2.1% |
| Vermont | 2000 | 2009 | 2000 | 0.3% |
| Maine | 2001 | 2009 | 2001 | 0.4% |
| Pennsylvania | 2001 | 2009 | | 3.9% |
| Connecticut | 2008 | 2009 | 2008 | 1.0% |
| Rhode Island | 2008 | 2009 | 2008 | 0.3% |
| Washington | 2009 | 2009 | | 1.8% |
| Oregon | 2009 | 2009 | 2009 | 1.0% |
| New Jersey | 2009 | 2009 | 2009 | 3.5% |
| Maryland | 2011 | 2011 | 2011 | 2.0% |
| Delaware | 2014 | 2014 | | 0.3% |
| Colorado | 2022 | 2022 | 2023 | 1.6% |

*Source: https://ww2.arb.ca.gov/sites/default/files/2019-03/177-states.pdf*

In 2013, the EPA granted California a waiver, applied to model years (MYs) 2015-2025, for its Advanced Clean Cars (ACC) program.[1] The ACC program is a bundle of four component emissions regulations. Low-Emission Vehicle (LEV III) standards apply to all new passenger cars (PCs), light-duty trucks (LDTs), medium-duty passenger vehicles (MDPVs), and certain heavy-duty vehicles (HDVs).

1. LEV III criteria pollutant (smog and soot) standards
2. LEV III greenhouse gas (GHG) standards
3. Zero-Emission Vehicle (ZEV) standards
4. Requirements for electric and hydrogen infrastructure improvements (not subject to federal preemption)

*1.1 The ZEV Program*

The Advanced Clean Cars standards for Zero-Emission Vehicles are premised on "ZEV credits," which are best thought of as a type of currency. The ZEV requirements establish

a minimum number of ZEV credits that manufacturers must generate each year. The number of ZEV credits that a manufacturer must generate in a given year is given by a percentage of a manufacturer's in-state production volume. These percentage requirements are listed in Table 2 for each model year. "Production volume" is defined as a three-year average of in-state sales of passenger vehicles and light-duty trucks of a manufacturer. Therefore, annual ZEV credit requirements for manufacturers are a percentage of sales. Manufacturers meet their credit requirements by placing eligible vehicles in the state.

**Table 2: ZEV Requirements**

| Model Year | ZEV Credit Requirement as % of Production Volume |
|---|---|
| 2018 | 4.5% |
| 2019 | 7% |
| 2020 | 9.5% |
| 2021 | 12% |
| 2022 | 14.5% |
| 2023 | 17% |
| 2024 | 19.5% |
| 2025 and later | 22% |

It is worth noting that many types of vehicles that are not formally classified as ZEVs generate "ZEV credits," and most pure ZEVs earn more than one ZEV credit. For these reasons, the regulation should not be interpreted of as a "percentage of sales that must be ZEVs." Rather, the regulation is a system that sets a target as a percentage of overall vehicle sales and includes multiple paths for compliance in terms of vehicle types and electric range.

To make this more concrete, the types of vehicles that generate ZEV credits are listed below. Different calculation schemes exist for each type of vehicle. The calculation scheme for pure ZEVs is shown below as well.

The following types of vehicles can generate ZEV credits:

- ZEV - Zero Emission Vehicle
- TEV - Transitional ZEV
- HICE - Hydrogen Internal Combustion Engine Vehicle
- BEVx - Extended Range Battery-Electric
- NEV - Neighborhood Electric Vehicle

The number of credits generated by a given vehicle is determined using an equation specific to its vehicle type. These formulae reward credits in proportion to the all-electric range of the vehicle. For example, the following calculation is used to determine the number of credits generated by a "pure" ZEV:

- Range < 50 miles = 0 credits
- Range >= 50 miles: (0.01)(range) + 0.50
- Range > 350 miles: 4 credits (cap)

As is made clear by the math above, "pure" ZEVs with an all-electric range of greater than 50 miles generate from one credit to four credits. Take the 2016 Nissan Leaf, for example. Its all-electric range (AER) range is 160 miles, so placing a Leaf in a state generates two credits for the manufacturer.

*1.2 Timeline of the ACC Standards*

Below is a history of the Advanced Clean Cars standards.[2]

1990: the California Air Resources Board (CARB) adopted the LEV program, which set criteria pollutant standards for MYs 1994-2003 on the basis of fleet average emission rates. These were less stringent than federal (EPA) standards at the time.

1990: In the same year the LEV Program began, Congress amended the Clean Air Act to define federal emission standards that would take effect in MY 1996. Standards have been tightened since, but lag behind California's. Since 1975, CAFE standards have worked alongside specific pollutant emission standards.

1998: LEV II tightened fleet average emission standards for MYYs 2004-2010. It also added a ZEV credit program, where these credits could be used to help lower fleet emissions average.

2002: California passed Assembly Bill 1493 directing CARB to establish GHG standards for PCs.

2004: California's first GHG standards (the so-called Pavely Standards) were implemented in CARB regulation and set to apply to MYs 2009 and beyond. In 2005, CARB requested a Section 202 waiver from the EPA for this addition.

2007: The Bush EPA did not consider the waiver request until 2007. In *Massachusetts v. EPA*, SCOTUS ruled that GHGs are CAA air pollutants, prompting the CARB director to send a letter to the EPA and push it to consider its waiver request.

2008: The EPA denied California's waiver request on the grounds that it did not meet "compelling and extraordinary conditions," one of three conditions required for waiving pre-emption.

2009: The Obama EPA reconsidered California's waiver and reversed the previous administration's ruling.

2009: In the wake of Massachusetts and an EPA "Endangerment Finding" on GHG, the EPA worked with the NHTSA and California to harmonize CAFE and federal GHG standards with one another and with California standards. These harmonized standards were finalized in April 2010 and set to start in 2016.

2012: EPA and NHTSA finalized rules to set GHG emission and fuel efficiency standards for medium- and heavy-duty vehicles.

*1.3 Legal Uncertainty*

Last year, the Trump Administration announced plans to revoke the EPA waiver allowing the State of California to enforce the ZEV standards program and the GHG program. If the administration follows through on this action, states would no longer have the authority to enforce stricter auto emission standards like the ZEV program. However, California and 22 other states have sued the EPA in response, arguing that the EPA lacks the authority to revoke the waiver. This lawsuit creates substantial long-term uncertainty regarding the future of the California Clean Cars program; it will likely take many years to resolve. The California Air Resources Board (CARB) in particular argues that there is no statutory basis or mechanism to remove its authority as the current waiver runs through 2025.[3] The only reasonable method to remove the waiver would be allowing it to lapse after this date.

However, in conversations with state regulators multiple officials expressed confidence that the ongoing legal battle will not have significant effects on the ability of California and other states to implement and enforce the ZEV program. Many states, in addition to New Hampshire, have continued pursuing adoption of the ZEV program as the lawsuit moves forward. Colorado adopted GHG requirements last August, Minnesota is currently undertaking public workshops related to adoption, and Utah has introduced, but not yet adopted, mandatory ZEV requirements. Further, regulators in Connecticut stated that while the legal and political conditions surrounding the California waiver are still unclear, car manufacturers are risk averse and will likely comply with ZEV standards if New Hampshire were to adopt.

The legal uncertainty surrounding the California waiver does not prohibit New Hampshire from moving forward with adopting aspects of the Clean Cars Program. However, regulators in Maine, a state that first mandated ZEV compliance in 2009, expressed serious doubt as to the ability of New Hampshire to enforce stricter auto emissions regulation and require auto manufacturers to comply. However, this doubt was not consistent with the opinions of CARB and Connecticut regulators.

## 2. BILL DESIGN

More than a dozen states (and a Canadian province) have already introduced, and most have passed, bills relating to ZEV regulation and program implementation. This section summarizes the various efforts made by states to implement plans similar to the California model legislation.

### *2.1 Onramps*

Since implementing the ZEV program is often a big change in policy, many states include provisions that help ease manufacturers, dealers, and the entire market into the new regulation. This often involves helping manufacturers establish their credit bank before ZEV credit limits are enforced. This is often done through two different methods:

1. By allowing manufacturers to start building credit by placing ZEVs in their state prior to the official start of the regulation.
2. By allowing each manufacturer to have a starting balance proportional to the credits they already have in California.

#### *2.1.1 Method One – Quebec and Maine*

This strategy allows manufacturers to get credit for placing ZEV in their state before the official start of the regulation. ZEV implementers in California encourage the use of this strategy, as it brings ZEVs into the state and helps build the market. Examples of this strategy have been used in Quebec and Maine.

In Quebec, regulation was not enforced until January 2018, but manufacturers got credit for ZEV they had placed any time after 2014. However, automakers could only use their early credits to fulfill 35 percent of their 2019-2021 credit requirements and 25 percent of their 2022-2024 credit requirement.[4]

In Maine, automakers got credit for placing ZEVs early and a credit multiplier was applied to these early placements, so each ZEV placed early was worth more than a ZEV placed during enforcement.[5]

**Figure 3: Maine Credit Multiplier** [6]

| Model Year | Year before Requirements | ZEV Credit Multiplier |
|---|---|---|
| 2004 | 5 years early | 3 |
| 2005 | 4 years early | 3 |
| 2006 | 3 years early | 2 |
| 2007 | 2 years early | 1.5 |
| 2008 | 1 year early | 1.5 |

### *2.1.2 Method Two – Oregon and Maryland*

Method 2, which allows automakers to start an amount of credits proportional to their California credit balance, with remaining credits after the requirements from the previous year had been satisfied. Often, the credit balance is distinguished between Type III ZEVs and non-Type III ZEVs. Non-Type III ZEVs are often multiplied by some value, often a ratio, to differentiate between the number of vehicles sold in California and the number of vehicles sold in their individual state. Examples of this strategy have been used in Oregon and Maryland.

Oregon ZEV regulation began in 2009 and, at that time, manufacturers could begin with their California credit balance for Type III ZEV plus their California credit balance for non-Type III ZEV multiplied by the ratio of new motor vehicles registered in Oregon to those registered in California in 2003 to 2005 or in 2009. However, in order to begin with these proportional credits, manufacturers must offer for sale in Oregon in model years 2009 to 2011 any ZEVs, excluding Type III, that it offers for sale in California during that same time period.[7]

Maryland ZEV regulation began in 2011. At that time, manufacturers could begin with their California credit balance for Type III ZEV and California credit balance for non-Type III ZEV multiplied the ratio of new motor vehicles delivered in Maryland to those delivered in California between 2003 to 2005 or in 2011.[8]

### *2.1.3 Combination of Methods – Colorado*

Some states choose to use a combination of these strategies. In Colorado, all manufacturers will start the 2023 model year, the beginning of ZEV enforcement, with a number of credits equal to its California credit balance multiplied by the ratio of new motor vehicles delivered in Oregon to those delivered in California. It is interesting to note that Colorado, unlike Oregon and Maryland, does not use a credit multiplier to calculate this starting bank. In addition to receiving proportional credits, automakers can decide to either:

a) use these proportional credits to meet up to 36 percent of their 2023-2025 credit requirements
b) use these proportional credits to meet up to 23 percent of their 2023-2025 credit requirements and earn early ZEV credits for ZEV vehicles places in the 2021 and 2022 model years.[9]

### *2.2 Enforcement*

Enforcement of the ZEV programs is standard across all states who adopt the program, pursuant to California's regulation. Auto manufacturers who fail to meet the ZEV credit requirements are punish under California Health and Safety Code section 43211, Subsection b:

> "For purposes of calculating the penalty for failure to meet zero-emission vehicle credit requirements pursuant to Sections 1962, 1962.1, and 1962.2 of Title 13 of the California Code of Regulations or any subsequent or related regulation, the civil penalty shall not exceed five thousand dollars ($5,000) per zero-emission vehicle credit."[10]

Regulators in Connecticut further stressed that failure to comply with ZEV regulations is extremely rare and has not occurred in the roughly ten years that the state has operated under the regulations.[11] This is due to the wide range of compliance options allowed to companies under the regulations. Namely, manufacturers have a three years compliance period if they fail to meet requirements in a given year. Given the ability of manufacturers to buy and sell credits between each other, manufacturers essentially never fail to comply because they can simply purchase more credits during the three-year grace period if they fail to meet needed credit levels in a given year. Companies like Tesla who primarily focus on ZEV compliant vehicles have an excess of credits to sell, making this practice possible.

## 3. BEYOND THE ZEV PROGRAM

This section moves beyond the details of the ZEV program and focuses on the various conditions necessary to implement such programs at the state level.

### *3.1 Infrastructure*

Having the infrastructure that allows Granite Staters to be assured that they can drive their ZEV everywhere they need to is essential in getting consumer buy-in. Being stranded and unable to charge an electric vehicle is a common concern, although not necessarily a

frequent occurrence, for consumers. Infrastructure projects can be Publicly Funded, Privately Funded, or come from Public Private Partnerships. Much of the public funding in states like Maine or Vermont has come from the Volkswagen Settlement, of which New Hampshire utilities has proposed a plan to use invest 40 percent of its funds to develop a network of charging stations.[12]

New Hampshire has already made investments in ZEV infrastructure. SB 575, enacted in 2018, contains several provisions for EV charging infrastructure, including updated signage for EV charging stations, requiring publicly-funded charging stations to be "open access," and confirming that EV charging facilities are not regulated as utilities.[13] However, New Hampshire is still behind in charging infrastructure compared to neighboring states. As of May 2019, there were only 113 public charging stations throughout New Hampshire, nine of which are Direct Current Fast Charging. Vermont currently has approximately 200 charging stations.[14] While the New Hampshire stations are not geographically distributed throughout the state, they represent approximately one charging station for every 80 square miles of the state. In New York, for comparison, this figure is one station for every 40 square miles.

### *3.1.1 Publicly Funded*

Much of Maine and Vermont's public charging infrastructure comes from government funded grants and competitive applications. In Maine, $3 million from the Volkswagen settlement was set aside purely for ZEV infrastructure. Recently, Maine has spent $300,000 to construct over 30 different charging stations, with most of them in the northern and western parts of the state where there was originally a lot less charging infrastructure.[15] Vermont dedicated 15 percent of the Volkswagen settlement funds for electric vehicle infrastructure; more specifically, Vermont offered over a million dollars in grants to local governments to build public charging stations. Earlier, in 2016, Vermont had offered a similar series of grants, totaling in $200,000, aimed at installing public charging stations specifically in downtown areas.[16]

### *3.1.2 Privately Funded*

In states that have implemented California's ZEV regulations, independent businesses have responded positively, and many have taken their own initiatives in investing in infrastructure. Maine highlighted that business, such as Hannaford's, has seen enough internal incentive that several sites have built their own charging stations for customers and employees.[17] Other businesses that are invested in the future of electric vehicles, like Tesla, are spending their own money to build a network of charging stations.[18] Electrify America has promised to spend $2 billion over 2017- 2027 to support the EV market by

building charging infrastructure and promoting consumer awareness as part of the Volkswagen settlement with the U.S. Environmental Protection Agency. [19]

States have also implemented education / outreach programs targeted at businesses. Studies show that although 80 percent of charging happens at the home, 20 percent happens at work. One of the Vermont programs, Drive the Dream Vermont, encourages employers to invest in plug-in electric vehicles; this includes commitments to install new charging at workplaces and workplace incentives for employees to purchase ZEVs.[20]

### *3.1.3 Public-Private Partnerships*

States are also providing public funds in the form of grants to help private businesses invest in ZEV; this can be in the form of workplace charging stations, moving to a ZEV workplace fleet, and other changes to improve the ZEV market. One example is Charge to Work New York, which offers rebates of $4,000 for workplaces to purchase EV chargers and $500 for the purchase or lease of a new EV for each employee in that business. [21]

State governments have also partnered up with private sector groups to better promote ZEV. One example of this is Connecticut's partnership with Avangrid, Eversource, Connecticut Automotive Retailers Association, and the Center for Sustainable Energy, which runs a program that offers up to $5,000 for the purchase or lease of a new electric vehicle. [22]

### *3.1.4 Eversource Fast Charging Corridor Proposal*

Eversource, the largest energy supplier in New England, has proposed a twelve-site EV fast charging corridor which would utilize funds from the VW settlement for construction. New Hampshire has a $31 million share of the overall VW settlement funds, $4.6 million of which have already been earmarked by New Hampshire for expanding EV charging infrastructure. Currently only ten fast charging stations exist in the state and Eversource has proposed to place twelve additional charging sites on major New Hampshire roadways using approximately $2 million dollars of the New Hampshire VW settlement money. Each site would contain four individual chargers. This proposal was first presented in March of 2019 and provides an illustrative model for future public-private partnerships to increase vehicle-charging infrastructure in New Hampshire.

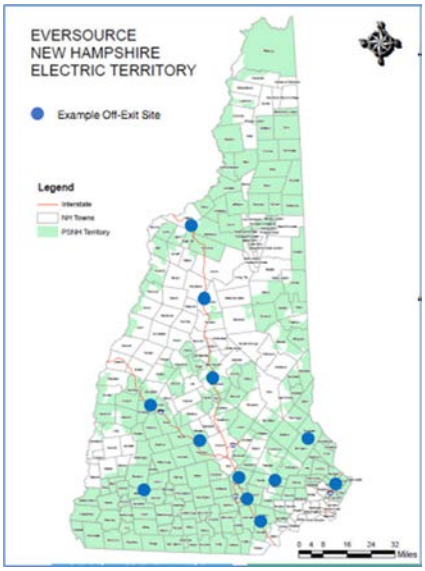


**Figure 4. Proposed Charging Sites**

*3.2 Consumer and Dealer Incentives*

Multiple regulators interviewed stressed the importance of coupling adoption of the Clean Cars program with economic incentives targeted at both consumers and auto dealers to make the program effective and ensure increases in zero and low emissions vehicles on the road. Most consumer incentives take the form of direct rebates, income tax credits, and reduced vehicle licensing taxes. The Vermont Transportation agency, for instance, through the state's 2019 Transportation Bill (section 34) allocated 1.1 million dollars for individual purchase incentives for the purchase or lease of new plug in vehicles.[23]

Examples of consumer rebates are found in Massachusetts and New York. Massachusetts offers rebates of $1,500 for fuel-cell and battery-EVs and $450 for zero-emission Motorcycles. New York State offers point-of-sale rebates for all electric vehicles, ranging between $2,000 and $500, with higher rebates for longer ranges. [24]

Regulators in Connecticut also highlighted the importance of financial incentives targeted at auto dealers. The clean cars program requires auto manufacturers to deliver cars to dealers, but one a car is on a dealer lot the manufacturer has earned their respective ZEV credit. Connecticut regulators suggested that this leads to tensions between dealers and manufacturers as dealers may struggle to sell zero and low emissions vehicles. Therefore, incentives giving tax credits to dealers who stock ZEV compliant cars may be an important avenue for New Hampshire to pursue. We are currently in the process of seeking more information on what other states, if any, have implemented dealer incentives of this type.

*3.3 Consumer Education and Outreach*

Through our conversations with ZEV implementers in other states, Consumer Outreach was consistently highlighted as one of the most important strategies to help a ZEV program succeed. NESCAUM and CARB both have and continue to participate in outreach events and media campaigns to create awareness about how you can and why you should drive ZEVs. [25] There is no one strategy that implementers we interviewed would recommend for New Hampshire. In fact, some believe New Hampshire may not even have to engage directly with outreach because the state benefits so much from regional/neighbor-state activities. [26]

*3.4 Building Codes*

One less direct way lawmakers can support the success of ZEV policies is to change regulation surrounding building codes. As we mentioned earlier in the report, 80 percent of charging happens at the home; when consumer homes do not have the necessary infrastructure to support an at-home charging station, it is incredibly difficult if not impossible to sustainably own an EV. California has led the country in having building code requirements that ensure new construction has the panel capacity for vehicle charging. Every time there is a new revision to these building codes, the charging capacity requirements get more stringent. [27]

## 4. CONCLUSION: CONSIDERATIONS FOR ADOPTION

Policymakers in New Hampshire need to be aware of a variety of conditions under which the possible implementation of ZEV program may take place, including the geography of the state, the operating costs of owning an electric vehicle in the state, changes in tax revenue from the gas tax, and total number of ZEVs necessary to be sold.

*4.1 Unique Conditions of New Hampshire*

New Hampshire is in a unique geographic position to implement California's ZEV policy because it is surrounded by state's that have already made this change. According to CARB, manufacturers typically send LEVs/ZEVs first to California, then to 177 states, and then to the rest of the nation.[28] New Hampshire consumers benefit from early rollouts being close to dealerships in Maine, Vermont, and Massachusetts. CARB speculates that it is likely that automakers already include NH in early rollout due to its proximity to other 177 states. [29] Additionally, a consumer survey done by NESCAUM found that 40% of New Hampshire's were very or somewhat likely to consider buying an electric vehicle.[30]

*4.2 Costs of Implementing*

There are several potential costs associated with the implementation of a ZEV program in New Hampshire.

*4.2.1 Operating Cost of ZEVs in New Hampshire*

The operating cost of electric vehicles in the northeast is generally much lower than gas-powered vehicles, and this effect will only magnify over time. According to the 2019 Report: Evaluating Electric Vehicle Infrastructure in New Hampshire, "at the New Hampshire average residential electricity price of $0.20 per kWh, it costs about $2.00 to get the range provided by a gallon of gasoline." The difficulty comes from the lack of availability of EV chargers in New Hampshire: only 113 public charging stations are available. [31]

*4.2.2 Changes in Revenue from Gas Tax*

Regulators in Vermont mentioned that there are some concerns that ZEV requires less gas which, in turn, means there is less gas tax collected and fewer funds road and infrastructure development.[32] Although the idea of an increased electricity tax, to make up for the missing gas tax revenue, has been suggested, the Vermont ZEV enforcement office recommends waiting until a higher ZEV adoption rate to catalyze the market. Once the market reaches this tipping point, ZEV enforcement office believes that additional fees cannot substantially decrease consumer incentives to purchase ZEVs.

*4.2.3 Required Number of ZEVs*

When CARB did a midterm review of the ZEV regulation in March 2018, they estimated the number of vehicle sales that would have to be electric by 2025 would be less than seven percent. In 2012 this number was more than double, 15 percent, but the development and subsequent popularity of longer-range vehicles, which generate more credits, has lowered that percentage significantly.[33] The Vermont Department of Environmental Conservation estimates this percentage to be even lower; they expect that by 2025 about 5.4 percent of new vehicles sold in Vermont will be required to be ZEVs.[34] As of 2018, two percent of new vehicles sold in New Hampshire were electric. [35]

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