Report to the Joint Standing Committee on Environment and Natural Resources

The Status of Light-Duty Motor Vehicle Regulatory Programs in the United States, Zero-Emission Vehicle Adoption Rates, and Barriers to Greater Zero-Emission Vehicle Adoption

December 2024

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I. Introduction

A. Purpose of this Report

This report is prepared in accordance with Public Law 2023, Chapter 624, *An Act Regarding New Motor Vehicle Emissions Rules,* which amended the law governing new motor vehicle emission standards and requires the Department of Environmental Protection to submit an annual report to the joint standing committee of the Legislature having jurisdiction over environment and natural resources matters regarding the status of the regulatory program adopted by the California Air Resources Board for new motor vehicle emissions, known as the Advanced Clean Cars II program, and the adoption of that program by other states, as well as any updates regarding federal motor vehicle emissions control requirements.

For the first report due January 1, 2025, P.L. 2023, Ch. 624 requires the Department of Environmental Protection, in collaboration with the Department of Transportation, the Governor's Energy Office, the Office of Policy Innovation and the Future, and the Efficiency Maine Trust to evaluate relevant barriers to the adoption of zero-emission vehicle standards or requirements in the State, including an analysis of zero-emission vehicle adoption rates in the State relative to national trends and identification of barriers to achieving higher adoption rates, identification of strategies to reduce those barriers with particular consideration given to barriers present in rural communities, and an evaluation of policies or market trends for overcoming those barriers.

B. Background

Transportation contributes 49% of Maine’s greenhouse gas emissions from fossil fuels; light - duty vehicles, which include passenger cars and pick-up trucks, contribute the greatest portion of those emissions. The Maine Climate Council identified accelerating the sales of new and used electric vehicles, including plug-in hybrids, as both the least costly and most effective way to reduce greenhouse gas emissions and improve air quality and public health. Some strategies and initiatives to reduce transportation greenhouse gas emissions are discussed below.

II. The California and Federal Motor Vehicle Emission Standard Programs

A. The California Advanced Clean Cars II (ACC II) Program

ACC II is a set of regulations that include the Low-emission Vehicle program, Greenhouse Gas emissions reduction, and Zero-Emission Vehicle (ZEV) sales requirements. It builds off an earlier regulation, Advanced Clean Cars I, which was adopted by Maine in 1998 and through amendments remains in effect through model year 2025. The California Air Resources Board (CARB) adopted ACC II in 2022 to reduce motor vehicle emissions of criteria pollutants and greenhouse gases. The ZEV component of the regulation, which was updated from the ACC I

requirement, requires manufacturers of passenger cars and light-duty trucks to produce and deliver for sale an increasing percentage of ZEVs. The annual ZEV sales requirements are shown in the figure below.

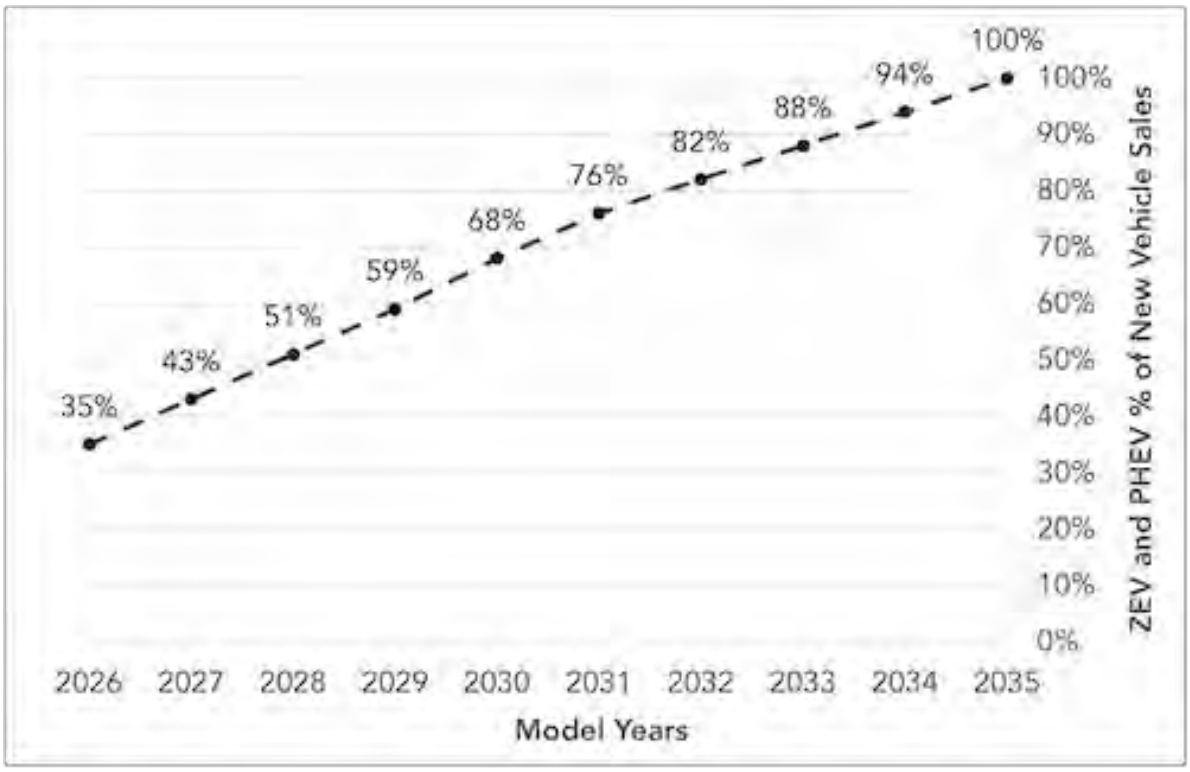

Figure 1
ACC II ZEV Sales Requirements

In order to meet these requirements, manufacturers may use battery-electric vehicles (BEVs), fuel-cell electric vehicles (FCEVs), and plug-in hybrid electric vehicles (PHEVs) that emit zero tailpipe emissions while operating on battery power. ACC II applies to passenger cars (i.e., vehicles designed to transport 12 persons or less) and light-duty trucks with a gross vehicle weight rating less than 8,500 pounds (collectively referred to as light-duty vehicles or LDVs). Class 2b and 3 vehicles, which include many of the medium-sized trucks used by commercial contractors and others, are subject to the Advanced Clean Trucks (ACT) regulation. However, manufacturers may elect to certify these vehicles and earn vehicle credits under the ACC II ZEV regulation; such vehicles would then be ineligible to earn credits under the ACT regulation.

In addition, ACC II provides zero-emission vehicle assurance measures, such as minimum warranty and durability requirements, increased serviceability, and by facilitating charging and battery labeling. These assurance measures help provide certainty to the market that zero-emissions vehicles are held to performance standards, able to be maintained, and have access to warranties that are comparable to internal combustion engine vehicles.

To date, 12 states including California, Vermont, Oregon, Washington, Massachusetts, New York, Colorado, Maryland, Delaware, New Mexico, New Jersey, Rhode Island, and the District of Columbia have adopted California's ACC II standards, as allowed under Section 177 of the Clean Air Act. These states account for more than 35% of national new light-duty vehicle sales that must now meet California automotive emissions standards.

In October 2023, CARB staff launched a new effort to consider potential amendments to the ACC II regulations, including updates to the tailpipe greenhouse gas emission standard, Low-emission Vehicle criteria pollutants and limited revisions to the Zero-emission Vehicle regulations. CARB has solicited public input on various options for amending ACC II and plans to conduct a Board meeting in the latter half of 2025 to adopt rule changes in effect for model year 2029.

CARB is considering amendments to ACC II to harmonize with EPA's final rule, *Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles*[1], which applies to all vehicles in those weight classes nationwide. When CARB first adopted ACC II, the existing tailpipe greenhouse gas emission standard flatlined after model year 2025 at 175 g CO_2e/mile or, worst case, 277 g CO_2e/mile for the largest footprint light-duty trucks. CARB's proposed revisions to ACC II are designed to align with the new U.S. EPA federal tailpipe greenhouse gas standards, which phase-in to 85 g/mile in 2032. A difference between the EPA and CARB programs is that ZEVs are included in the federal fleet average for greenhouse gas emissions which makes it easier for auto manufacturers of internal combustion engines (ICE) vehicles to comply with the federal rule. CARB's ACC II program beginning with the 2030 model year will not include ZEVs in the greenhouse gas fleet average to prevent backsliding of emission reductions from ICE vehicles.

CARB is also considering amending ACC II to align with EPA's more stringent standard for particulate matter (PM) of 0.5 mg/mile for 2027 to 2030 model years. CARB proposes to strengthen the PM standard in ACC II for light duty-vehicles, from 1-3 mg/mile (current) to 0.5 mg/mile beginning in model year 2030 with no phase-in. This will harmonize the national and CARB-led regulations regarding PM.

In EPA's final rule, specific language was added to 40 CFR §86.1803-01 to clarify that cargo vans are not medium-duty passenger vehicles. CARB proposes to adopt EPA's updated medium-duty passenger vehicle definition for 2030 and subsequent model years and maintain the current definition through the 2029 model year.

Although CARB's light-duty non-methane organic gasses plus nitrogen oxides (NMOG+NO_X) fleet average will stay the same, CARB proposes to reduce the current NMOG+NO_X fleet average – from 150 mg/mile for class 2b vehicles and 175 mg/mile for Class 3 vehicles —to

[1] Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 89 Fed. Reg. 27842 (April 18, 2024) and 89 Fed. Reg. 50234 (June 13, 2024). https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-multi-pollutant-emissions-standards-model#rule-summary

EPA's combined fleet average of 75 mg/mile for model year 2030. This will again result in harmonizing CARB regulations with federal EPA regulations and will achieve equivalent stringency as EPA's projected internal combustion engine (ICE) medium-duty vehicle fleet average. CARB additionally proposes to reduce the current ACC II 8-10 mg/mile PM standard to align with EPA's more stringent 0.5 mg/mile standard for medium duty vehicles, beginning with 2031 model year.

California submitted a request to EPA to grant a waiver of preemption under Section 209(b) of the Clean Air Act for the state's ACC II regulation. Without this waiver neither California nor any Section 177 state that adopts ACC II can enforce the rules. EPA issued the waiver on December 17, 2024.

B. The U.S. Environmental Protection Agency 2027 Light-Duty/Medium-Duty Multi-Pollutant Rule

As discussed above, in June 2024, the U.S. EPA promulgated new and stronger standards to further reduce harmful air pollutant emissions from light-duty and medium-duty vehicles (also known as Class 2b and 3 vehicles) starting with model year 2027.[2] The standards will significantly reduce passenger car, light truck, and medium-duty vehicle emissions of greenhouse gases, hydrocarbons, NOx, and PM2.5, resulting in widespread reductions in air pollution. Reduced vehicle emissions will provide important benefits to communities near major roadways, where low-income households are concentrated and are disproportionately exposed to air pollution from vehicles. The new federal standards will phase in over model years 2027-2032. In this federal rule, medium-duty vehicles include primarily large pick-ups and vans with a gross vehicle rating of between 8,501 and 14,000 pounds, often used for work due to their higher towing and hauling capabilities as compared to light-duty vehicles.

For light-duty vehicles, EPA's standards will increase in stringency each year from model years (MY) 2027-2032. For light-duty vehicles, the greenhouse gas standards are projected to result in an industry-wide average target for the light-duty fleet of 85 grams/mile (g/mile) of CO_2 in MY 2032, representing a nearly 50 percent reduction in projected fleet average emissions levels relative to existing MY 2026 standards.

For medium duty vehicles (MDV), the standards phase in over a six-year period from MY 2027 through MY 2032. When fully phased in, the MDV standards are projected to result in an average target of 274 g/mile of CO_2 by MY 2032, representing a 44 percent reduction in projected fleet average emissions levels relative to the existing MY 2026 standards.

EPA established "Tier 4" criteria pollutant emissions standards for non-methane organic gases (NMOG), NOx, PM, and other criteria pollutants and their precursors. For light-duty vehicles, EPA established NMOG plus NOx standards that will phase down to a fleet average level of 15

[2] https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1019VP5.pdf

milligrams per mile (mg/mi) by MY 2032, representing a 50 percent reduction from the existing 30 mg/mi standards for MY 2025 established in the Tier 3 rule in 2014. For MDVs, EPA established NMOG+NOx standards that will require a fleet average level of 75 mg/mi by MY 2033, representing a 58 to 70 percent reduction from the Tier 3 standards of 178 mg/mi for Class 2b vehicles and 247 mg/mi for Class 3 vehicles. The standards will also reduce emissions of mobile source air toxics.

For both light-duty and medium-duty vehicles, EPA also established a PM standard of 0.5 mg/mi and a requirement that the standard be met across three test cycles, including a cold temperature (-7°C) test. The PM standard is a per-vehicle cap (not a fleet average) and will be fully phased in by MY 2030 for light-duty vehicles and by MY 2031 for medium-duty vehicles. EPA projects the PM standard will reduce tailpipe PM emissions from gasoline vehicles by over 95 percent, in addition to reducing mobile source air toxics. To meet the more protective PM emissions standard, manufacturers will likely widely utilize gasoline particulate filters on vehicles with internal combustion engines.

EPA projects that the new national standards will accelerate the transition to clean vehicle technologies. EPA projects that, from MYs 2030-2032, manufacturers may choose to produce battery electric vehicles (BEVs) for about 30 to 56 percent of new light-duty vehicle sales and about 20 to 32 percent of new medium-duty vehicle sales.[3] EPA also projects that consumers will see an increase in the availability of other clean vehicle technologies, including hybrid electric vehicles and plug-in hybrid electric vehicles, as well as cleaner gasoline vehicles. Unlike ACC II, EPA does not have a ZEV sales requirement and auto manufacturers (OEMs) may choose to employ ZEVS, PHEVS, Hybrid and ICE vehicles to meet the proposed fleet wide standards. More than 100 plug-in hybrid and full battery electric vehicle models are already available in U.S. markets, alongside hybrid and gas-powered options, giving Americans unprecedented flexibility in where and how they choose to fuel.

However, there remain important differences between the CARB and federal light-duty programs. ACC II has stronger durability requirements for 2030, requiring 80% range for 10 years/150k miles versus EPA's proposed 70% usable battery energy for 8 years/100k miles. ACC II requires other ZEV assurance measures such as battery labeling for recycling, minimum 150-mile range, charging cord required and multiple direct current fast charger (DCFC) capability.

EPA's proposed Non-Methane Organic Gases (NMOG)+NOx fleet average will reduce from 30 mg/mile to 15 mg/mile by 2032. ACC II's NMOG+NOx fleet average remains 30 mg/mile, but no longer includes ZEVs after model year 2029. This means that any non-ZEVs that continue to be sold by manufacturers will have to meet this fleetwide average on their own, without benefiting from "watering down" the average with zero emissions vehicles. Therefore, CARB projects that ACC II will result in greater reductions in NMOG +NOx than the EPA's rule, due to the increased ZEV sales requirement.

[3] https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1019VP5.pdf

Last year, the International Council on Clean Transportation (ICCT) completed a state-by-state analysis of the GHG emission reductions attributable to the ACC II Program and the EPA 2027 Light-duty/Medium duty Multipollutant rule as proposed. For Maine, the cumulative reductions from 2025-2040 due to adoption of the EPA proposed rule was 9.2 million metric tons of carbon dioxide equivalent greenhouse gases (CO_2e), versus 17.0 million metric tons of CO_2e in reduced GHG emissions due to adoption of the ACC II Program (Figure 2). EPA's final rule is less stringent than the proposal ICCT evaluated, meaning ACC II will result in even greater reductions of CO_2 than the federal standard.

Incremental increase in GHG benefit for ACC II over EPA's Light duty/Medium duty multi-pollutant proposal, 2025-2040:

- 123% for NO_x
- -17% for $PM_{2.5}$
- 83% for Wheel-to-Well CO_2e[4]

State	2025-2040 Cumulative Reductions, EPA 2027 MP Proposal			2025-2040 Cumulative Reductions, ACC II Implementation MY 2028-2032		
	NOx (U.S. tons)	PM2.5 (U.S. tons)	CO2e (MMT)	NOx (U.S. tons)	PM2.5 (U.S. tons)	CO2e (MMT)
ME	897	170	9.16	2,004	141	16.76

Figure 2
A Comparison of Emission Reductions under the ACCII and Federal Programs

Overall, ACC II provides better consumer protection, larger GHG reductions, and better air quality improvements.

III. Electric Vehicle Adoption Rates

A. National Trends

EV sales data from the Alliance for Automotive Innovation shows continued and significant growth in sales shares in the United States from 2021 through the third quarter of 2023.[5] Figure

[4] Total greenhouse gas emissions produced by a fuel from its extraction or generation to its use in a vehicle. This includes all emissions related to the fuel's production, processing, distribution, and use.
[5] https://www.autosinnovate.org/EVDashboard

3 illustrates the increase in quarterly sales (bars, left axis) and EV sales shares (red line, right axis). EV sales increased from about 125,000 in Q1 2021 to 375,000 in Q3 2023. The year 2023 also marked the first time that annual U.S. EV sales surpassed 1 million, achieved by Q3; sales through the first three quarters of 2023 were about 58% higher than the same period in 2022.

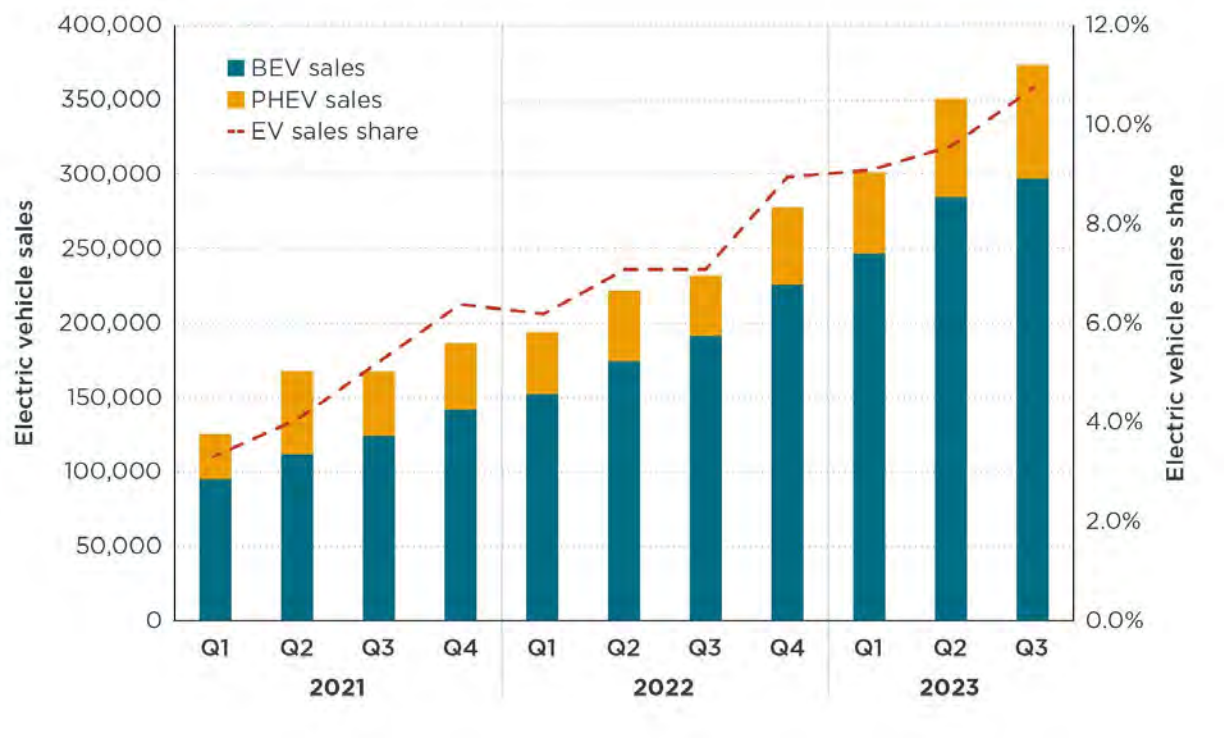

Figure 3
Electric Vehicle Adoption Rates in the United States

Additionally, state-level data shows that several states are far ahead of the national averages shown in Figure 4. California leads the country and EVs were nearly 27% of sales in the state through September 2023; this means that more than one in every four new light-duty vehicles sold in that state were battery electric or plug-in hybrid electric. Another 12 states—Washington, Oregon, Colorado, Nevada, New Jersey, Massachusetts, Maryland, Hawaii, Connecticut, Virginia, Vermont, and Arizona—and the District of Columbia had EV sales shares between 10% and 20% through Q3 2023.[6]

The graph below (Figure 5) shows the ZEV sales[7] for the third quarter of 2024 in the Section 177 states that have adopted California's ACC I, which includes Maine. The percentage of ZEV sales in the third quarter of 2024 in Maine was 6.7%, up from less than 1.5 percent in 2020.

[6] https://theicct.org/us-ev-sales-soar-into-24-jan24/
[7] Both battery electric and plug-in hybrid

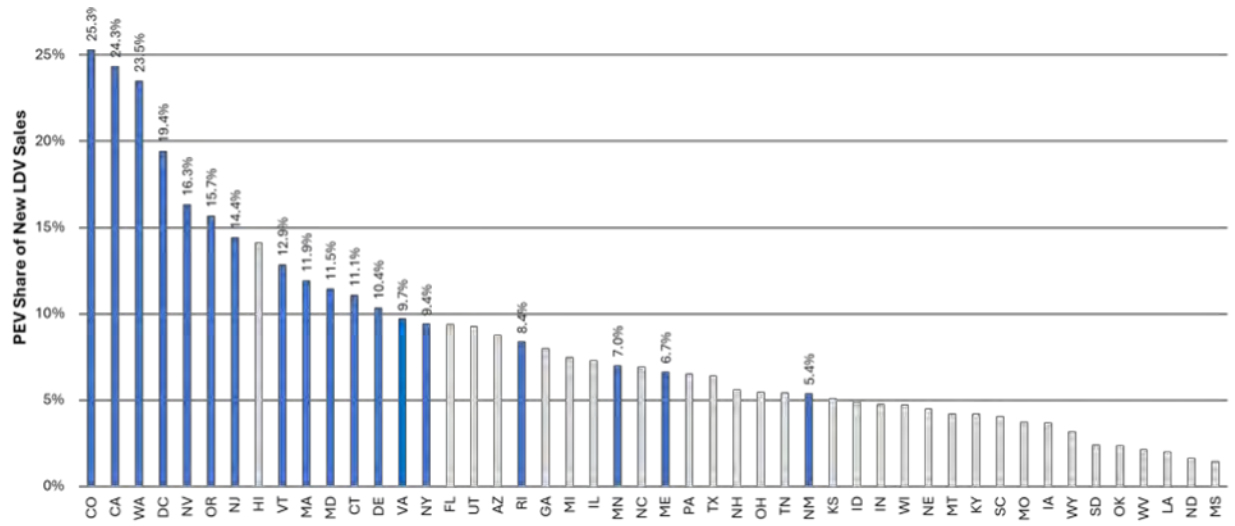

Figure 4
U.S. Light-Duty Battery Electric and Plug-in Hybrid Light-duty Vehicle Sales in the Unites States

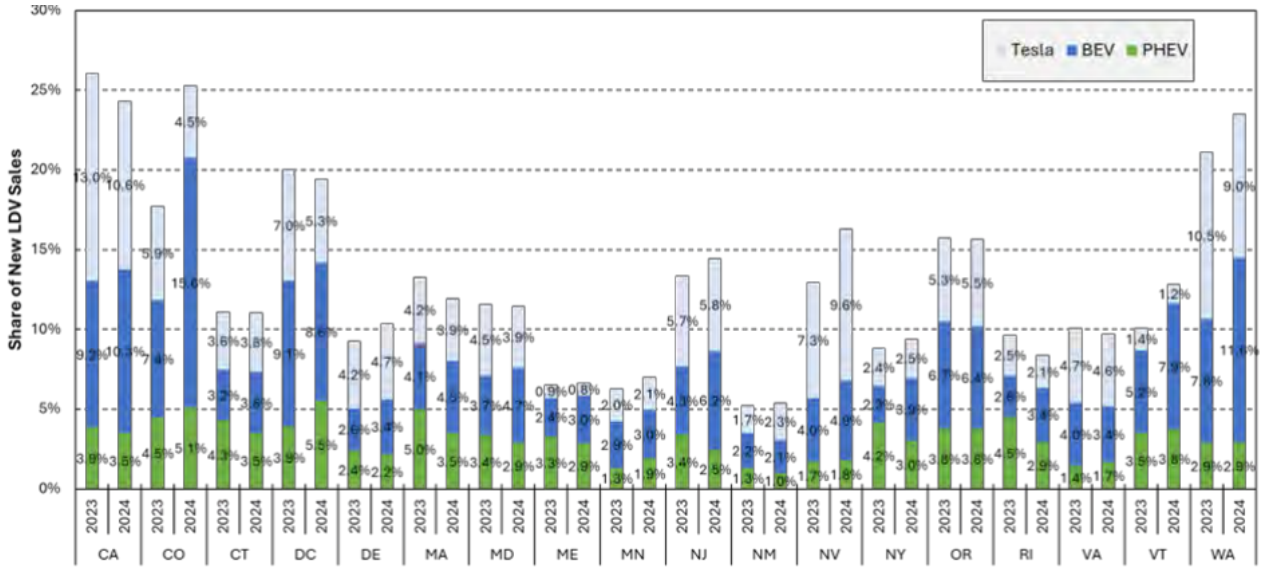

Figure 5
ZEV sales for the third quarter of 2024 in the Section 177 States
Source: Experian via Atlas Public Policy's EV Hub https://www.atlasevhub.com/materials/ev-market-dashboard/

B. Maine's Trends for EV Registrations

The table below shows the current registrations in Maine through November of 2024. These electric vehicles are defined as battery electric (BEV), plug-in hybrid electric (PHEV), and neighborhood electric vehicle (NEV) with top speeds of 25 mph which are permitted on roads having speed limits of up to 35 mph.

ZEVCLASS	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
BEV	151	206	312	486	899	1388	2355	3462	5182	8629
NEV	58	54	65	65	61	94	101	159	233	358
PHEV	651	827	1081	1479	2020	2299	3365	4607	5842	8643

Table 1
EV Registrations in Maine

Source: Recharge Maine: Maine Electric Vehicle Charging Infrastructure

IV. Barriers to EV Adoption

Although EV adoption rates are increasing in Maine and other states, there are a number of barriers, both real and perceived, that will need to be addressed before these vehicles are more widely accepted. Consumer concerns about the price of new vehicles, vehicle availability at dealerships, charging infrastructure (and range anxiety), and safety are among the barriers reported against wider EV adoption.

A. Purchase Price

One obstacle to the widespread adoption of EVs is their relatively high purchase price when compared to their gasoline counterparts. This price disparity is primarily attributed to the cost of batteries, a critical component of EV technology. While the cost of battery technology is coming down, and while some all-electric models have already reached price parity with their conventional alternatives, cost deters potential buyers from making the switch to electric. Many potential buyers focus predominantly on the initial purchase price, overlooking lower overall cost of ownership from reduced fuel expenses – driven both by increased efficiency of electric motors and the lower price of electricity as compared to gas and diesel - as well as decreased maintenance needs.

A study conducted by JD Power published in April 2024, involving over 8,000 consumers nationwide, revealed that more than half of the individuals who expressed reservations about EVs believe that the purchase price needs to be within $1,000 of a comparable gasoline vehicle for them to consider making the switch.[8] This highlights the importance of cost in the decision-making process for consumers. Existing price differentials create a financial hurdle, particularly for low- and moderate-income households, who may struggle to afford the initial investment in an EV despite long-term savings on fuel and maintenance.

Various studies have analyzed the trajectory of EV costs. A 2022 study by the International Council on Clean Transportation conducted a detailed examination of vehicle component-level costs to project when price parity with internal combustion engine (ICE) vehicles might be achieved (Table 2). The findings indicated that, without considering any additional benefits from state or federal tax credits or rebates, price parity is anticipated to occur for EVs with a

[8] https://www.jdpower.com/sites/default/files/file/2024-04/U.S.%20EVC%20Study%20Product%20Page.pdf

range of 100 to 150 miles between 2024 and 2026 (indeed, some models have already reached this), for EVs with a range of 250 to 300 miles between 2027 and 2029, and for BEVs with a range of 350 to 400 miles between 2029 and 2033.[9]

Vehicle class	Range (miles)					
	BEV-150	BEV-200	BEV-250	BEV-300	BEV-350	BEV-400
Car	2024	2025	2027	2028	2029	2030
Crossover	2024	2025	2027	2028	2029	2030
SUV	2024	2025	2027	2028	2029	2030
Pickup	2025	2026	2028	2029	2031	2033

Table 2
Summary of Year by which Battery Electric Price Parity is Reached
Note: Numbers in table are rounded to the nearest calendar year
Source: ICCT ASSESSMENT OF LIGHT-DUTY ELECTRIC VEHICLE COSTS AND CONSUMER BENEFITS IN THE UNITED STATES IN THE 2022–2035 TIME FRAME

With the inclusion of the full federal tax credit—currently set at $7,500—as well state rebates offered through Efficiency Maine, incentives significantly accelerate the timeline for achieving price parity. With financial incentives, some models have already achieved price equivalency with their gasoline counterparts, making the transition to EVs more accessible. However, EVs equipped with all-wheel drive, which is important for many Maine drivers, remain more expensive, even with available financial incentives.

B. Availability of EVs at Dealerships

Local dealerships play a crucial role in the adoption of EVs, but several challenges limit their effectiveness in the market. One significant issue is the limited inventory of EVs at many dealerships. According to the Dunsky's Energy + Climate Advisor's EV Market Assessment prepared for Efficiency Maine, the supply of EVs at local dealerships is constrained in Maine as compared to national averages.[10] In the Northeast, a Sierra Club report found that only 32% of dealerships had an EV available for sale. Among those without inventory, 46% indicated they would sell EVs if they were available, while 40% expressed no interest.[11]

Additionally, Efficiency Maine discovered in conversations with local dealerships that most EVs coming off leases are being sent to out-of-state auctions, where they often end up in other states, limiting the growth of the used EV market in Maine.[12] Efficiency Maine requires rebate recipients to maintain ownership of rebated vehicles in Maine for at least 36 months.

[9] https://theicct.org/wp-content/uploads/2022/10/ev-cost-benefits-2035-oct22.pdf
[10] https://www.efficiencymaine.com/docs/TPVI_Appendix_L3_EV_Market_Assessment.pdf
[11] https://www.sierraclub.org/sites/www.sierraclub.org/files/2023-05/SierraClubRevUpReport2023.pdf
[13] https://www.efficiencymaine.com/docs/TPVI_Appendix_L1_Electric_Vehicle_and_Public_Electric_Vehicle_Charging_Analysis_and_Considerations_11-24.pdf

However, as demand for EVs grows and manufacturing and production increases, dealership availability is expected to improve. State and federal regulatory policies also influence availability of EVs at dealerships. California's Advanced Clean Car II rule gives the manufacturers credit as an incentive to keep vehicles coming off-lease in the states that have adopted ACC II.

Supply chain disruptions, inventory challenges, and automaker allocations have hindered the availability of EVs. In areas with low consumer demand and skepticism about EVs, this hesitation leads to a cycle: without strong demand, dealerships are less likely to stock EVs, which in turn reduces inventory, resulting in fewer vehicles for consumers to view and consider for purchase. Although supply was limited during the COVID-19 pandemic, production has since ramped up, resulting in shorter lead times for customers.

As the adoption of electric vehicles (EVs) grows, it is crucial to ensure that manufacturers can meet the increasing demand. Estimating battery production capacity serves as an effective indicator for predicting vehicle production levels. Looking ahead, projections show that by 2028, 100% of the EPA's anticipated demand for EVs will be met by manufacturers, emphasizing the importance of local dealerships in preparing for this shift.[13] However, the current lack of variety in available models on the lot in Maine creates a perception of limited consumer choice for EVs. The graph below (Figure 6) shows projected U.S. battery demand and announced battery production capacity (2022-2032).

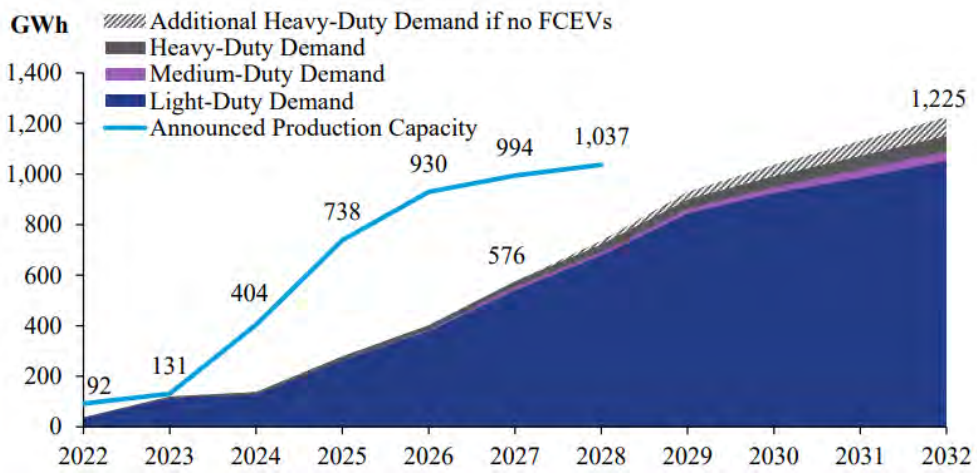

Figure 6

Projected U.S. Battery Demand and Announced Battery Production Capacity

Source: Environmental Defense Fund

In addition to supply challenges, some dealerships and salespeople are in the process of becoming more familiar with EVs and enhancing their knowledge. Currently, some salespeople may lack comprehensive information about EV technology, charging requirements, and

[13] https://www.edf.org/sites/default/files/2023-12/EDF%20Analysis%20on%20US%20Battery%20Capacity%2012.13.23%20final%20v3.pdf

available federal and state incentives. Efficiency Maine offers training for dealership staff to help address this gap. By improving staff knowledge and expanding the variety of inventory, while at the same time investing in efforts and advertising that help drive local demand, local dealerships can foster greater consumer interest in EVs.

C. Public EV Charging Infrastructure Reliability and Availability

For most EV drivers, 80% of charging happens at home, bringing the convenience of topping up on gas into the garage. The cost of installing a Level II charger at home could cost up to $2,000, which includes both equipment and electrical upgrades.[14]

According to survey results from the 2024 report provided by Dunsky Energy + Climate Advisors to Efficiency Maine (Dunsky Report) found that home charging access is a constraint for Mainers adopting EVs. Also, the U.S. Department of Energy found that employees who have access to workplace charging are six times more likely to own an EV than those who lack access.[15]

EV charging infrastructure reliability and availability is commonly cited as the top barrier to EV adoption across the nation. Maine's distinctive rural landscape poses logistical challenges for establishing a visible and comprehensive charging network. As a result, it can be difficult to ensure that publicly available charging stations are accessible to all residents, particularly those in remote areas.[16] Significant efforts are underway to address these concerns and improve access for everyone, especially along those routes most traveled (see the Appendix for a detailed look at charging infrastructure in Maine).

Maine already has an adequate number of public charging ports to support the current EV population, and the median range for all 2023 EV models is nearly 270 miles[17], providing more than sufficient range to cover average daily driving distances in Maine, even for residents in rural parts of the state. When drivers need to charge on the go, Maine has more than 1,000 public charging ports available across the state.[18] However, public perception and visibility of public charging stations can still lead to adoption challenges. Many people tend to overestimate the range they need. Data from the 2017 National Household Travel Survey shows that the average daily miles driven in private cars is 33 miles for urban residents and 30 miles for rural residents in Maine.[19]

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[14] https://afdc.energy.gov/fuels/electricity-infrastructure-development

[15] https://afdc.energy.gov/files/u/publication/federal_wpc_case_study.pdf

[16] The University of Maine examined the concerns of low income and disadvantaged communities (including rural communities) as part of Maine's 2024 climate plan. *See:* https://digitalcommons.library.umaine.edu/cgi/viewcontent.cgi?article=1057&context=rural_issues

[17] https://www.energy.gov/eere/vehicles/articles/fotw-1323-january-1-2024-top-range-model-year-2023-evs-was-516-miles-single

[18] https://afdc.energy.gov/fuels/electricity-locations#/analyze?country=US&region=US-ME&tab=fuel&fuel=ELEC

[19] https://www.nhtsa.gov/data

The state is actively working to expand the EV charging network in a strategic and efficient manner, ensuring charging stations reach rural areas, with coverage across all major travel corridors. Significant federal funding for EV charging has been awarded to the state (formula and competitive funding), setting the state for significant investment and transformation in the next few years. The investment will enhance charging access along highways, near multi-family housing, at large workplaces, and in other community locations across the state.

Research from the National Renewable Energy Laboratory (NREL) underscores the critical and consistent role that charging availability and reliability play in influencing EV adoption.[20] For example, 53% of participants in a Pew Research Center survey expressed doubts about the U.S. developing sufficient charging infrastructure to support large-scale EV adoption. This perceived lack of availability directly impacts consumer willingness to transition to EVs.[21]

A 2022 Consumer Reports survey with over 8,000 participants found that uncertainty about "where and when I'd be able to charge" was the top barrier to acquiring a battery electric vehicle (BEV), followed closely by concerns about range and costs.[22] While Maine's current infrastructure may be adequate for existing EVs, addressing public perception about public charging is essential.

Previous quantitative analyses reinforce the significance of charging availability. Research by Narasimhan and Johnson (2018) found that an additional charging station per 100,000 drivers correlated with a 7% increase in BEV sales and a 3% increase in plug in hybrid electric (PHEV) sales.[23]

D. Workforce

Maine is currently experiencing a shortage of trained technicians to service EVs, a concern highlighted in previous surveys. Although EVs generally require less maintenance than ICE vehicles due to their simpler mechanics and the absence of internal combustion engines, potential owners still need reassurance that reliable service will be accessible should any issues arise. This gap in skilled labor affects consumer confidence in EVs.

Additionally, federal funding for EV charging infrastructure mandates that the workforce involved in the installation, maintenance, and operation of chargers adhere to specific safety regulations. This includes ensuring that electricians/installers are certified through the Electric Vehicle Infrastructure Training Program (EVITP) or enrolled in a registered apprenticeship program that offers charger-specific training.

[20] https://www.nrel.gov/docs/fy24osti/89896.pdf
[21] https://www.pewresearch.org/short-reads/2023/07/13/how-americans-view-electric-vehicles/
[22] https://advocacy.consumerreports.org/wp-content/uploads/2022/08/2022-Battery-Electric-Vehicles_by-gender-1.pdf
[23] https://iopscience.iop.org/article/10.1088/1748-9326/aad0f8/pdf

Significant efforts are underway to address these challenges. The Governor's Energy Office (GEO) launched the Clean Energy Partnership, aimed at advancing innovation, clean energy and energy efficiency workforce development statewide. Part of this effort included establishing the Maine Clean Energy Jobs Network, an online platform connecting job seekers with clean energy employers and workforce training opportunities, including those related to EVs.[24] Additionally, Eastern Maine Community College and Southern Maine Community College have already developed EV technician training programs, which they have been offering to fully-enrolled classes of both new students and existing mechanics looking to expand their skills to fix EVs.

Regarding EV charging stations, Maine DOT, in partnership with the Maine Department of Labor, aims to train up to 143 new EVSE apprentices through various workforce programs.[25] These apprenticeships will focus on high-voltage installations, including Level 2 and DC fast charging equipment, and will include specialized training such as EVITP certification.

E. Misconceptions about EVs

Numerous misconceptions about EVs discourage their adoption, particularly among individuals unfamiliar with this emerging technology. Research conducted by Vermont Energy Investment Corporation (VEIC) and The Nature Conservancy reveals significant gaps in knowledge regarding EV performance, charging, and the total cost of ownership, as well as perceived barriers to adoption. Rural drivers in Northern New England often express heightened concerns about battery range, winter performance, and the availability of EV models in their areas, regardless of actual observed market conditions and operational performance in all weather. A 2021 market study by The Nature Conservancy and Efficiency Vermont found that, while many rural drivers have some awareness of EV technology, most lack direct personal experience with EVs.[26] The EPA underscores the vital link between awareness and education in promoting EV adoption. Their findings indicate that a lack of understanding about the benefits of EVs—such as lower operating costs and available incentives—significantly affects consumer willingness to transition to electric. [27]

There are concerns that EV batteries are prone to spontaneous fire and explosion, and that battery fires are extremely difficult to extinguish. However, EVs must pass the same safety tests as other vehicles, and data shows EV fires are rare compared to fires in gasoline-and diesel-powered vehicles.[28, 29] One caveat is that EV fires tend to burn longer and at a higher intensity,

[24] https://mainecleanenergyjobs.com/
[25] https://www.efficiencymaine.com/docs/2024-MAINE-NEVI-PLAN.pdf
[26] https://www.nature.org/content/dam/tnc/nature/en/documents/TNC_NNE_Rural_EV_Toolkit_April_2022_Final.pdf
[27] https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=OTAQ&dirEntryId=353465&submit=Search https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=OTAQ&dirEntryId=353465&submit=Search
[28] https://www.autoinsuranceez.com/gas-vs-electric-car-fires/
[29] https://electrek.co/2022/01/12/government-data-shows-gasoline-vehicles-are-significantly-more-prone-to-fires-than-evs/

although this is being addressed through safer battery designs and new fire management techniques.[30] Fire risks may be mitigated by refraining from overcharging the battery, 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.[31]

V. Strategies and Policy to Address the Barriers to Adoption

A. Strategic Incentives for EVs

1) EV Purchase Rebates for Low- and Moderate-Income Drivers

Many states provide purchase incentives for EVs. Among the 17 states and Washington, DC that have adopted the original Advanced Clean Cars regulation (ACC I), seven states, including Maine, offer additional incentives specifically for low-income consumers.[32]

Efficiency Maine has implemented an income-based, point-of-sale purchase rebate for EVs, first launched in 2019. Until recently, this program allowed Mainers of any income level to receive $2,000 for a new BEV and $1,000 for a new PHEV for eligible vehicles. Higher rebates were available based on income levels: moderate-income households could access $3,500 for new BEVs and $2,000 for new PHEVs, while low-income households could receive $7,500 for new BEVs, $3,000 for new PHEVs, and $2,500 for used BEVs or PHEVs. On November 16, 2024, Efficiency Maine suspended all electric vehicle (EV) rebates with the exception of those for low-income Mainers due to all funds being committed. No other Efficiency Maine programs are affected by this change; only EV rebates are affected.

The graph below (Figure 7) created by Atlas Public Policy for Recharge Maine shows the cumulative number of rebates issued by Efficiency Maine over time.[33]

[30] https://www.cnbc.com/2022/01/29/electric-vehicle-fires-are-rare-but-hard-to-fight-heres-why.html
[31] https://www.nhtsa.gov/battery-safety-initiative
[32] https://theicct.org/wp-content/uploads/2024/05/ID-154-%E2%80%93-U.S.-EVs_final.pdf
[33] https://atlaspolicy.com/rechargemaine/

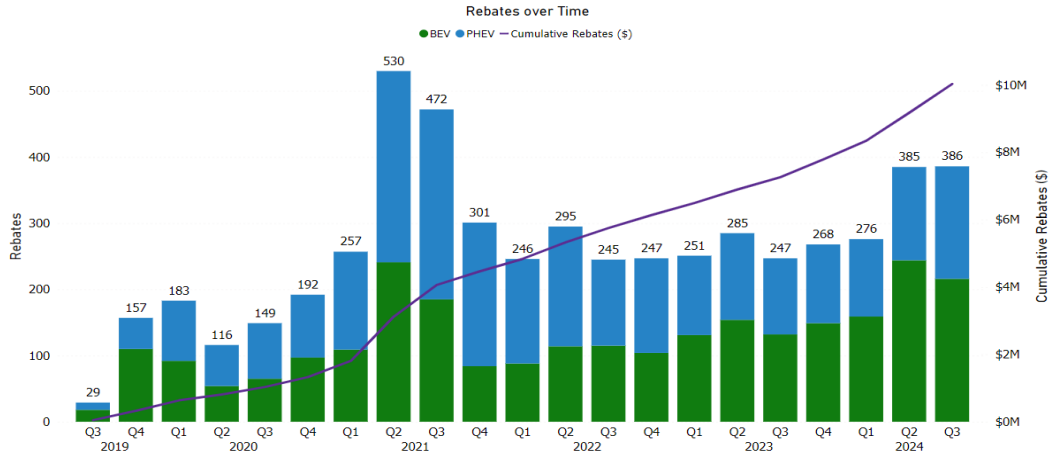

Figure 7

Cumulative Rebates Issued by Efficiency Maine Trust *Source:* Atlas Public Policy

According to survey results from the Dunsky Report, the Efficiency Maine rebate had an influence on the majority of eligible buyers. Specifically, over two-thirds (68%) of all respondents stated that the influence of the rebate on their purchase decision was moderate to high (responses of 6 to 10 out of 10). The rebate influenced low- and moderate-income (LMI) households more than any income households. Nearly all (92%) of LMI recipients stated that the rebate had a moderate to high impact on their EV purchase decision, compared to 66% of any income recipients. This demonstrates LMI rebate structure effectively offsets costs and encourages greater EV adoption.

Further, over half of any-income respondents (52%) say they would have still purchased an EV if there was no rebate available, whereas only 22% of LMI recipients felt the same. To maximize the effectiveness of available funds, the study recommends that the state prioritize EV rebates for low- to moderate-income households, which received only 17% of state EV rebates in 2024.[34]

The Dunsky Report regression model suggests that the impact of the rebate in Maine has likely been positive: specifically, it suggests that EV sales in Maine would have been approximately 10% lower in 2022 without the incremental benefit of the Efficiency Maine rebate[35] (the predicted sales rate without the rebate is 5.0% and with the rebate is 5.6% in 2022) (Figure 8).

[34] https://www.maine.gov/climateplan/sites/maine.gov.climateplan/files/2024-11/MWW_2024_Book_112124.pdf
[35] Electric Vehicle Market Assessment: Historical and Forecasted Adoption and Influence of Rebates. Dunsky Energy + Climate Advisors. July 24, 2024

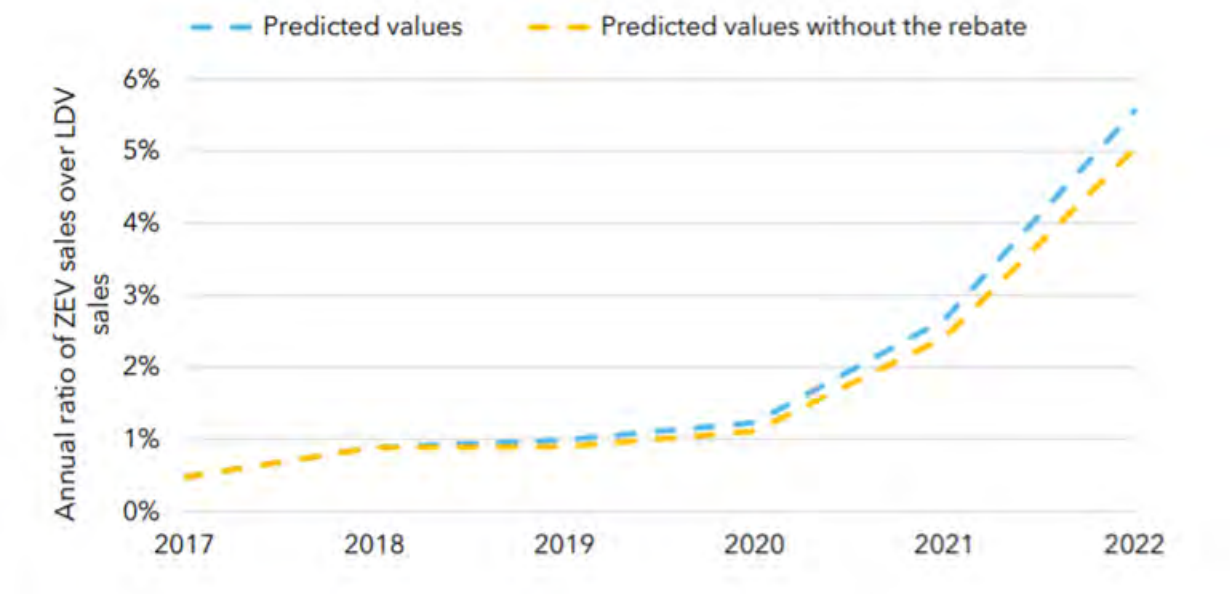

Figure 8
Isolated impacts of the Efficiency Maine Rebate according to the regression model

2) Loan Loss Reserve Program

Loan Loss Reserve (LLR) programs offer protection against defaults for financial institutions like local banks and credit unions, making it easier for them to finance EV purchases, especially for low-income borrowers. These programs act as a form of credit enhancement, allowing lenders to provide below-market interest rates, which can significantly encourage participation from low-income consumers who often struggle to obtain financing due to limited or poor credit histories. By helping low-income individuals access more affordable loans, LLR programs enable them to consider EVs as a realistic option, allowing them to take advantage of the lower operating costs associated with EVs. This could help reduce the financial barriers that have traditionally restricted low-income households from entering the EV market.

The Federal Reserve's findings highlight how LLR programs can effectively boost the adoption of EVs.[36] Their research shows that the Asset-Backed Securities market views a higher share of EVs as lower risk, which allows lenders to lower the amount they need to set aside for potential loan losses. This results in savings of about $233 for each EV loan, which can help keep costs down for consumers. Additionally, borrowers of EVs are 29% less likely to default compared to those with ICE vehicles, due to less fuel and maintenance costs, giving lenders even more reason to support EV financing. By using LLR programs, lenders can offer better financing terms, making EVs more affordable and attractive to a broader range of consumers.

[36] https://www.federalreserve.gov/econres/feds/files/2024065pap.pdf

Some states have implemented these programs. The California Air Resources Board's "Financing Assistance for Lower-Income Consumers"[37] program offers low-interest loans and vehicle buy-downs to help lower-income individuals purchase new or used zero-emission or hybrid vehicles. This initiative has successfully supported thousands of projects that benefit low-income households. Additionally, New York's Loan Loss Reserve Program[38] enhances clean energy financing options, including for EVs, and provides a Climate Finance Toolkit to help lenders effectively utilize the program.

3) Cash for Clunkers Program

The "Cash for Clunkers" program was a federally funded initiative, established by the federal government in response to the economic recession of 2008, resulting in the replacement of nearly 700,000 older, fuel inefficient vehicles. It was estimated that the program prevented an estimated 4.4 million metric tons of CO_2-equivalent emissions, or about 0.4% of annual emissions from light-duty vehicles in the U.S. This impact underscores the program's effectiveness in promoting cleaner vehicles and enhancing air quality. While the program ran for a short time at the federal level, states such as Vermont[39] and California[40] have implemented their own variations, focusing on promoting EVs and addressing specific regional environmental goals. In 2001, Maine had a similar program called Scrap and Buy which provided 67 vouchers to replace a high-emitting, gas guzzling vehicle with a cleaner more fuel-efficient vehicle. The popular program ran out of funding in the first year.

B. Increase Access to EV Charging at Home and Work

1) EV Charging Building Standards

An increasing number of states and cities such as Seattle are implementing EV charging standards for buildings and residential developments to enhance EV charging accessibility. For new housing, commercial spaces, and public buildings in those jurisdictions, a designated percentage of parking spaces must be EV-ready and/or equipped with Level 2 EV charging stations.[41] As the EV stock increases, the percentage of EV owners with single-family home charging access decreases dramatically, reinforcing the importance of multi-family housing and workplace charging.[42]

[37] https://www.caclimateinvestments.ca.gov/financing-assistance-for-lowerincome-consumers
[38] https://www.nyserda.ny.gov/All-Programs/Loan-Loss-Reserve-Program
[39] https://afdc.energy.gov/laws/12656
[40] https://afdc.energy.gov/laws/11161
[41] EV-ready is a term used to describe a property or facility that is equipped with the necessary electrical infrastructure (such as sufficient electrical capacity and pre-wired circuits) to support the installation of an EV charging station.
[42] https://www.nrel.gov/docs/fy22osti/81065.pdf

Given that new residential, commercial, and public buildings are designed to last for decades, it is crucial to integrate EV charging infrastructure at the pre-construction stage to meet the charging needs of future EV owners. Research from the U.S. Department of Energy's Pacific Northwest National Laboratory indicates that the costs associated with installing EV charging infrastructure during new construction are significantly lower than retrofitting existing structures. These additional retrofit costs typically include labor for demolition, trenching, circuit balancing, and new permitting expenses. For example, a case study from San Francisco estimates that retrofitting an existing building with two EV-ready spaces costs approximately $3,710, whereas the cost for the same spaces in new construction is only $920, or 75% less.[43]

Several states, including Massachusetts[44], Connecticut[45], and Delaware[46], require a combination of parking spaces at new developments to be either EV-ready or equipped with EV charging stations. During Maine's 131st Legislature, a bill was introduced to mandate the installation of EV charging stations in new commercial and multifamily parking lots. However, the bill ultimately did not pass.[47] By mandating provisions in new developments, access to EV charging can be significantly improved at workplaces, public facilities, and multifamily housing, particularly benefiting rural communities that need more opportunities to charge at home and at work.

2) Streamline Local Permitting and Zoning Processes

In the coming years, requests for permit approvals are expected to surge due to federal and state funding for EV charging stations. Consequently, local governments or utilities with lengthy and complicated processes may face significant backlogs of projects awaiting approval, resulting in delays in charger deployment. Many states, municipalities, and utilities offer guides aimed at streamlining the local permitting process for installing EV charging stations, helping to address any identified obstacles. Some local governments have implemented best practices to expedite the permitting process for DCFC stations and clarify their status within zoning codes. Although zoning and permitting fall under local jurisdiction, several states have taken proactive measures to inform local authorities about these effective practices and encourage their adoption.

Delays in the local permitting process can lead to increased construction costs and extended project timelines. The Northeast States for Coordinated Air Use Management (NESCAUM) outlines several actions states can take to assist local governments or authorities having jurisdiction (AHJ).[48] States can develop resources such as guidance documents and model ordinances to help streamline permitting processes. They can also provide online resources,

[43] https://www.energycodes.gov/sites/default/files/2021-07/TechBrief_EV_Charging_July2021.pdf
[44] https://afdc.energy.gov/laws/11758
[45] https://afdc.energy.gov/laws/12955
[46] https://afdc.energy.gov/laws/13353
[47] https://www.mainelegislature.org/legis/bills/display_ps.asp?ld=524&PID=1456&snum=131
[48] https://www.nescaum.org/documents/ev-charger-permit-and-zoning-streamlining-fs-12-05-23.pdf

engage in targeted outreach to high-priority jurisdictions, or pass state laws that require AHJs to adopt expedited permitting procedures.

For example, California mandates that all cities and counties enact ordinances to create expedited and streamlined permitting processes for EV chargers.[49] To support this mandate, the state has developed resources outlining permitting best practices, including example language and checklists, as well as an EV charging station permitting guidebook. They also require AHJs to create a checklist of requirements for expedited reviews that is accessible online. Colorado has enacted a comparable law.[50]

States can further facilitate the installation of EV charging stations by requiring localities to establish a standardized and transparent permitting review process, simplify the review and approval workflow, and implement online permitting systems. New Jersey has developed a Best Management Practice Guide[51] to promote EV charging station installation, which emphasizes standardizing and clarifying the permitting review process, similar to initiatives in New York.[52]

3) Right to Charge Laws

"Right to Charge" laws empower residents of multifamily housing, and homeowners, to install home charging stations. Homeowners may face restrictions from homeowner's associations (HOAs) regarding the installation of EV chargers, while renters encounter even greater challenges, as many leases prohibit modifications to the property, including the installation of charging stations. As 80% of charging for most EV drivers happens at home, access to at-home charging significantly increases the likelihood of purchasing an EV.

Under "Right to Charge" laws, individuals are responsible for all costs associated with installing charging, ensuring that HOAs and landlords are not obligated to finance the installations. Right to charge laws also help clarify responsibilities and address common concerns of renters.

Several states have enacted right to charge laws to promote home charging. For instance, Connecticut's Condominium Act prevents condominium associations from prohibiting or restricting the installation and use of EV chargers.[53] The law also clarifies that the condominium unit owner is responsible for obtaining necessary approvals and covering all costs associated with the charger.

[49] https://afdc.energy.gov/laws/11660
[50] https://afdc.energy.gov/laws/13463
[51] https://dep.nj.gov/wp-content/uploads/drivegreen/pdf/chargeupyourtown.pdf
[52] https://www.nyserda.ny.gov/-/media/Project/Nyserda/files/Programs/clean-energy-siting/DC-Fast-Charger-Guidebook.pdf
[53] Connecticut General Statutes, Chapter 825, Section 47-90h. https://law.justia.com/codes/connecticut/title-47/chapter-825/section-47-90h/

Additionally, Connecticut has introduced a similar law for rental properties, requiring landlords to approve tenant requests for charger installations.[54] Tenants must comply with all relevant regulations and take on responsibility for the chargers.

4) Residential Level 2 EV Charging Rebates for Low-Income Drivers

An EV charging rebate program specifically for low-income households would help to reduce barriers to adopting EVs. Low- and moderate-income households allocate a larger share of their income to transportation expenses compared to high-income households.[55] Rebates for the purchase and installation of Level 2 chargers at home would lower the upfront costs of EV adoption and provide access to convenient and cheaper charging.

C. Expand EV Model Options- Direct Sales to Consumers

As the EV transition progresses, numerous new vehicle manufacturers focused solely on EVs and direct sales have emerged. Currently, twelve models are available from EV-only manufacturers. State laws that protect franchised dealerships by restricting direct sales to consumers may be limiting the growth of electric vehicle (EV) sales and undermining consumer choice. These laws, which require new vehicles to be sold through third-party dealerships, create barriers for EV manufacturers, especially those like Tesla, Rivian, and others that sell directly to customers.

Franchise laws may limit EV adoption by requiring consumers to rely on dealerships that are often not equipped to prioritize or stock electric vehicles. While limited, literature on EV direct-to-consumer sales demonstrates how the franchise dealer model impacts consumer choices and shapes EV adoption. Findings from the literature can be summarized in four main themes: 1) Consumers have poor EV buying experiences at dealerships, 2) dealers are incentivized to sell gas cars and trucks instead of EVs due to future service needs and the requirements of gasoline vehicles, 3) dealer franchise laws add costs for consumers, and 4) the direct-to-consumer sales model makes consumers and manufacturers better off. Atlas found that EV-only direct-to-consumer sales policy could potentially increase EV adoption between 2023 and 2030 by between 360,000 and 3.9 million units (1-13% increase) with a medium case increase of about 1.4 million (5% increase) additional EV sales.[56]

Early sales data indicate that markedly more EVs are sold in states with direct sales than in states where such channels are prohibited. In 2019, open states had an average EV market share of 3.4%, versus 1.3% in closed states. According to data from the National Automobile Dealers Association, in states where direct sales are open to at least one active EV

[54] Connecticut General Statutes, Chapter 830, Section 47a-13b. https://www.cga.ct.gov/2023/pub/chap_830.htm#sec_47a-1
[55] https://www.maine.gov/future/sites/maine.gov.future/files/inline-files/Maine%20Clean%20Transportation%20Roadmap.pdf
[56] https://atlaspolicy.com/wp-content/uploads/2022/09/direct-sales-report.pdf

manufacturer, dealerships saw 58% growth in sales revenue from 2012 to 2019. Over the same period, closed states only saw 29% growth. This shows that allowing manufacturers to sell directly to consumers can accelerate EV adoption without harming the overall automotive market.[57]

In Maine, vehicles must be sold by a licensed dealer. MRS Title 29-A, Chapter 9 requires dealers have a brick-and-mortar store and repair facility among other requirements. All electric vehicle manufacturers such as Tesla, Rivian, and Lucid have a different business model and sell their vehicles direct to consumers.

There are challenges for customers wishing to buy a vehicle from one of these EV-only manufacturers. For example, Tesla's nearest pick up location is in New Jersey, meaning customers must either travel there for pickup or arrange for home delivery. In contrast, traditional manufacturers like Chevrolet, Ford, and Toyota operate franchise dealerships in Maine, making it impossible for consumers to buy an EV model from those dealers directly from the manufacturer. If a desired EV is unavailable at a local dealership, consumers must rely on these dealers to purchase the EV, which can lead to higher costs and delays. Direct sales offer a fixed price and enhanced consumer protections, ensuring fair pricing regardless of gender and income-levels.

D. Develop a Robust EV Workforce

To ensure that Maine has a workforce capable of supporting the adoption of EVs, the state could build on existing initiatives aimed at advancing clean transportation jobs. While the Maine Clean Energy Jobs Network is a valuable resource, there is potential for additional programs that specifically facilitate Mainers entering EV-related careers and obtaining the necessary certifications and training to fill workforce gaps.

For example, the Colorado Department of Transportation launched the ZEV Workforce Development Grants program to support communities and organizations in establishing training programs aimed at growing the EV workforce. One initiative resulting from this funding was a community college in Colorado, which received grants to create scholarships for training, with a particular focus on female students, who are underrepresented in the automotive technician field.

Furthermore, the state could collaborate with partners to host and sponsor periodic EV safety and technician training courses, potentially hiring a training company to conduct in-person sessions. For example, Maine Clean Communities organized a training event in Southern Maine in 2023 that drew attendees such as technicians, fleet managers, and service staff.[58]

[57] https://www.act-news.com/news/direct-to-consumer-sale-of-evs-is-a-no-brainer/
[58] https://www.eventbrite.com/e/ev-safety-technician-training-course-tickets-727721232797?msockid=3a377bc36e64617916626f506f9960fb

Additionally, the state could continue to work closely with the Maine Community College System to enhance technician training programs and foster collaboration between schools that have established EV training and those that have yet to do so. Expanding the Maine Apprenticeship Program to include more EV charging apprenticeship opportunities would also be beneficial in growing the EV charging workforce needed for this transition.

E. EV Education for Consumers, Dealerships, and Employers

1) Consumer Education

To enhance public understanding of EVs and increase familiarity with the technology, the Transportation Working Group of the Maine Climate Council outlined actions to address this barrier including a recommendation to launch new education and awareness campaigns by 2026.[59] These initiatives would significantly promote the adoption of electric and plug-in hybrid vehicles throughout the state, targeting Maine communities, the dealer network, and employers.

Communities can build on existing efforts by Efficiency Maine by hosting tabling events, presentations at community centers, and ride and drives. Regional organizations could study consumer attitudes in their regions and identify knowledge gaps, particularly among disadvantaged populations. Tailored campaigns could be developed for various consumer segments and regions, focusing on "superusers" who typically drive over 40,000 miles annually. Recent outreach by the Mitchell Center has indicated that EV adoption and infrastructure are not top priorities in rural areas, where concerns about vehicle reliability and safety persist. To address these issues, a pilot program might be established, offering rural drivers an EV for a set period to gain experience with the vehicle and charging options.[60] Consumers are more likely to purchase an EV once they have tested it out (See Figure 9).

There are several organizations in the EV sector combatting misconceptions about EVs. The State can utilize existing resources and reduce time and resources spent building language for campaigns. For example, the ICCT recently launched a webpage “Clearing the Air: Understanding the EV Advantage” which addresses unfamiliar and complex issues in the transition to EVs such as cold weather performance, grid capacity, and consumer choice.[61]

[59] https://www.maine.gov/future/sites/maine.gov.future/files/inline-files/WG%20Transportation%20-%20Final%20Recommendations%20June%202024.pdf
[60] WG Transportation - Final Recommendations June 2024.pdf
[61] https://theicct.org/clearing-the-air-series-understanding-the-ev-advantage/

Figure 9
Drive Electric Week 2024: Ride and Drive in South Paris, Maine

2) Dealership Education

To support dealerships, the State could expand educational and training initiatives to deepen their understanding of EVs. This would include specialized training for technicians as well as information on rebates for EVs and plug-in hybrids. It is especially important for rural dealerships to offer these rebates. Currently, Efficiency Maine provides a range of educational materials at dealerships participating in the rebate program and is enhancing its resources to address the needs of specific customer segments, such as fleet managers, municipalities, homeowners, and tenants.

Efficiency Maine works closely with dealerships and sales staff to ensure that inquiries about EVs, purchaser eligibility, and rebate programs are effectively addressed. Ongoing training and information are provided to dealership staff to bolster their knowledge of EVs and the available rebates. Dealer education is essential, particularly given the variety of vehicle options and the limited availability of EV models for test drives. To tackle this challenge, the program collaborates with dealers and organizations to facilitate test drive opportunities.

3) Employer Education

To broaden outreach to employers, the State could partner with businesses to educate employees about EVs. This initiative might leverage the GO MAINE[62] program or Maine Clean Communities Workplace program, 'EMPOWER', demonstrating the benefits of providing EV charging options for employees.[63]

[62] https://gomaine.org/
[63] https://www.mainecleancommunities.org/empower

Appendix
Charging Infrastructure in Maine

In November 2021, the U.S. Congress enacted the Infrastructure Investment and Jobs Act (IIJA), including the $7.5 billion National Electric Vehicle Infrastructure (NEVI) program to build a national network of EV chargers. The NEVI program requires 4 direct current fast charger (DCFC) ports, each able to operate at 150kW, at each station and requires at least 97% uptime for the chargers. In order to receive Maine's allocation of approximately $19 million in NEVI funds, Maine established the Recharge Maine Initiative, a partnership between MaineDOT, Efficiency Maine, the Governor's Office of Policy Innovation and the Future, the Governor's Energy Office, and Maine Department of Environmental Protection, to develop a plan with stakeholder input for electric vehicle (EV) infrastructure deployment over the next five years.

The Maine Plan for EV Infrastructure Deployment (NEVI Plan) describes the priorities and strategies for developing a statewide EV charging network called "Recharge Maine" to support the build out of EV charging infrastructure along highways, within communities, and near tourist destinations.[64] Additional goals are to enhance Maine communities' capacity to attract commerce and tourism and to serve local EV drivers. For more details, please see Maine's NEVI Plan https://www.maine.gov/mdot/climate/electrification/.

Maine is building out a network of EV charging stations with policies, investments, and regulatory streamlining, to ensure everyone can access reliable, convenient, and affordable charging options when at home, work, around town, and when traveling longer distances. To support the buildout of fast charging that meets EV drivers' need to re-charge more quickly when traveling longer distances, the State has set a goal to have a DCFC within 50 miles of the next DCFC on the State highway network by 2026. This network of public DCFC chargers can provide 30-90 miles of range per 10 minutes of charging. In support of achieving this goal, Maine DOT was awarded over $15 million with a $3.7 million match through the Federal Highway Administration's Charging and Fueling Infrastructure (CFI) grant program. The Infrastructure Bill provides $2.5 billion discretionary funding over five years for the CFI program. Figure A-1 shows current (2024) and future State-supported charging stations.

Under the CFI program, awarded funds will be dedicated towards charging infrastructure near multifamily buildings, large workplaces, regional service centers, and other community locations. CFI funds will also be dedicated towards DCFCs along key highways. Recharge Maine will prioritize rural areas as well as low-and moderate-income areas.

[64] www.maine.gov/rechargemaine/

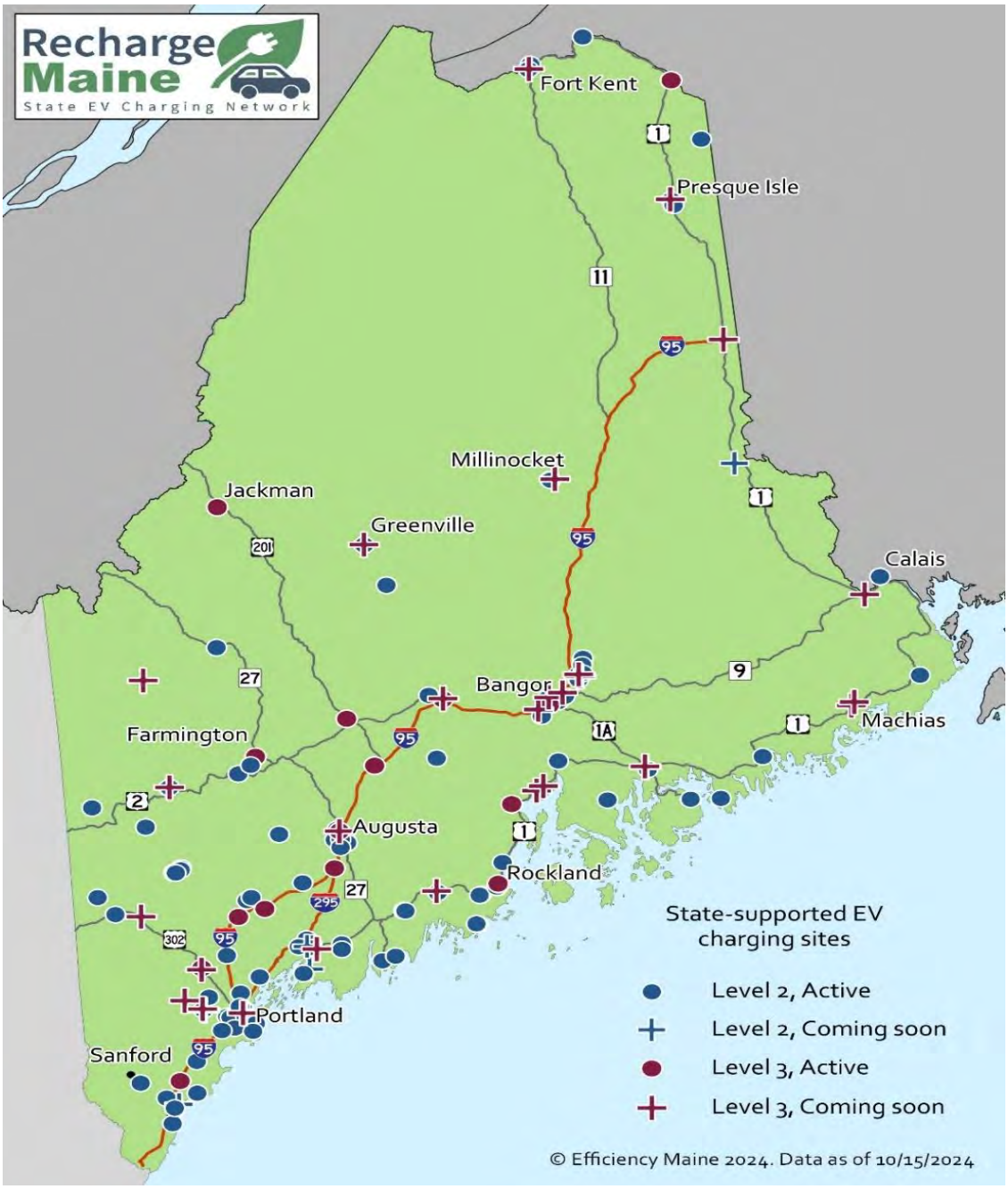

Figure A-1
Current and Future State-Supported Charging Stations.

For those who cannot charge at home, there are over 1,000 public charging ports at 500 stations across the state, and many more continue to be built across Maine (Figure A-2). There are also a number of private sector investments (e.g., GM, Tesla, Ford, Electrify America, Shell) that are expected to invest in expanding the charging network across the state.

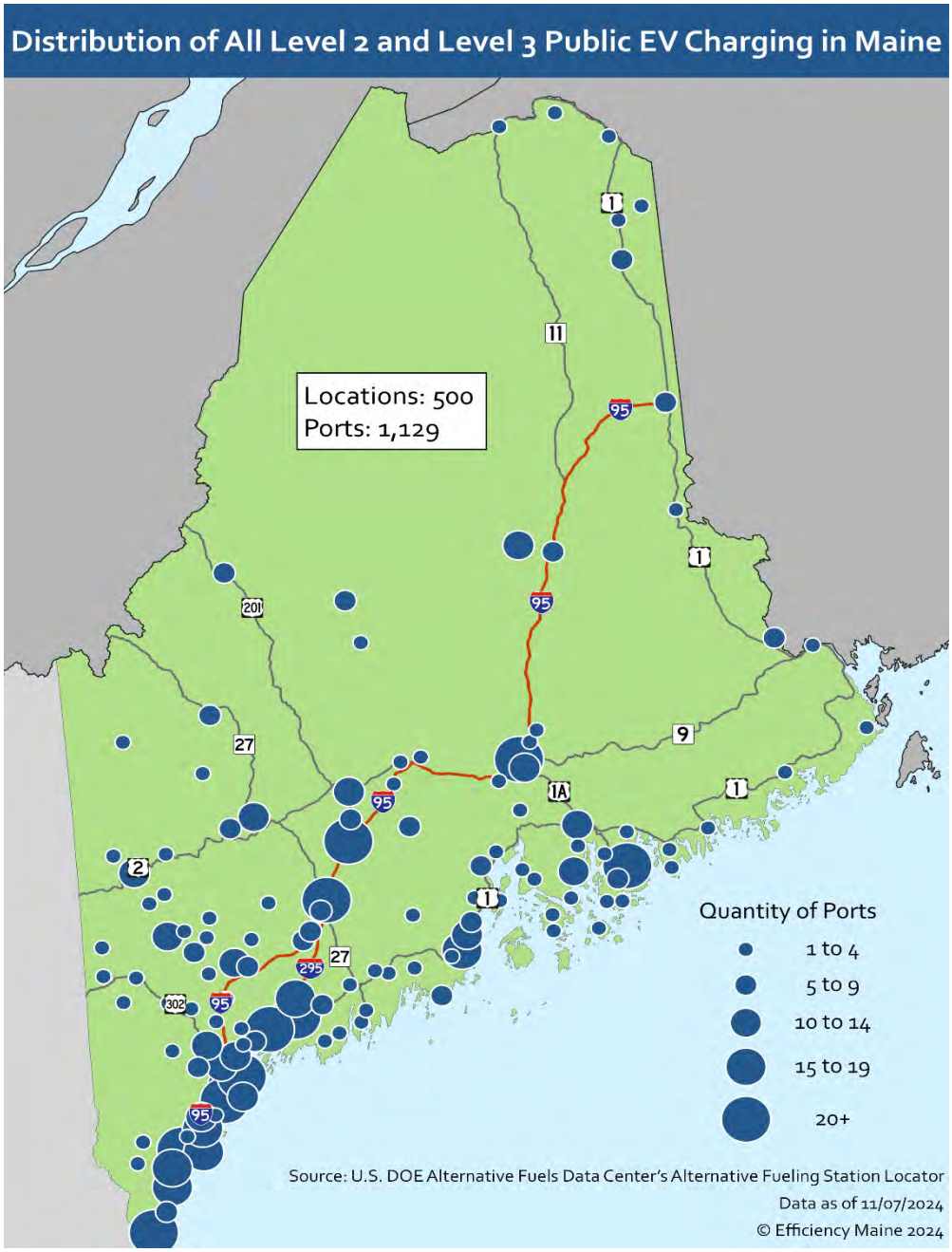

Figure A-2
Public Charging Ports in Maine

In the mid- and long-run, significant increases in charging infrastructure will be necessary to accommodate increasing numbers of EVs. The National Renewable Energy Lab (NREL) forecasts

charging infrastructure demand under several scenarios for every state.[65] For an EV population of 160,000 vehicles in 2030, the NREL study forecast a need for 6,000 level 2 and 1,100 level 3 (DC fast chargers) in 2030—a significant expansion of Maine's public charging network.[66] On a national basis, NREL estimates total costs of $31-55 billion to meet 2030 charging demand, but notes that $23.7 billion in charging infrastructure funding has already been announced from sources such as the Bipartisan Infrastructure Law, private firms, state and local governments, and utilities. As noted in the report: "If sustained with long-term market certainty grounded in accelerating consumer demand, these public and private investments will put the United States on a path to meeting the infrastructure needs simulated in this report."[67]

Projections indicate that advances in EV battery chemistry and architecture will allow for much quicker charging speeds in the near future and facilitate off-site charging (e.g., at the workplace or while shopping). Current federally-funded DCFC stations operate at a minimum of 150-kW per port, with some offering 350-kW per port. As EV battery design continues to improve to allow for higher charging rates, charging times will be greatly reduced. Solid state batteries are another development coming in a few years that will drastically reduce charging times.

The NREL recommends 3.4 Direct Current Fast Charging (DCFC or Level 3) and 40 Level 2 plugs per 1,000 EVs. Using that ratio, 17,000 EVs in Maine divided by 1,000 and multiplied by 3.4 equals 58 DCFC plugs, which demonstrates that Maine far exceeds the NREL ratio with its 220 DCFC plugs offered today. NREL recommends 40 level 2 plugs per 1,000 EVs. According to the Alternative Fuel Data Center, Maine currently has 50 Level 2 plugs per 1000 EVs totaling over 850 EV ports. In fact, Maine has one of the highest ratios in the country for plugs to EVs (Figure A-3).

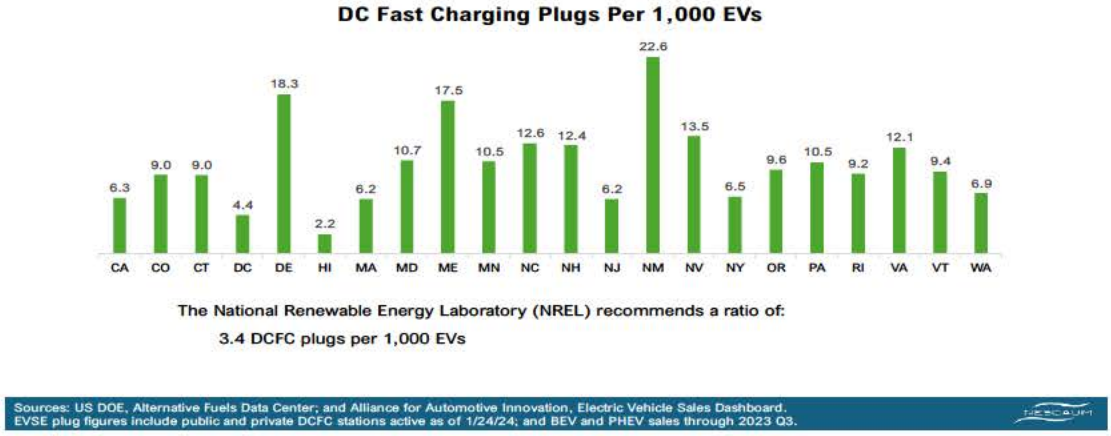

Figure A-3
DC Fast Charging Plugs Per 1,000 EVs.

[65] https://www.nrel.gov/docs/fy23osti/85654.pdf
[66] The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure. 2023. https://www.nrel.gov/docs/fy23osti/85654.pdf
[67] https://www.publicpower.org/periodical/article/new-report-projects-number-ev-ports-us-will-be-close-18-million-2027