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ZERO EMISSION VEHICLES IN VERMONT

Creating Incentives for Market Growth

Presented to the Agency of Transportation and Energy of Vermont

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EXECUTIVE SUMMARY

In 2013, Governor Peter Shumlin of Vermont — along with the governors of California, Connecticut, Maryland, Massachusetts, New York, Oregon, and Rhode Island — signed a Zero Emission Vehicle (ZEV) Memorandum of Understanding (MOU). Per the agreement, the coalition of states committed to undertaking necessary actions to ensure that at least 3.3 million ZEVs are on the road across the seven states by 2025. Yet due to technological and infrastructural limitations, along with persistently low consumer awareness and confidence, all of the signatory states continue to encounter challenging barriers to ZEV adoption. Indeed, a fundamental point suggested by current literature is that “existing complementary policies are important but insufficient to ensure California and the Section 177 states meet the 2025 targets.”¹ This report assesses potential programs to incentivize the purchase of ZEVs in Vermont. We consider ways that Vermont could increase both financial and non-financial incentives, while also expanding consumer awareness and outreach efforts. Given that funding is a primary concern, we evaluate similar incentive and outreach programs adopted by other states with a particular attention to cost and compatibility. Such cost-effective strategies include both tried-and-tested methods (i.e., point-of-sale rebates, tax credits, ride-and-drive events) and creative solutions (i.e., raffles, broad advertisement campaign, waiving vehicle registration fees, and preferential parking). To catalyze growth in a nascent market, Vermont must be aggressive in its initiatives and be willing to undertake up-front spending, at least until ZEVs become relatively mainstreamed, which, according to the literature, is the point at which registered ZEVs represents approximately 15 percent of total passenger automobile sales.² This will prove to be essential if Vermont is to achieve its ZEV goals and, of course, its broader commitments to reducing dependency on fossil fuels and addressing climate change.

1. INTRODUCTION

On October 24, 2013, Vermont entered a ZEV MOU with California, Connecticut, Maryland, Massachusetts, New York, Oregon, and Rhode Island. The MOU commits participating states to have a combined 3.3 million ZEVs on the road by 2025. This agreement supports efforts of signatory states to improve air quality and to meet greenhouse gas reduction targets. The ZEV MOU was established with the idea that supporting ZEV transportation alternatives would reduce air pollution, protect consumers from unstable energy prices, and promote sustainable growth in a clean energy economy.³

A multi-state ZEV Program Implementation Task Force was created in 2014 to foster collaboration among states to ensure that MOU efforts are implemented efficiently. The task force identified eleven key actions to promote a more robust ZEV market across all signatory states, relying on inter-state coordination and partnerships between states and other stakeholders to create a market that increases ZEV availability and ownership in all participating states.⁴



In addition to the joint cooperative actions identified by the ZEV task force, individual states are also mandated to support the ZEV market within their respective jurisdictions. In the past several years, Vermont has implemented several programs to increase ZEV ownership in the state. As part the efforts of the Vermont ZEV Action Plan, we have been tasked with identifying and evaluating strategies to incentivize the purchase of zero-emissions vehicles in Vermont.

1.1 Statement of Purpose

As a signatory of the MOU, Vermont has established annual goals for ZEV sales. However, the state has been failing to meet its annual benchmarks for the past two consecutive years. Vermont must reinvigorate its incentive programs to overcome the barriers to the nascent ZEV market and stimulate consumer acceptance. Due to fiscal restraints, such programs must be cost-effective and be coupled with a viable revenue-generating plan.

With these two main objectives in mind, we researched successful incentive programs adopted by other signatory states. We then assessed the compatibility of those programs in the context of Vermont. The data was primarily collected through internal and external reports and interviews with representatives from various state agencies, public-private coalitions, nonprofit organizations, and other key ZEV stakeholders. Particular emphasis was placed on analyzing different types of purchase incentive programs that have been tried and tested, and the extent to which each respective program has been implemented across the seven signatory states.

2. CONTEXT

2.1 Climate and Energy Goals of Vermont

In 2006, Vermont passed legislation setting greenhouse gas reduction goals of 25 percent by 2012 and 50 percent by 2028.⁵ Vermont failed to reach its 2012 goal, as the eight million metric tons of carbon dioxide emitted in 2012 matched the levels of emissions in the benchmark year of 1990.⁶ However, the state significantly cut emissions from 2004 to 2012. If the state hopes to meet the 2028 emission reduction target, serious efforts must be made to promote renewable energy in Vermont. The Comprehensive Energy Plan of Vermont set aims for a goal of 90 percent of Vermont's energy coming from renewable sources by the year 2050.⁷ Effective implementation of the ZEV plan is thus imperative if Vermont is to meet these challenging targets.

The transportation sector, including both passenger and commercial vehicles, accounts for 46 percent of Vermont's GHG emissions and for 34 percent of the state's energy consumption. Reducing the transportation sector's reliance on fossil fuels through increased ZEV adoption would have a significant impact on the emission profile of Vermont's transportation activities. So, it is unsurprising that the 2011 Comprehensive Energy Plan identified vehicle electrification as the primary strategy to allow Vermont to



satisfy its renewable energy goals, setting an ambitious target to have 25 percent of Vermont vehicles powered by renewable sources by the year 2030.⁸ The ZEV implementation plan is the main pathway towards achieving these objectives.

2.2 Zero Emission Vehicles in Vermont

2.2.1 What are ZEVs?

Zero-emissions vehicles, or ZEVs, utilize electricity or hydrogen as sources of fuel and have no direct carbon emissions when operating in electric mode. ZEVs include plug-in hybrid vehicles (PHEV), hydrogen fuel cell electric vehicles (FCEV), and pure battery electric vehicles (BEV).⁹

2.2.2 Benefits of ZEV Ownership

Drive Electric Vermont has compiled a list of several key benefits to electric vehicle ownership for Vermont consumers.¹⁰ Charging costs for ZEVs are generally much cheaper than the cost of gas, as are maintenance costs when compared to non-electric vehicles. ZEV owners are protected from volatile gas prices, as electricity prices tend to be far more stable. Additionally, electric vehicles generally accelerate faster than non-electric vehicles, and the heavy electric batteries can contribute to increased traction during winter months, which is a particularly relevant concern for Vermont consumers.

Increasing ZEV ownership will also bring broader, statewide benefits. The use of electric vehicles increases energy dependence on local resources, benefiting local jobs and promoting economic growth in Vermont.¹¹ Providing ZEV options to Vermonters will reduce the reliance on imported petroleum products while promoting the use of clean energy sources from within the state. In 2010, \$1.1 billion was spent on taxable gasoline and diesel sales in Vermont.¹² Drive Electric estimates that powering all personal transportation in Vermont with electricity would be \$800 million cheaper than this benchmark, creating massive savings for consumers and the entire state. However, this could cause a gap in state revenue due to reduced gasoline and diesel tax earnings.

Lastly, and most relevant to Vermont's climate goals, incentivizing ZEV ownership in Vermont would help the state achieve many of its environmental goals through a reduction of carbon emissions and fossil fuel dependency. A critical mass of ZEVs on the road would also strengthen Vermont's economy through the support of local clean energy jobs required to support the infrastructure necessary for increased ZEV ownership in the state.

2.2.3 Current State of Vermont ZEV Market

Vermont has experienced significant growth in the number of registered ZEVs in recent years. Per the Vermont Agency of Natural Resources and Vermont Agency of Transportation, the state experienced an increase from only 88 registered electric vehicles



in 2012 to 1,253 registered electric vehicles in July 2016.¹³ More than 75 percent of Vermont's electric vehicles are plug-in hybrid electric vehicles (PHEVs), which can run on both electricity and gasoline.¹⁴ In the past year, plug-in vehicles have represented one percent of all new passenger vehicle registrations. This seems to be the electric vehicle of choice for Vermonters, as the option to run on gasoline improves driver confidence in travelling in rural areas with minimal charging infrastructure. The most popular PHEVs in Vermont are Ford's C-Max Energi and Toyota's Prius Plug-in.¹⁵ Ownership of electric vehicles is primarily clustered in the counties of Caledonia, Chittenden, Lamoille, and Washington.¹⁶

Providing appropriate infrastructure for electric vehicles is an important pull-factor for ZEV ownership, and the number of public charging stations in Vermont has increased in recent years, with 137 charging stations being currently available to consumers across Vermont.¹⁷ As charging stations become more ubiquitous in Vermont, we may witness a transition to other types of electric vehicles that rely solely on electric power.

It is also worth noting that about 65 percent of registered PHEVs in 2016 were leased.¹⁸ As ZEV technology continues to develop, leasing may be an attractive option for Vermont consumers. Altogether, there are currently 24 models of unique plug-in vehicles available to Vermonters, with a total of 36 car dealerships selling ZEVs in the state.¹⁹

2.3 ZEV Program Implementation

2.3.1 Vermont Compliance with ZEV MOU Objectives

The MOU sets ZEV sales requirements, with the hope that consumer demand will expand as ZEV products become more readily available and popular across the MOU states. ZEV sales are allocated proportionately by population across the signatory states. While current trends in increasing ZEV ownership in Vermont are promising, the increase in EV ownership in 2015, at 246, is well below the 500 sales projection outlined in Vermont's ZEV Action Plan. Adding to the challenge is a substantial rise in the ZEV registration benchmark after the year of 2017.

2.3.2 Vermont ZEV Action Plan

The 2014 Vermont ZEV Action Plan provides state-specific strategies for increasing ZEV ownership in the state, in line with the 11 action strategies identified by the ZEV multi-state task force. These key strategies represent a broad implementation plan that targets many different stakeholders to promote increased ZEV sales in Vermont.

The ZEV Action Plan outlines goals for public sector advertising programs, increasing ZEV composition in public fleets, improving charging and other necessary electric vehicle infrastructure, increasing the affordability and availability of electricity and hydrogen as transportation fuels, and creating incentives to promote private ZEV



ownership. Vermont has already implemented programs in line with many of these actions, including a dealership training initiative, an outreach marketing campaign to promote electric vehicles, and efforts to build and maintain charging stations across the state. Each one of these diverse pathways will play an important role in promoting ZEV ownership in Vermont, but for the remit of this report, a particular emphasis will be placed on ensuring both the accessibility and attractiveness of ZEVs for consumers.

2.3.3 Current Purchase Incentives for ZEVs in Vermont

Drive Electric Vermont (DEV), a coalition funded by the state of Vermont and led by the Vermont Energy Investment Corporation, has been the leading actor in promoting ZEV ownership through various programs across all of the Vermont's ZEV action strategies.

Of special relevance to this report, DEV offered a point-of-sale consumer rebate of \$500 and an incentive of \$200 for the dealer for the sale or lease of a plug-in electric vehicle. 11 car dealerships participated in this program, and 76 rebate certificates were ultimately distributed.²⁰ This rebate program was considered a success, and DEV is currently offering a higher rebate of up to \$1,000. These rebates were funded by a grant from the nonprofit Vermont Low Income Trust for Energy (VLITE.)

2.4 Challenges to Meeting ZEV Sales Requirements

Vermont faces unique challenges in meeting its target ZEV sales. On the consumer side, there are many concerns with regards to climate and topography. Cold weather means reduced battery life for electric vehicles. Even though the range of these vehicles is increasing, this still remains an issue. Harsh winters also require four-wheel drive and higher clearance for when road conditions are snowy and icy. As Vermont has smaller metropolitan areas and has a relatively rural population than other signatory states, this concern is amplified.

However, as of 2014, Vermont was tied for the highest percentage of plug-in electric vehicle registrations for cold weather areas in the United States.²¹ Although local weather conditions may provide a challenge to increasing ZEV ownership, Vermont is faring well compared to states with similar weather conditions.

The distribution of Vermont's rural population also makes charging stations harder to place. Furthermore, relatively low gas prices do not dissuade consumers from owning cars with worse gas mileage (e.g., sport utility vehicles and light-duty trucks) and mitigate the financial benefits of ZEV ownership. There are also challenges to finding appropriate revenue sources to support ZEV programs. If ZEV ownership is increased in Vermont, then less revenue will be collected through the gas tax and the state will have to find alternative funding for the upkeep of roads and automotive-related infrastructure. Although there are several challenges to the successful funding and implementation of



ZEV incentive programs, results from states facing similar obstacles suggest that increasing ZEV ownership in Vermont is an achievable goal.

3. STATE-BY-STATE EXAMINATION OF FINANCIAL INCENTIVES

To recommend cost-effective strategies that would best serve Vermont’s ZEV market, we researched and evaluated ZEV programs and policies that have enjoyed success in other signatory states. We collected and analyzed data provided by internal and external reports and interviews with representatives from various state agencies, public-private coalitions, nonprofit organizations, and other key ZEV stakeholders. We especially focused on different types of purchase incentive programs that have been tried and tested, and the extent to which each respective program has been implemented in each state.

The states that have been selected for comparison with Vermont include other signatories of the MOU, namely California, Connecticut, Massachusetts, Maryland, New York, Rhode Island, and Oregon. Other jurisdictions, such as Washington and Hawaii, were also considered due to their success in achieving a relatively critical mass of ZEVs. It is also worth noting that Oregon — currently ranked as having the second highest percentages of ZEVs sold, behind California — was given particular consideration since the state’s population density, size, and success of program implementation are most similar to Vermont’s.²²

Table 1: Comparison of Vermont with Selected MOU States²³

State	Population (2015)	Population Change (since 2010)	Mean Travel Time to Work (Minutes)	Median Income (\$)	Population per Square Mile
Oregon	4,028,977	5.2	22.7	50,521	39.9
Connecticut	3,590,886	0.5	25.1	69,899	738.1
Massachusetts	6,794,422	3.8	28.3	67,846	839.4
Maryland	6,006,401	4	32.2	74,149	594.8
California	39,144,818	5.1	27.6	61,489	239.1
Vermont	626,042	<0.1	22.3	54,447	67.9
Comparison Group Average	11,913,100	3.7	27.18	64,781	490.3

Table 2: Incentive Programs across MOU States²⁴

State	Rebates or Tax Credits	Utility Discounts	HOV Lane Access	Charging Station Incentive	Fleet Incentives
California	Yes	Yes	Yes	Yes	Yes
Connecticut	Yes	Yes	No	Yes	Yes
Maryland	Yes	Yes	Yes	Yes	No
Massachusetts	Yes	Yes	No	Yes	Yes



New York	No*	Yes	Yes	Yes	Yes
Oregon	Yes	Yes	No	Yes	Yes
Rhode Island	Yes	No	No	Yes	Yes
Vermont	Yes	Yes	No	Yes	No

*In progress of development by NYSERDA.

Current literature concludes that financial incentives, offered by both federal and state governments, serve as the primary motivating factor for consumers to purchase ZEVs. Without such incentives, ZEVs remain, in terms of price, uncompetitive relative to comparable passenger automobiles.²⁵ It is unsurprising, then, that 70 percent of current ZEV owners in California affirmed that government incentives “played either an extremely or very important role in their purchase decision.”²⁶

3.1 Rebates

Rebates, in application, have been deemed the most effective way of incentivizing ZEV purchases.²⁷ It is thus worth considering the programs and experiences of other signatory states. Table 3 details the extent to which each MOU state has financially committed to promoting ZEV sales through rebates:

Table 3: Funding Dedicated to ZEV Rebate Programs²⁸

State	Program Inception	Funding Dedicated (\$)	ZEVs Sold, 2011–2016	ZEV Target by 2025
California	2010	~438,000,000	247,515	1,500,000
Connecticut	2015	~5,000,000	4,994	154,000
Maryland*	N/A	8,937,188	8,080	304,210
Massachusetts	2014	~10,200,000	8,745	302,000
New York	N/A	N/A	20,139	843,000
Oregon	N/A	N/A	11,077	33,000
Rhode Island	2016	500,000	862	43,000
Vermont	2014	~200,000	1,601	35,000

*Maryland has a tax credit program.

In evaluating this data, of course, it is also important to contextualize the amount that each rebate entails. Table 4 categorizes rebate amounts according to EV type and battery capacity:

Table 4: Rebate Amount by State (\$) ²⁹

State	FCEV	BEV	PHEV
California	5,000	2,500	1,500
Connecticut	5,000	Up to 3,000	Up to 3,000
Maryland	Up to 3,000 excise tax credit		
Massachusetts	N/A	2,500	1,500



New York*	2,000	2,000	2,000
Oregon		N/A	
Rhode Island		Up to 2,500	
Vermont		Up to 1,000	

*Program in development.

It is especially indicative that states with the most substantial financial incentives, such as California and Massachusetts, have captured market share rates that are over double to quadruple the rate of total ZEV sales in the United States.

Oregon is a particularly elucidating case for Vermont since the state continues to consider expanding its financial incentives. A recent report conducted by Drive Oregon, the state’s leading ZEV nonprofit organization, determined that establishing a robust rebate program will be necessary if the state is to meet its MOU benchmarks.³⁰

Oregon is ranked as having the second highest percentages of ZEVs sold nationwide. While Oregon does not currently have a dedicated rebate program, there has been notable consideration of developing one to meet the state’s short-term and long-term goals. Despite the lack of a rebate program, Oregon drivers enjoy one of the nation’s best financial incentives to purchase a ZEV. Due to favorable residential electricity and retail gas costs, Oregon leads all other states in terms of fuel cost savings per year at \$1,240 (compared to \$580 in annual fuel cost savings for Vermonters).³¹ The state also offers fleet, commercial, and residential tax credits in addition to a \$750 tax credit for the cost of home EV charging stations.

3.2 Tax Incentives

Tax incentives are also worth considering since many states offer such credits or refunds in lieu of rebates for ZEV purchases. Maryland, for instance, has seen substantial success in establishing a critical mass of ZEVs through a robust excise tax credit program which offers up to \$3,000. Since the program’s inception in 2011, the state has dedicated over \$8.9 million. Similarly, the state of Washington offers state sales and use tax exemptions, in which consumers can receive up to \$4,000 in savings. This exemption, in terms of dollar amount, is a competitive rate compared to other MOU states and has been determined to be “the single most important factor for future success of electric vehicles in [Washington].”³²

The following is a list of states that currently offer tax incentives for purchase of either alternative fuel vehicles (AFVs), fuel cell vehicles (FCVs), or zero-emissions vehicles (ZEVs):

1. **New Jersey:** ZEVs sold, rented or leased in New Jersey are exempt from state sales and use tax.
2. **Colorado:** Up to \$6,000 income tax credit for AFVs.



3. **Georgia:** Income tax credit of 10 percent of the cost up to \$2,500 for AFVs; 20 percent up to \$5,000 for ZEVs.
4. **Louisiana:** Income tax credit of 10 percent of the cost up to \$3,000.
5. **Maryland:** Tax credit equal to \$125 times the number of the vehicle's kWh of battery capacity vehicle, up to \$3,000.
6. **Montana:** Businesses or individuals are eligible for an income tax credit of up to 50 percent of the equipment and labor costs for converting vehicles to operate using alternative fuels.
7. **South Carolina:** Residents who claim the federal FCV tax credit are eligible for a state income tax credit equal to 20 percent of the federal credit.
8. **Washington:** New passenger cars, light-duty trucks, and medium-duty passenger vehicles that are dedicated alternative fuel or zero emission vehicles are exempt from the state motor vehicle sales and use taxes.

Among the jurisdictions that offer tax incentives, Washington and Colorado boast relatively high EV market share within the nationwide automobile market, with both breaking the one percent threshold.

Still, it is worth noting that the U.S. Department of Energy found that tax credits are only half as effective as a rebate in incentivizing consumers.³³ This is primarily due to two reasons. First, in terms of present value for the consumer, an immediate discount evidently has more utility than a future tax decrease. Second, depending on tax liability, a consumer may not be able to enjoy a full tax credit or could potentially be unaware of the credit at all. Given both this delay in benefits and the risk of not being able to take full advantage of the credit, tax incentives are ultimately considered to be less likely to mobilize consumers as effectively as rebates.

3.3 Other Possibilities

3.3.1 Raffles

It is worth considering the potential benefits of raffles in raising both funds and awareness for Vermont's ZEV efforts. As dictated in Vermont Gambling Laws §2143, only nonprofits can legally sell raffle tickets to the public. Drive Electric Vermont (DEV), as a nonprofit, can thus conduct a raffle themed around electric vehicles to (1) promote general awareness of ZEVs, (2) inform the public about existing incentive programs, and (3) generate funding for future marketing campaigns. Empirical results from studies have shown that raffles perform much better than mailers and door-to-door solicitations alone for fundraising purposes. Additionally, the literature suggests that there are substantial economic incentives in raffle fundraisers that can motivate ambivalent consumers.³⁴



3.3.2 Marketing

Financial incentives alone, of course, cannot establish a viable, long-term ZEV market. Indeed, the utility of rebates can only be maximized insofar as consumers are aware of such financial incentives. Surveys conducted by California, Oregon, and Washington consistently found that few consumers considered ZEVs when purchasing a new vehicle.³⁵ Even fewer still were aware of the extent to which they would be able to benefit from both financial and non-financial incentives.

It is also worth mentioning that in Massachusetts, over 60 percent of respondents had learned about the state's rebate program through a dealership.³⁶ But this, to an extent, is surely a cause for concern. Customers that are informed about such benefits through a dealer are often sufficiently interested in purchasing a ZEV and are thus self-selecting. Moreover, Vermont's dealerships encounter challenges that must be considered, such as high turnover of sales staff and the subsequent difficulty of retaining and educating staff about ZEVs.³⁷ Maryland had similar communication issues in effectively informing consumers about federal and state incentives.³⁸ In turn, Maryland created a flyer (Figure 1) that concisely summarized each program, replete with QR codes that allowed consumers to access updated information, applications, etc.

FIGURE 1: Maryland's ZEV Dealership Flyer

MARYLAND
Electric Vehicle Incentives

Plug-in electric vehicles offer lower operating costs and cleaner air for all Marylanders. Read below for incentives available to Maryland citizens and businesses that purchase or lease these vehicles.

1. Federal Income Tax Credit

A federal tax credit is available to buyers of new plug-in electric vehicles based on battery capacity and ranges. The credit ranges from **\$2,500 to \$7,500**. For model year 2015, the credits are as follows:

Toyota Prius Plug-In Hybrid: **\$2,500**
Ford Fusion Energi & C-Max Energi: **\$4,007**
Chevrolet Volt, Nissan Leaf, Tesla Model S, and others: **\$7,500**

Note that this credit, which became available in 2009, will begin to phase out once auto manufacturers meet their sales quota.

To get this credit: Complete IRS Form 8936, Qualified Plug-in Electric Drive Motor Vehicle Credit and submit with your income tax return: <http://www.irs.gov/pub/irs-pdf/f8936.pdf>

2. Maryland Excise Tax Credit

A Maryland excise titling tax credit of \$125/kWh of battery capacity up to \$3,000 is available to buyers and lessees of qualifying new plug-in electric vehicles. The credit is effective July 1, 2014 through June 30, 2017 and credits are processed subject to the availability of funds. Business entities may also qualify for the tax credit on up to ten vehicles.

To get this credit: Complete Form VR 334 and submit to the Maryland Motor Vehicle Administration. Your dealership can assist you with this. http://www.mva.maryland.gov_resources/docs/VR-334.pdf

3. Use of High Occupancy Vehicle (HOV) Lanes

As a driver of a plug-in electric vehicle titled and registered in Maryland, you are allowed to use all HOV lanes in Maryland regardless of the number of passengers provided you obtain and display an HOV permit on the vehicle. The permit will be valid from October 1, 2010 through September 30, 2017.

HOV lanes in Maryland:

- The I-270 southbound HOV lane extends from I-370 to the Capital Beltway (I-495) in Montgomery County and is operational during the morning peak period from 6:00 a.m. to 9:00 a.m.
- The I-270 northbound HOV lane operates on a 19-mile stretch from the Capital Beltway to MD 121 (Clarksburg Road) and is operational during the evening peak period from 3:30 p.m. to 6:30 p.m.
- The HOV lanes run east and west on a 7.5-mile stretch of US 50 between the Capital Beltway (I-95 / I-495) and US 301 (Crain Highway) in Prince George's County and are in operation 24 hours / day.

To get this benefit: Complete Form VR 335 and submit to the Maryland Motor Vehicle Administration then put the decal on your car. Your dealership can assist you with this. http://www.mva.maryland.gov_resources/docs/VR-335.pdf

4. Rebates and Grants for Charging Stations

Plug-in electric vehicles can be charged through regular 120-volt household electrical outlets (known as Level 1 charging), 240-volt systems (Level 2 charging) and higher voltage DC Fast Charge stations. Rebates are available for all of these charging systems and cover 50 percent of the equipment and installation cost up to a limit (\$900 for residential, \$5,000 for commercial and \$7,500 for service stations) for systems purchased and installed between July 1, 2014 and June 30, 2017.

To get the charging station rebate: Complete the Electrical Vehicle Supply Equipment (EVSE) rebate forms on the Maryland Energy Administration website. http://energy.maryland.gov/transportation/Pages/incentives_evse rebate.aspx

Grants are also available for solar photovoltaic canopies installed at parking garages where the array is charging at least four electric vehicle charging stations.

To get the parking lot solar PV charging station grant: Complete the forms on the Maryland Energy Administration website: <http://energy.maryland.gov/business/Pages/incentives/PVEVprogram.aspx>



This low-cost solution, distributed both to dealers and consumers directly, was deemed successful in synthesizing what can often be confusing information to consumers and in advertising the existence of such programs as well.

3.3.3 Parking Benefits

Since parking spaces in Vermont are administered and metered by the state and local government, it would be worth considering offering free or preferential parking to ZEV drivers. To test how receptive consumers are to this incentive, the potential beneficiaries of this program could initially be limited to the residents of more densely populated cities such as Montpelier and Burlington. This will especially be insightful since current and potential ZEV buyers are concentrated in these two urban centers. Combined with other incentive programs, this measure offers additional marginal benefits to owning a ZEV. Most importantly perhaps is that free or preferential parking entail very low administrative costs compared to more conventional ZEV incentives.

States that offer free parking (ZEV market share in parentheses):

1. **Hawaii** (1.42 percent)
 - a. Parking fee exemption: Qualified vehicles with electric vehicle license plates are exempt from certain parking fees charged by any non-federal government authority.
2. **California** (3.6 percent)
 - a. Free parking: Sacramento offers free parking to certified individuals or small businesses that own or lease EVs in designated downtown parking garages and surface lots. Free metered parking in San Jose, Hermosa Beach, and Santa Monica for electric vehicles displaying a Clean Air decal.
3. **Connecticut** (0.84 percent)
 - a. Alternative fuel and hybrid electric vehicle parking: Free parking on all city streets for qualified AFVs and HEVs registered in New Haven.
4. **Nevada** (0.68 percent)
 - a. Parking fee exemption: All local authorities with public metered parking areas within their jurisdiction must establish a program for AFVs to park in these areas without paying a fee.
5. **Utah** (0.85 percent)
 - a. Free electric vehicle parking: Free metered parking in Salt Lake City for electric vehicles displaying a Clean Air license plate.

The aforementioned states all have an above-average performance in terms of its ZEV market share. There could be, of course, a correlation between a parking program in



tandem with other significant incentive program, such as rebates and tax credits, that contribute to the strong showing.

3.3.4 Tax Holidays

Given Governor Phil Scott’s proposal of a tax holiday to promote EVs, it is worth considering the efficacy of this approach in incentivizing consumers. The literature’s consensus is that tax holidays primarily shift consumption patterns — that is, the timing of purchases — and do not increase consumption or effectively attract new consumers to the market.³⁹ Those consumers that initially decided to purchase an EV, then, would simply wait until the designated time of the holiday.

Furthermore, tax holidays do not effectively benefit low-income consumers, since such consumers are often unable to take advantage of short-term benefits “for cost, mobility or timing reasons.”⁴⁰ This is an especially important consideration since Vermont has committed to broadening and equalizing the ZEV market. Creating a critical mass of ZEVs would require an extensive adoption of such vehicles by lower income brackets, as acknowledged by other signatory states such as Massachusetts. Tax holidays, however, provide a “large amount of savings to higher income groups,”⁴¹ while lower income consumers may be restricted from enjoying this incentive. Economists at the Federal Reserve Bank of Chicago, for example, found that consumption increases during tax holidays were limited largely to the wealthiest households.⁴² To this end, “a more targeted and effective approach,”⁴³ such as rebates, would better reduce barriers to entry for low-income residents.

There are, of course, two caveats. First, results may vary for Vermont if the state opts to continue offering its current point-of-sale incentives in addition to a potential tax holiday. Given Vermont’s budgetary constraints, as aforementioned, committing to a more robust rebate program may better serve the state’s ZEV goals. Second, there is evidence that retailers have historically responded to tax holidays by either increasing prices or reducing sale promotions during the designated time period.⁴⁴ In Florida, for example, retailers claimed “20 percent of the tax relief”⁴⁵ that was, in principle, meant for consumers. This additional concern of retailer behavior may thus cause additional complications for a successful tax holiday.

4. POLICY RECOMMENDATIONS

To expand nascent ZEV markets, leading states such as California and Oregon have concluded that a concerted effort to both reduce vehicle costs and increase consumer awareness, education, and outreach is required. Below are cost-effective strategies that can help reduce the persistent barriers to ZEV adoption in Vermont. Since cost and funding is of paramount concern, in concurring with other assessments,⁴⁶ we find that such incentives could be maintained until Vermont’s ZEV market emerges from its early stages.



4.1 Rebates

We find that, first and foremost, Vermont could consider the possibility of either expanding its point-of-sale incentives to become equally competitive with peer signatory states, or adopting a rebate scheme similar to ones administered by California or Massachusetts.

It is well-documented by current literature that vehicle subsidies are the leading factor in motivating consumers to purchase ZEVs.⁴⁷ And higher financial incentives, particularly rebates, correlate with higher sales.⁴⁸ Indeed, the U.S. Department of Energy found that decreasing the price of a vehicle by 10 percent would result in an increase of up to 80 percent in market share.⁴⁹ Vermonters themselves have affirmed that price remains the primary barrier to purchasing a ZEV.⁵⁰

Consider the fact that the largest Nissan Leaf markets in the United States — California, Georgia, and Washington, respectively — have emerged in states with relatively generous financial incentives. California, for example, offers up to a \$7,000 rebate (depending on income), while Georgia provides a \$5,000 tax credit. Vermont lags behind such states in offering competitive rates to incentivize ZEV adoption.

In order to maximize the utility of a rebate program, Vermont could also consider cost-effective parameters such as establishing an income cap. California adopted a cap in 2010 and has seen notable success in broadening and equalizing the market for lower income brackets. Such caps have arisen from legitimate concerns about barriers to entry for low-income residents. For example, in Massachusetts, the median income of consumers that utilize the state's rebate program (MOR-EV) is between \$150,000 and \$199,999.⁵¹ Given concerns for limited funding while also needing to expand ZEV adoption, an income cap may allow more Vermonters to access a higher financial incentive. Another benefit of income caps is a potentially high return on investment: whereas more funding would need to be dedicated to motivate fewer affluent consumers, the same level of funding can incentivize even more low-income consumers.

To this end, Vermont could emulate states like California and Massachusetts and explore this possibility by conducting detailed demographic research on ZEV ownership based on household income. The viability of an income cap on a robust rebate program will evidently depend on the state's consequent findings.

4.2 Cost-Effective Advertisement and Outreach Campaign

A mass marketing campaign is necessary to inform and motivate the average consumer that may not have sufficient initial interest in ZEVs. While a broad outreach campaign that utilizes both conventional (i.e., TV, billboards, websites) and new media (i.e., social media, YouTube videos, blogs) strategies will be critical, this report will focus



particularly on cost-effective methods. First, the state could explore the possibility of posting free advertisements in public spaces such as state offices, courthouses, municipal buildings, town halls, post offices, and motor vehicle agencies. Such ads can underscore the amount of money a potential customer could save through federal and state benefits.

Another cost-effective mass advertisement strategy would be direct mailers. One noteworthy concept is a concise mailer that compares the cost of a ZEV model with two or three other popular passenger automobiles in Vermont. Side-by-side comparisons can powerfully demonstrate the extent to which consumers can save against ZEV competitors. Aggregate savings — including federal and state incentives, in addition to long-term savings such as on fuel cost — could be underscored so that consumers can be readily enticed to learn more.

As experts consistently have affirmed through numerous interviews, one-on-one direct consumer interface has proved to be the most effective outreach program.⁵² Since most consumers lack any direct knowledge of ZEVs, Vermont can consider expanding efforts to inform and spread awareness at a variety of social gatherings and events. For example, booths can be staffed at popular community-wide events, such as wine and beer festivals, church bazaars, farmers' markets, etc. In doing so, the state would not need to go through the additional burden of organizing an entire event for purely outreach purposes. The challenge, then, would be refining a target audience and ensuring that attendees of a certain event are compatible with the general demographics that tend to purchase ZEVs.

In considering efforts to expand public-private partnerships, Vermont could also explore the possibility of replicating successful organizational structures, such as the California PEV Collaborative. The California PEV Collaborative includes critical members in both the automobile industry (Nissan, Kia, Toyota, Tesla, Subaru, Honda, General Motors, Mercedes-Benz, Ford, and BMW) and utilities sector (e.g., Pacific Gas and Electric Company and Southern California Edison). In considering the challenges of replication, however, a partnership with the PEV Collaborative could also be a more viable option worth exploring further.⁵³

4.3 Raffle

Realizing the economic benefits of raffles is important since it expands DEV's toolbox. Raffles can attract consumers who would otherwise not consider ZEVs. Raffles should not only be advertised in tandem with promotional events such as ride-and-drives, demo days, auto expos, and environment conferences, but other community gatherings with broad demographic appeal (e.g., town fairs and farmers' markets). The inclusion of raffles at such venues would be more effective than simply distributing informational brochures, leading to greater general awareness about ZEVs.

Through a potential partnership with an auto manufacturer or an EV supply provider, the prize could include electric vehicles or charging stations. This can encourage businesses



to also participate in raffles. In addition to the raffle's awareness-promoting scheme, it can also generate economic benefits for the organizer (i.e., DEV). As an extra revenue source, raffles would give DEV more capital to invest in further robust marketing campaigns and organizational expansion.

4.4 Free and/or Preferential Parking

Vermont could consider analyzing the demand for parking in the state and the potential appeal of such a program to consumers. We suspect, though, that parking demands in urban clusters such as Montpelier and Burlington could be substantially high enough to attract consumers.

Vermont could further consider allotting dedicated parking spots for ZEVs that are in close proximity to popularly-attended venues (i.e., malls, downtown business districts, and plazas). In addition to serving as an incentive for purchasing a ZEV, such preferential spots could gradually mobilize Vermonters to take notice and consequently incite more awareness and interest for ZEVs.

5. CONCLUSION

This report provided an overview of potential ZEV sales incentives for Vermont. Through the discussion of these topics, the paper sought to provide readers with an understanding of the effectiveness of different incentive strategies as well as the costs and benefits of each policy option. The findings presented here can hopefully aid the Departments of Transportation and Environmental Conservation in crafting policy that will move Vermont towards its established ZEV sales goals.

Compared to peer states, Vermont's financial incentives do not reduce the cost of ZEVs sufficiently to make them competitive relative to comparable passenger automobiles. To overcome barriers to ZEV adoption, the state must be willing to adopt or expand such incentives, at least until a critical mass of ZEVs are established and the market becomes mainstreamed. Vermont, then, could explore the possibilities to adopting the cost-effective strategies outlined above.

The ZEV market has come a long way from the time there was but a single vehicle model available to consumers. Nationwide, market share of ZEVs continue to enjoy growth, and the technology is projected to become more reliable, advanced, and affordable in the coming years. We encourage Vermont to maximize its efforts to ensure that the road ahead remains optimistic.



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