

REPORT TO THE LEGISLATURE PURSUANT TO 19 V.S.A. § 2905

Report on Status of the Vermont Clean Transportation Incentive Programs

January 2024

Submitted to

The Vermont House and Senate Committees on Transportation, the House Committee on Environment and Energy, and the Senate Committee on Finance

Vermont Agency of Transportation

As the Agency of Transportation reviews the progress made over the past year with the vehicle incentive programs that it administers, Environmental Policy and Sustainability staff wish to acknowledge their important partners who make this work possible: the Vermont Legislature in authorizing program funding and administrative flexibility to optimize program effectiveness, our non-profit administrators—Capstone Community Action, Center for Sustainable Energy, and Drive Electric Vermont—who help the Agency deliver these programs, build public awareness, and report on the results—the distribution utilities who continue to offer additional incentives which increase the impact of these, participating dealerships, bike shops, mobility organizations who provide direct benefits to recipients and their communities, and colleagues within our Agency and across state government who contribute to the collective work of reducing greenhouse gas emissions from the transportation sector.

Included in this legislative report are multiple annual reports: CSE’s report on the Incentive Program for New PEVs, Replace Your Ride, and the eBike Incentive Program; Capstone’s MileageSmart (used vehicle incentive) report; the Agency’s own Electrify Your Fleet report with program guidelines; and the Incentive Optimization Report issued by CSE to inform program projections, design and modifications. Collectively these represent a significant volume of work and thought to improve upon our programs and deploy funding as cost-effectively as possible. Agency staff have summarized below some of the key highlights from the past year’s successes, challenges, and thoughts on further changes for the year to come.

2023 in Review

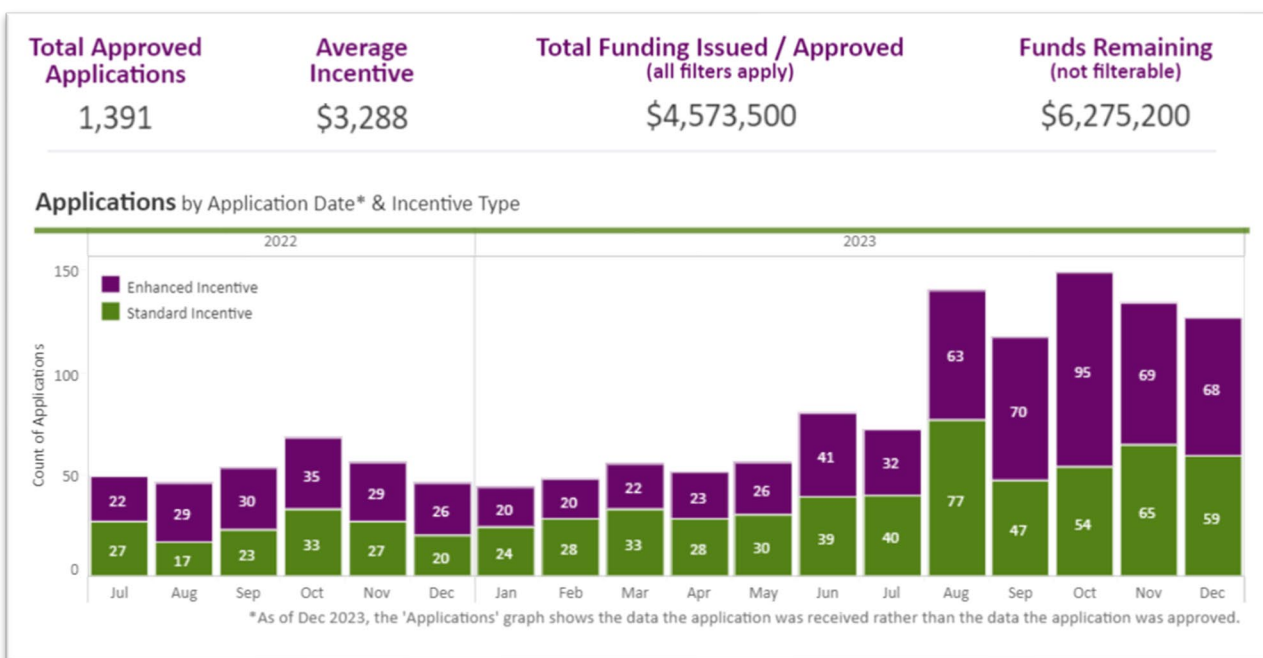
The Agency sought a number of changes to state incentive programs in the past legislative session which have resulted in important successes to report. Importantly, the Vermont Legislature codified the Incentive Program for New PEVs, MileageSmart, and the Replace Your Ride program, and approved changes to program guidelines and more flexibility to the Agency in mid-year adjustments for all programs. Funding from the struggling Replace Your Ride program was repurposed for a new iteration of the eBike Incentive Program and a new fleet incentive, Electrify Your Fleet, which was launched in-house by the Agency in November. Although none of these are without their own challenges, the Agency is proud to report that it has used the funding and programmatic flexibility authorized in Act 62 to the greatest effect, achieving notable increases in uptake for the statutory programs, and significant progress on equity across all programs.

Incentive Program for New PEVs

This past year, the Legislature authorized changes to income thresholds and eligible tax filing households, increases to the base MSRP cap for eligible vehicles, and increases to the possible

incentive amounts. More flexibility was provided to adjust some of these elements midyear based on a documented rationale to optimize the effectiveness of program funding. In July 2023, the Agency implemented many of those changes in the following ways:

- Increased number of qualifying households based on income, and added a higher threshold for “Head of Household” as a distinct tax-filing status
- Increased the base MSRP cap to \$50,000 for model year 2023 and then again to \$52,500 for model year 2024
- Increased the incentive amount from \$4,000 to \$5,000 for all-electric vehicles purchased or leased by households with lower incomes
- Increased the incentive amount up to \$6,000 for all-electric vehicles replacing flood-damaged vehicles due to the State emergency this summer.



The result of these changes since late July have been clear:

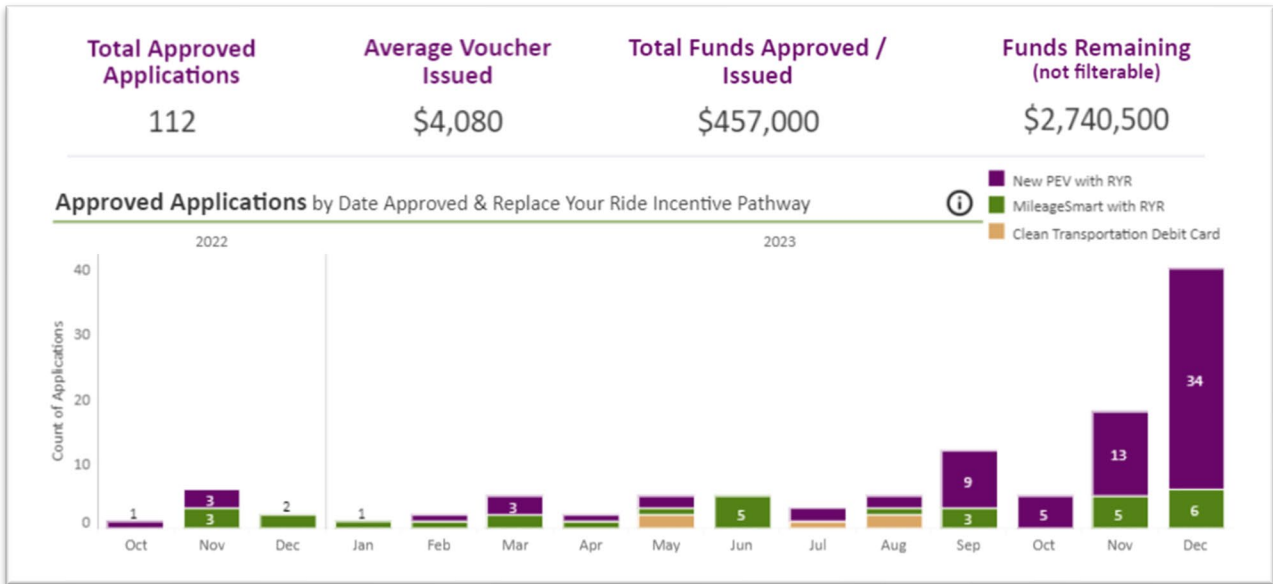
- From August through the end of 2023, the number of applications and incentives issued nearly tripled.
- The changes reinforced shared Agency and legislative priorities, increasing the amount of program funding for all-electric vehicles to 88% and funding to households with lower incomes to 70% share of the total

- Funding projections have been revised based on the increased pace, with funds expected to be expended by the end of this calendar year

Replace Your Ride

Prior program guidelines proved to be too strong a structural barrier to utilization of this program. With the used vehicle market experiencing extraordinarily inflated pricing, the \$3,000 amount was not enough to encourage scrapping of vehicles that could demand a higher trade-in price at the dealership. The complexity of the program also required more education and outreach and longer lead times for Vermonters to take advantage of it. To invite greater participation, the Agency implemented the following changes:

- Increased incentive amounts from \$3,000 to \$5,000 for households with lower incomes
- Added \$2,500 incentive for moderate-income households
- Increased number of participating dealerships, scrapping partners and mobility providers
- Provided programmatic flexibility for replacing flood-damaged vehicles, waiving some guidelines such as drivability requirements

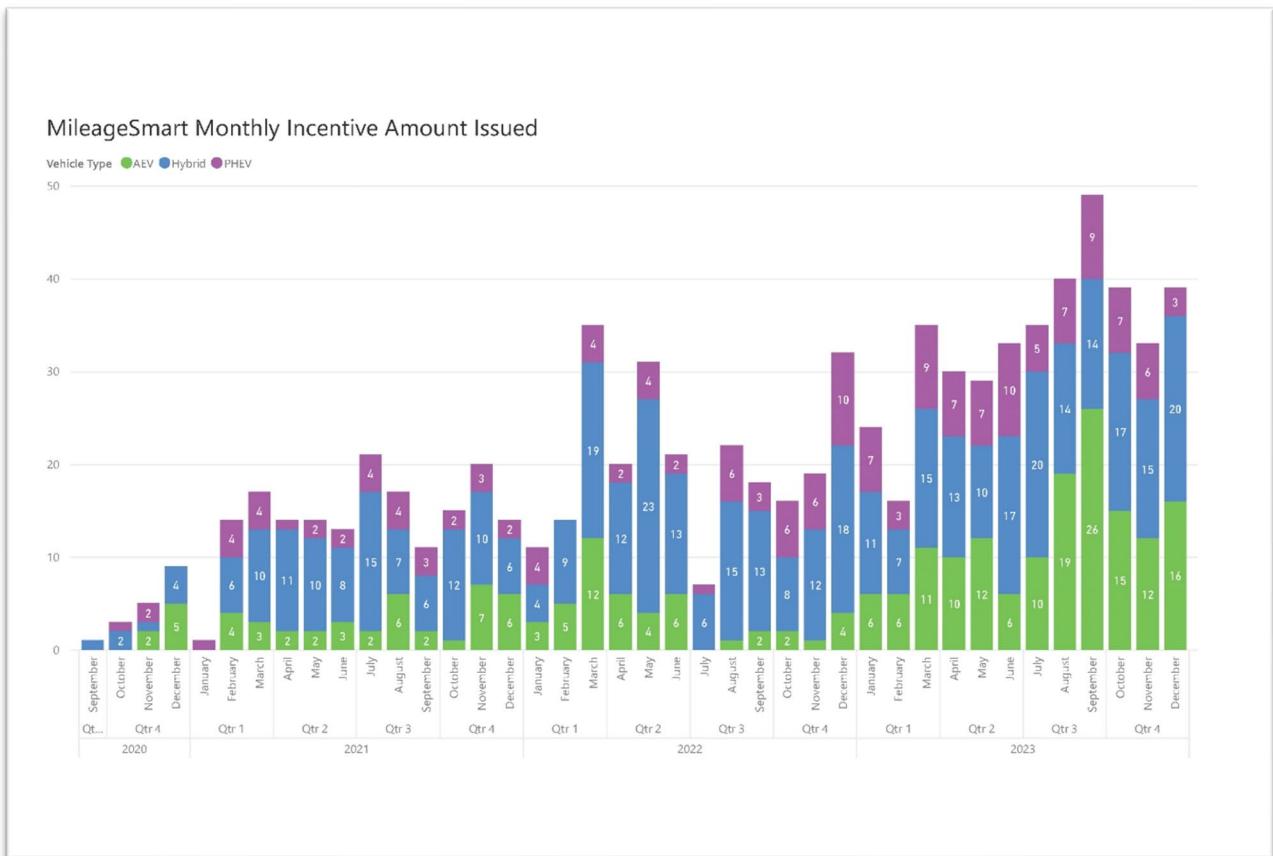


Here again, the Replace Your Ride program responded to changes with applications sharply increasing toward the end of 2023, and likewise adjusting projections for how long the program funding will last.

MileageSmart

Program guidelines remained largely unchanged by last year’s transportation bill, but Capstone staff worked creatively with the Agency to implement the following changes later in 2023 to address a few emerging concerns:

- Introduced \$40,000 vehicle price cap to avoid non-essential rebates issued for expensive vehicles
- Increased incentive amounts for applicants demonstrating participation in and income eligibility for 3Squares, so that households with lower incomes can obtain full \$5,000 benefit even if it exceeds 25% of the purchase price
- Provided similar benefit to those replacing a flood-damaged vehicle



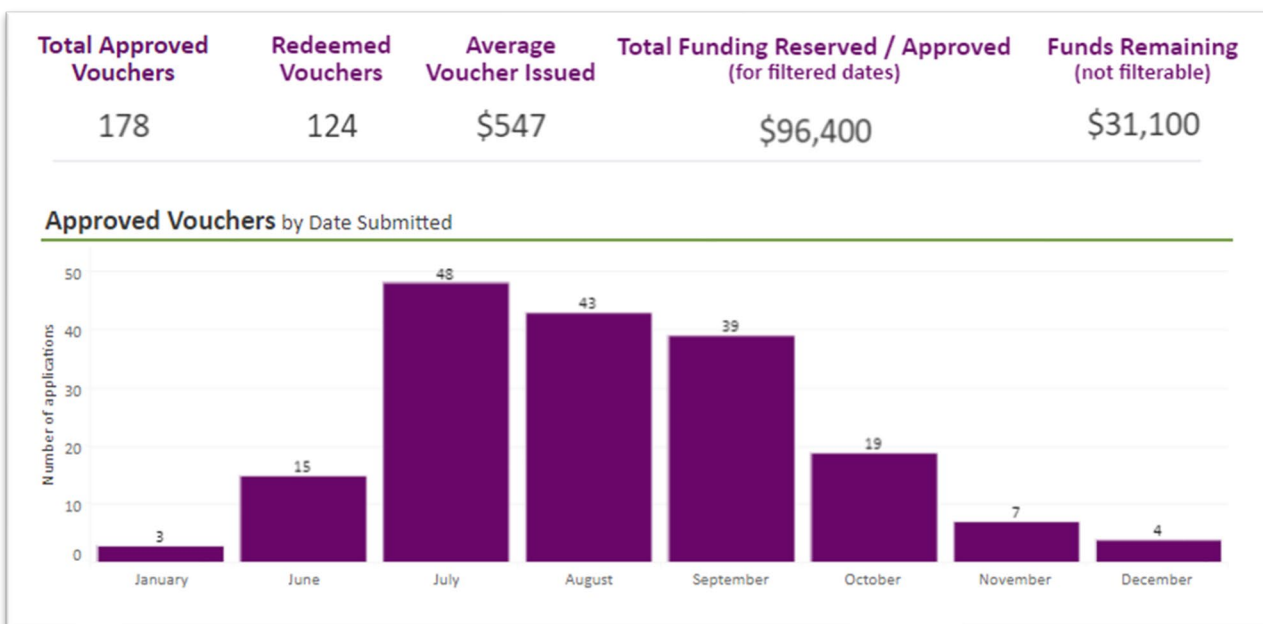
Increased uptake to the MileageSmart program is likely due both to the maturation of the program, increasing participation of dealerships, and some normalization of the used vehicle market which had experienced unusually high prices for a couple of years. With less than \$1

million remaining in program funds, MileageSmart is projected to be fully expended before the end of this state fiscal year. The share of used all-electric vehicles incentivized through the program is also growing, which is likely a function of increasing availability of those vehicles and the current trend of steep price depreciation of early EV models that lack the range of newer models.

eBike Incentive Program

To address concerns with the effectiveness of an earlier iteration of the eBike program, in particular with rebate essentiality questions where moderate income households reported that they would have bought an e-bike regardless of program subsidies as well as questions around whether bikes would be used primarily for transportation or recreational purposes, the Agency implemented the following changes when it relaunched in June 2023:

- Narrowed income eligibility to households with low incomes
- Changed from a rebate to a voucher-based program
- Included enhanced language to encourage needs-based applications
- Increased incentive amounts for an electric cargo bike and adaptive e-bike to \$800 per bike
- Eliminated any price cap for adaptive e-bikes



The results from changes to the eBike Incentive Program have likewise achieved many of the goals the Agency and Legislature had envisioned during last year's session. Beyond the obvious structural changes which targeted 100% of the funding towards households with lower incomes and to Vermont-based bike shops, the following results were achieved:

- 70% of applicants reported that the incentive was critical to making the purchase that they would not have been made otherwise, with an additional 22% who reported that they would have purchased a less expensive, potentially less suitable bike
- 50% of funding went to households earning \$50k or less
- Increased accessibility: incentives were issued for 10 adaptive e-bikes and 54 electric cargo bikes

Electrify Your Fleet

Agency staff designed, launched, and is administering the fleet incentive as a grant program for businesses, municipalities, and other tax-exempt organizations. Although the program has only been operational for about two months (since November 2023), the Agency has been encouraged by the broad range of applicants and interest in it, as well as early estimates of the GHG emissions reduction potential. More detail can be found later in this report.

Proposed Changes for 2024

Largely as a result of the successes achieved in 2023, the most pressing challenge in 2024 will be managing the remaining state funds in the incentive programs in order to extend their life and bridge them to the next viable funding source. The Agency is currently working with the Agency of Natural Resources on a potential request to be included in the State's application to the EPA's Climate Pollution Reduction Grant (CPRG) program. This flexible funding source could be awarded as early as this fall and comes with no state match requirements. A successful state application could extend the State's transportation climate programming for a few years. How the vehicle incentive programs are ultimately modified may also depend on the federal program requirements and how large an award is obtained through the CPRG. In the meantime, the Agency is seeking the ability to transfer funding between incentive programs in order to ensure that each can remain open until federal funding is available to replenish those programs running out of funding at varied rates.

In addition to more flexibility with the existing appropriations for the Environmental Policy and Sustainability programs, the Agency is likely to seek more modest changes in the upcoming year, most of which do not require additional legislative authorization:

Incentive Program for New PEVs

- Likely to raise the mileage range for eligible PHEVs to a minimum of 30 miles, with the possibility of further limiting the program to all-electric vehicles when state funding runs out and is replaced with federal funds.
- After a review of program data, and given the limited funding available, the Agency will likely change program guidelines to limit incentives to one lifetime incentive per person.
- While the base MSRP cap would remain as is (or adjust slightly within current authorized limits), the Agency may institute an overall price cap to discourage extremely expensive vehicles that reduce the effectiveness of the incentive and drive more funding to higher income households even within the income sensitive guidelines.
- As funding transitions from state to federal funding, eligible households might be limited to those with the lowest incomes

Replace Your Ride

- Agency is proposing statutory changes to increase vehicle eligibility for scrappage—those that have failed the emissions test and those which have had an inspection in the last two years but might not pass one in the current year
- Agency is also proposing to allow for flexibility in emergency declarations in order to provide more support for electrification at critical household decision points.
- Agency is monitoring progress with Burlington Electric’s gasoline “superuser” pilot program, and may modify based on initial results

MileageSmart

- Agency will work with Capstone on potential modifications such as a limit on incentives per vehicle (to prevent multiple incentives as a vehicle is traded in multiple times) as well as a price floor to ensure the longevity of vehicles incentivized
- As the program transitions from state to federal funding, conventional hybrids may become ineligible and the focus may shift to those with the lowest incomes (households enrolled in 3SquaresVT)

eBike Incentive Program

- Agency has modified the guidelines so that eligible e-bikes must be participating in a voluntary national program to commit to recycling batteries responsibly
- Agency is likely to extend the timeframe applicants have to redeem their prepaid card at participating bike shops

Electrify Your Fleet

- Possible inclusions in this year's transportation bill would modify the fleet incentive program to add ATVs (all-terrain vehicles) and UTVs (utility vehicles) to the list of eligible vehicles, as well as increase the price of eligible e-cargo bikes for fleet purposes
- A final change might increase incentive amounts for AEVs, all-electric trucks, and EJ and disadvantaged entities currently identified in program guidelines

Conclusion

The State of Vermont has made significant progress in the past year towards its climate targets with vehicle electrification, and has done so by increasing its focus on achieving equitable outcomes for vulnerable Vermonters. As we enter an even more challenging fiscal environment this year, the Agency will continue to rely upon its valued partnerships, success in competing for federal dollars, and the strategic, data-driven use of legislative authority to deploy limited resources as cost-effectively and fairly as possible. We thank you and look forward to our work together in the coming year.



State of Vermont PEV Incentive Programs Annual Report - 2023

January 31, 2024



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Acronyms

ACH: Automated Clearing House

AEV: All Electric Vehicle

AGI: Adjusted Gross Income

CBO: Community-Based Organization

CSE: Center for Sustainable Energy

DEV: Drive Electric Vermont

DU: Distribution Utilities

eBike: Electric Bicycle

EVT: Efficiency Vermont

EV: Electric Vehicle

EEU: Energy Efficient Utilities

FPL: Federal Policy Level

GHG: Greenhouse Gas

ICE: Internal Combustion Engine

IRA: Inflation Reduction Act

KPI: Key Progress Indicators

MSRP: Manufacturer's Suggested Retail Price

PHEV: Plug-in Hybrid Electric Vehicle

PEV: Plug-in Electric Vehicle

RYR: Replace Your Ride

VEIC: Vermont Energy Investment Corporation

VTrans: Vermont Agency of Transportation

i. Executive Summary

This Annual Report summarizes progress, insights and recommendations for the Vermont New PEV, Replace Your Ride, and eBike incentive programs for the period of November 2022 through October 2023. Program statistics since inception are available in Appendix A. The New PEV program, launched in 2019, was previously administered by the State's electric distribution utilities (DUs) and Vermont Energy Investment Corporation (VEIC). This report also summarizes results to date on the Replace Your Ride (RZR) scrap and replace incentive program launched in September 2022, and the electric bicycle (eBike) incentive program which relaunched in June 2023.

For the period from November 1, 2022, through October 31, 2023:

- The New PEV program has issued \$2,282,500 in incentives for 732 PEVs
- Replace Your Ride has issued \$194,000 in incentives for 53 applications, including 28 purchasing new PEVs, 20 purchasing used PEVs, and 5 opting for a clean transportation debit card
- 95 eBike incentives were redeemed for \$46,805

In response to the increased incentive levels enacted in July 2023, application volume for New PEV has roughly tripled and have sustained through the end of 2023. At this increased drawdown, incentive funds could be fully allocated by January 2025.

Applications for New PEV favored income-qualified Enhanced rebates, representing 62% of approved applications. Program participation has been spread across the state, with Chittenden and Washington counties having the two highest per capita participation rates in the New PEV program.

The Replace your Ride Program saw the scrapping of 53 vehicles. Scrapped vehicles had an average model year of 2007 and 174K average mileage.

Of 143 approved eBike vouchers, 95 were for standard eBikes, 43 for cargo, and 5 were adaptive eBikes. The eBike program had a large influx of applications at launch, however many vouchers were not redeemed within their eligibility window and were subsequently cancelled. Of 287 vouchers issued through October, half (144) were cancelled.

Consumer surveys results for New PEV and RZR had the following findings:

- 91% of respondents were satisfied or very satisfied with the program application process and receiving the incentive
- 82% of respondents in the New PEV program were likely to recommend the State of Vermont incentive program to a family member or friend
- 58% of respondents stated they would not have purchased their EV without the incentive
- 90% of respondents in the New PEV program replaced an existing vehicle

Marketing, education and outreach efforts, led by partner VEIC, have primarily focused on updating the Drive Electric Vermont (DEV) website with information on the New PEV program as well as the RYR and eBike Programs, and engagement with auto dealers and eBike retailers to orient them to the programs and encourage their participation.

CSE provides the following key recommendations by program:

New PEV

- **Incentive Funding** - With increased program participation and changes to the federal tax credit, there is cause for concern that incentive funds will not be sufficient to fund the program through 2025. VTrans should continue to ask the Vermont legislature for flexibility in adapting some program rules and funding levels in response to changing market dynamics, with an eye to ensuring continuity of program funding. If application volume remains high, VTrans may wish to decrease incentive levels, reinstate more restrictive income levels, or implement a more restrictive MSRP cap.
- **Plug in Hybrids** – While PHEVs play an important role as a bridge technology, Vermonters appear to be getting more comfortable with AEVs. Additionally, PHEVs have less impact on GHG emission reductions than AEVs. CSE recommends that VTrans continue to consider the potential phase-out of PHEVs from the program. This could include increased minimum range requirements, a minimum MPGe requirement, lower incentive amounts or removal of the PHEV incentive from the program.
- **Vehicle Price Requirement** – CSE recommends reevaluating the MSRP cap requirement and consider applying either an MSRP cap at the trim-level, or a total vehicle cost cap. While this would increase complexity for applicants and dealers in understanding if a vehicle qualifies, it would also prevent incentives from going to higher priced vehicles with extensive packages and add-ons.

Replace Your Ride

- Income and vehicle eligibility requirements limit availability of this program to a relatively small pool of applicants. Opening up the used PEV program to moderate income non-MileageSmart participants could drive more participation. CSE recommends adapting the emissions inspection requirement to allow those with recently expired inspections to participate in the program.

eBike

- Allocate sustained funding to keep the program operational year-round, especially in the spring season when many bicycles are purchased.
- Leverage existing program infrastructure to maximize the limited administrative spend. Allocate additional administrative resources if more significant program changes are required.
- Approximately half of the eBike incentives paid were never redeemed and subsequently cancelled. Increasing the rebate amount, opening the program to online retail, and increasing the 60-day limit on the pre-paid cards could increase program participation.

ii. Summary of Incentive Processes

New PEV Incentive Program Process

The New PEV program re-launched under CSE's administration on July 1st, 2022. Buyers/lessors who wish to participate in the program must be Vermont residents and meet certain income requirements to be eligible. Additionally, Vermonters are limited to one incentive per year. The incentive is only available to approved plug-in hybrid or all-electric PEVs that meet the required base Manufacturer Suggested Retail Price (MSRP) caps, as outlined in the Program Guidelines.

Consumers have two pathways to receive an incentive: 1) at the dealership point-of-sale, or 2) direct to the consumer post-purchase. Through either claim, an account must be created, and a corresponding application submitted, through the online application portal with the following supporting documentation attached:

- a. Signed Consumer Attestation Form
- b. Complete copy of the purchase/lease agreement
- c. Proof of residency, generally a legible copy of a current Vermont driver's license, and
- d. Vehicle registration

CSE staff reviews this documentation for accuracy, and applications that have all correct documentation and meet all eligibility criteria are approved. If additional documentation is needed, CSE contacts the applicants or dealerships for more information.

Consumers applying through the post-purchase pathway must be in possession of their vehicle prior to applying. There is a 60-day window to apply after the purchase or lease of an eligible PEV. Once approved, consumers are mailed an incentive check within 6-8 weeks.

Dealerships wishing to offer point-of-sale or -lease incentives are required to have a Participating Dealer Agreement on file. Once this agreement is approved, dealerships are given a link to enroll as an administrator on the online application portal and submit Automated Clearing House (ACH) information prior to being able to submit applications. Once an account is set up, dealerships apply the corresponding incentive amount to the down-payment on eligible Vermonter's purchases/leases. If the incentive cannot be itemized on the contract, dealerships have the option to use the down payment verification template in the Program Guidelines, or an itemized OEM incentive sheet. Dealerships have 15 days from the date of sale/lease to apply for reimbursement. Once approved, dealerships receive incentive funding through ACH payment.

For both point-of-sale and consumer post-purchase applications, CSE batches approved applications and submits an invoice to VTrans monthly for the approved incentives amount. Once CSE receives payment from VTrans, CSE remits payment to applicants, either via ACH for enrolled dealerships, or via check for consumer post-purchase applications.

Beginning July 1, 2023, the New PEV program instituted the following changes to incentive levels and eligibility:

Change	Was	Is
Increased Enhanced rebate amount - AEVs	\$4,000	\$5,000
Increased Enhanced rebate amount - PHEVs	\$3,000	No change
Increased the Household income threshold for Enhanced Rebate eligibility	<ul style="list-style-type: none"> Individual filing as single or head of household: \$50,000 or less Individual filing as qualifying widower / surviving spouse: \$75,000 or less Married filing jointly: \$75,000 or less Married filing separately: \$50,000 or less 	<ul style="list-style-type: none"> Individual filing as single: \$60,000 or less Individual filing as head of household: \$75,000 or less Individual filing as qualifying widower / surviving spouse: \$90,000 or less Married filing jointly: \$90,000 or less Married filing separately: \$60,000 or less
Offered an additional \$1,000 through the end of calendar year 2023 for Vermont residents replacing vehicles damaged by July 2023 flood events with a new AEV or PHEV	N/A	\$1,000

Table 1 Changes to Program Guidelines beginning July 1, 2023

Replace Your Ride Incentive Program Process

The Replace Your Ride (RZR) program launched September 14, 2022 providing a \$3,000 incentive to income-eligible consumers to replace an eligible ICE vehicle. Effective July 1, 2023 the incentives were updated to a tiered system of \$2,500 for a standard incentive and \$5,000 for income-qualified enhanced incentives. The vehicle replacement must be combined with the purchase/lease of a new PEV, used PEV, or a request for a clean mobility prepaid card. The three RZR incentive pathways include:

1. **New PEV - Point-of-Sale Claim Only:** When scrapping and replacing with a new vehicle, the RZR incentive must be stacked with the New PEV Program incentive application.
2. **Used PEV - Point-of-Sale Claim Only:** When scrapping and replacing with a used vehicle, the RZR incentive will only be approved if accompanied by a MileageSmart Used EV Incentive Program Commitment Letter. MileageSmart is a separate vehicle incentive program funded by the Vermont Agency of Transportation administered by Capstone Community Action. MileageSmart operates under different income guidelines and is only available to Vermonters earning less than 80% of State Median Income based on household size.

3. **Clean Mobility Prepaid Card** - The RYR incentive is offered through a prepaid card to be used at eligible businesses that reduce or avoid vehicle miles traveled in single occupancy automobiles. For example, this includes public transportation, carshare, rideshare and bikeshare, as well as the purchase of a bike and bike accessories.

RYR + New PEV

Consumers interested in combining the RYR incentive with a New or Used PEV may only claim the incentive at a participating dealership as a point-of-sale claim on their down payment. For RYR plus New PEV incentives, the process for receiving the incentive and for dealership reimbursement is the same as described for New PEVs but with four additional documentation requirements, including:

1. A Replaced Vehicle Attestation Form
2. Scrapped Vehicle Registration
3. Scrapped Vehicle Title, and
4. Bill of sale (for the scrapped vehicle to the dealership)

RYR + Used PEV

For RYR plus Used Vehicle incentives, dealerships must still have a Participating Dealer Agreement and enroll through the application portal, but submissions are sent to CSE via email:

vermontPEV@energycenter.org. Supporting documentation required includes:

1. A Consumer Attestation Form
2. A Replaced Vehicle Attestation Form
3. Proof of residency, generally a legible copy of a current Vermont driver's license,
4. Scrapped Vehicle Registration
5. Scrapped Vehicle Title
6. Bill of sale (for the scrapped vehicle to the dealership), and
7. A MileageSmart Used EV Incentive Program Commitment Letter

RYR Clean Mobility+ Prepaid Card

Consumers interested in receiving the RYR incentive directly have the option to get preapproved and utilize a participating scrapping partner to scrap their ICE vehicle. Consumers submit applications for preapproval to CSE via email: vermontPEV@energycenter.org. Supporting documentation required includes:

1. A Consumer Attestation Form
2. Proof of residency, generally a legible copy of a current Vermont driver's license,
3. Scrapped Vehicle Registration
4. Scrapped Vehicle Title, and a
5. Copy of the vehicle's Inspection Sticker

The documentation outlines the intended scrapping partner that CSE will reach out to prior to confirming preapproval. Once preapproved, consumers have 30 days to scrap their ICE vehicle at their chosen scrapping partner and submit their final document for approval:

6. Bill of Sale/Receipt showing proper transfer of the vehicle to the eligible scrapping partner.

Once approved, consumers are mailed a prepaid debit card from PEX, a third-party service provider that offers a platform to distribute and manage prepaid debit cards. CSE works with PEX to create a whitelist of participating clean mobility partners with whom participants can utilize the card. Upon application approval, CSE creates a digital card with the applicant’s information and the incentive amount, and initiates mailing of the physical card to the recipient. Upon receipt of the digital card, the applicant may activate it to use online, or in-person if their chosen participating partner accepts the card number at point of sale. Otherwise, applicant can wait for physical card to arrive (within three weeks of issuance) to use at whitelisted participating partners. CSE’s administrative PEX dashboard allows issuance of replacement cards as needed, returning the remaining card balance funding back into the account. Mobility card information, including some limited transaction information, is tracked within the PEX dashboard, while raw application information, such as applicant submission data, processing documents, and application status is tracked outside of the PEX platform.

eBike Incentive Program Process

The eBike incentive program provides an incentive to income-eligible Vermont individuals for a maximum of one electric bicycle purchase over the life of the program. eBikes must be equipped with a motor of 750 watts or less and be sold as new. eBike incentive amounts vary by eBike type (standard, cargo, or adaptive). **Table 2** lists the incentives by eBike type and their MSRP caps.

eBike Type	MSRP Cap	Incentive
Standard	\$4,000 or Less	\$400
Cargo	\$5,000 or Less	\$800
Adaptive	No MSRP Limit	\$800

Table 2 eBike Incentive Types and MSRP Limits

Consumers interested in receiving the eBike incentive must submit an online application, and upload supporting documentation. In cases where consumers are unable to access the Internet, they may mail applications and documentation to CSE’s office. Supporting documentation required includes:

1. A Consumer Attestation Form
2. Proof of residency, generally a legible copy of a current Vermont driver’s license
3. Signed terms and conditions (for mailed applications)

CSE staff reviews this documentation for accuracy. Applications that have all correct documentation and meet all eligibility criteria are approved. If additional documentation is needed, CSE contacts the applicants for more information.

Once approved, consumers are sent a prepaid debit card from PEX. CSE works with PEX to create a whitelist of participating retailers where participants can use the card toward the purchase of an eligible eBike. Upon application approval, CSE creates a digital card with the applicant's information and the incentive amount, and initiates mailing of the physical card to the recipient. Upon receipt of the digital card, the applicant may activate it to use online, or in-person if their chosen participating retailer accepts the card number at point of sale. Otherwise, applicants can wait for physical card to arrive (within three weeks of issuance) to use at a whitelisted participating retailer. CSE's administrative PEX dashboard allows issuance of replacement cards as needed. PEX card information, including some limited transaction information, is tracked within the PEX dashboard, while raw application information, such as applicant submission data, processing documents, and application status is tracked outside of the PEX platform.

Upon redemption of prepaid debit card voucher by a consumer at a participating retailer, the retailer must complete an online Dealer Voucher Redemption Form¹ including sales receipt within thirty (30) calendar days of the date of sale of the eligible eBike. Retailers interested in participating in the VT eBike Incentive Program are required to complete a Participating Retailer Agreement to enroll in the Program.

¹ <https://survey.alchemer.com/s3/7386443/vt-ebike-dlr-submission>

iii. Summary of Incentive Volume and Figures

This section summarizes the incentives approved during the period of November 2022 through October 2023.

New PEV

Participation by Rebate Level and Application Type

From November 1, 2022, through October 31, 2023, the New PEV program approved 732 applications. 27% of approved applications were consumer post-purchase and 73% were dealer point-of-sale, with 52% of applications receiving the Standard Rebate and 48% receiving the Enhanced Rebate (**Table 3**).

Both standard and enhanced applicants preferred the dealer point-of-sale option. 71% of standard applicants and 75% of enhanced applicants preferred this option.

Application Pathway	Standard Rebate	Enhanced Rebate	Total Approved Applications
Consumer post-purchase	111	88	199
Dealership point-of-sale	269	264	533
Total	380	352	732

Table 3 Approved Applications by Application Pathway and Type

Table 4 shows 564 unapproved, or cancelled, applications. Most cancellations are initiated by the applicant. For those not initiated by the applicant, **Table 5** lists the most common reasons for cancellation, with the vast majority due to a failure to (re)submit required application documents.

Application Pathway	Unapproved Standard applications	Unapproved Enhanced Rebate	Total Unapproved Applications
Consumer post-purchase	131	314	445
Dealership point-of-sale	70	48	118
Total	201	362	564

Table 4 Count of unapproved applications

Most common requests to cancel application			
Cancellation Reason	Consumer	Dealership	Total
Initial documents not submitted	125	3	128
Requested documents not (re)submitted	17	38	55
Late submission	6 (past 60 days)	3 (past 15 days)	9

Reapply for enhanced	0	6	6
Reapply for RYR	0	6	6

Table 5 Cancellation Reasons

Figure 1 below shows approved applications by month from November 1, 2022, through October 31, 2023, with a monthly average of 61 applications.

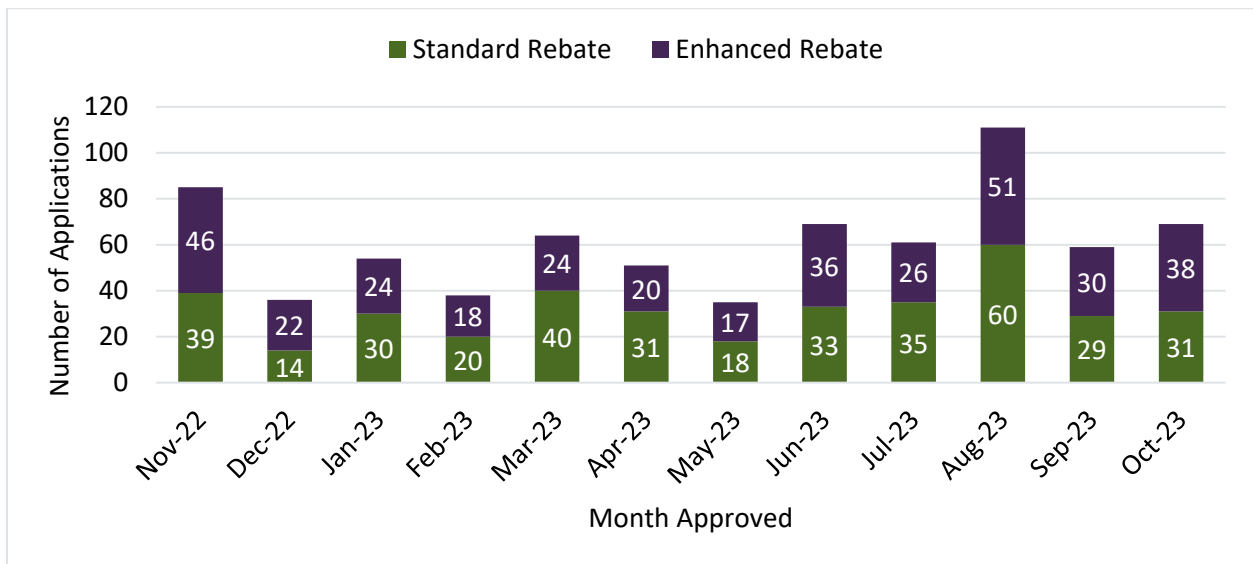


Figure 1 Approved Application by Date Approved and Rebate Level

Participation by Vehicle Category

AEVs were the most popular vehicle type by volume, representing 81% of approved applications compared to 19% PHEVs. Both Standard and Enhanced applicants overwhelmingly preferred AEVs (82% and 80%, respectively). AEV purchases increased from 72% to 81% compared to the previous reporting period of July-October 2022.

Vehicle Type	Standard Rebate	Enhanced Rebate	Total
AEV	310 (82%)	282 (80%)	592 (81%)
PHEV	70 (18%)	70 (20%)	140 (19%)
Grand Total	380	352	732

Table 6 Standard vs Enhanced by Vehicle Type

Participation by Vehicle Make

The most popular vehicle make was Chevrolet with 24.5% of all approved applications, all of which were AEVs (**Table 7**). Nissan was the second most popular make, with 17.5% of applications.

Vehicle Make	Total	AEV	% AEV	Enhanced	% of Total	% of Enhanced
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Chevrolet	179	179	100.0%	83	24.5%	23.6%
Nissan	128	128	100.0%	81	17.5%	23.0%
Volkswagen	121	121	100.0%	40	16.5%	11.4%
Hyundai	107	77	72.0%	51	14.6%	14.5%
Toyota	69	5	7.2%	37	9.4%	10.5%
Kia	36	16	44.4%	16	4.9%	4.5%
Subaru	32	23	71.9%	16	4.4%	4.5%
Tesla	29	29	100.0%	15	4.0%	4.3%
Ford	18	9	50.0%	7	2.5%	2.0%
MINI	6	6	100.0%	3	0.8%	0.9%
Mitsubishi	5	0	0.0%	2	0.7%	0.6%
Chrysler	1	0	0.0%	0	0.1%	0.0%
Mazda	1	0	0.0%	1	0.1%	0.3%
Total	732	593	81.0%	352	100.0%	100.0%

Table 7 Applications by Vehicle Make

Of the top five makes, Nissan and Toyota represented a larger proportion of Enhanced incentives compared to their proportion of the total. Nissan had an outsized proportion of Enhanced incentives, representing 23.0% of Enhanced, but only 17.5% of the total.

The top five manufactures represented 82.5% of all program participation. The same five manufacturers were at the top for Enhanced rebates.

Participation by Vehicle Model

For the reporting period, the Volkswagen ID.4 was the most popular vehicle with 121 approved applications. The Chevrolet Bolt EUV (115) and Nissan LEAF/LEAF Plus (99) followed next.

The LEAF/LEAF Plus (16.5%), Bolt EUV (14.5%), and ID.4 (11.4%) were the preferred vehicles for Enhanced applicants. The most popular AEV vehicle model was the Volkswagen ID.4 (20.4%), and the most popular PHEV vehicle model was the Toyota Prius Prime (24.5%).

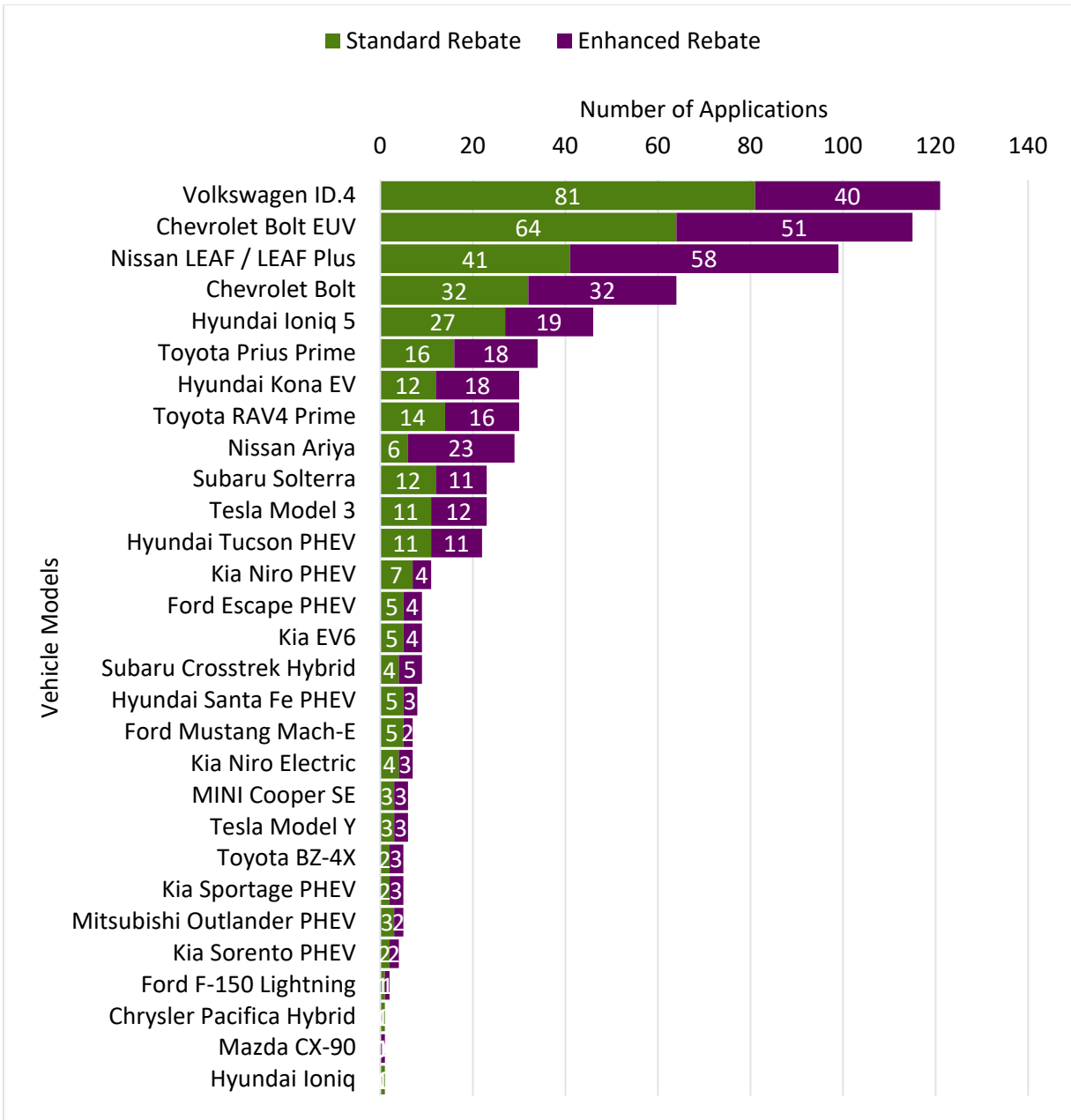


Figure 2 Applications by Vehicle Make/Model and Rebate Level

Make and Model	Total	Standard	Enhanced
Volkswagen ID.4	121	81	40
Chevrolet Bolt EUV	115	64	51
Nissan LEAF / LEAF Plus	99	41	58
Chevrolet Bolt	64	32	32
Hyundai Ioniq 5	46	27	19
Toyota Prius Prime	34	16	18

Hyundai Kona EV	30	12	18
Toyota RAV4 Prime	30	14	16
Nissan Ariya	29	6	23
Subaru Solterra	23	12	11
Tesla Model 3	23	11	12
Hyundai Tucson PHEV	22	11	11
Kia Niro PHEV	11	7	4
Ford Escape PHEV	9	5	4
Kia EV6	9	5	4
Subaru Crosstrek Hybrid	9	4	5
Hyundai Santa Fe PHEV	8	5	3
Ford Mustang Mach-E	7	5	2
Kia Niro Electric	7	4	3
MINI Cooper SE	6	3	3
Tesla Model Y	6	3	3
Toyota BZ-4X	5	2	3
Kia Sportage PHEV	5	2	3
Mitsubishi Outlander PHEV	5	3	2
Kia Sorento PHEV	4	2	2
Ford F-150 Lightning	2	1	1
Chrysler Pacifica Hybrid	1	1	0
Mazda CX-90	1	0	1
Hyundai Ioniq	1	1	0

Table 8 Applications by Vehicle Model and Rebate Level

Participation by Purchase vs Lease

Vehicle purchases represent about two thirds of approved incentives (63%). Both standard and Enhanced applicants preferred to purchase, though standard applicants purchased at a much higher percentage than enhanced (68% vs 58%, respectively).

Vehicle leases have increased significantly over the reporting period, from as low as 6% of monthly applications to over half by the end of the period (**Figure 3**).

Application Pathway	Standard Rebate	Enhanced Rebate	Total
Purchased	258	203	461
Leased	122	149	271
Total	380	352	732

Table 9 Count of Purchased vs Leased

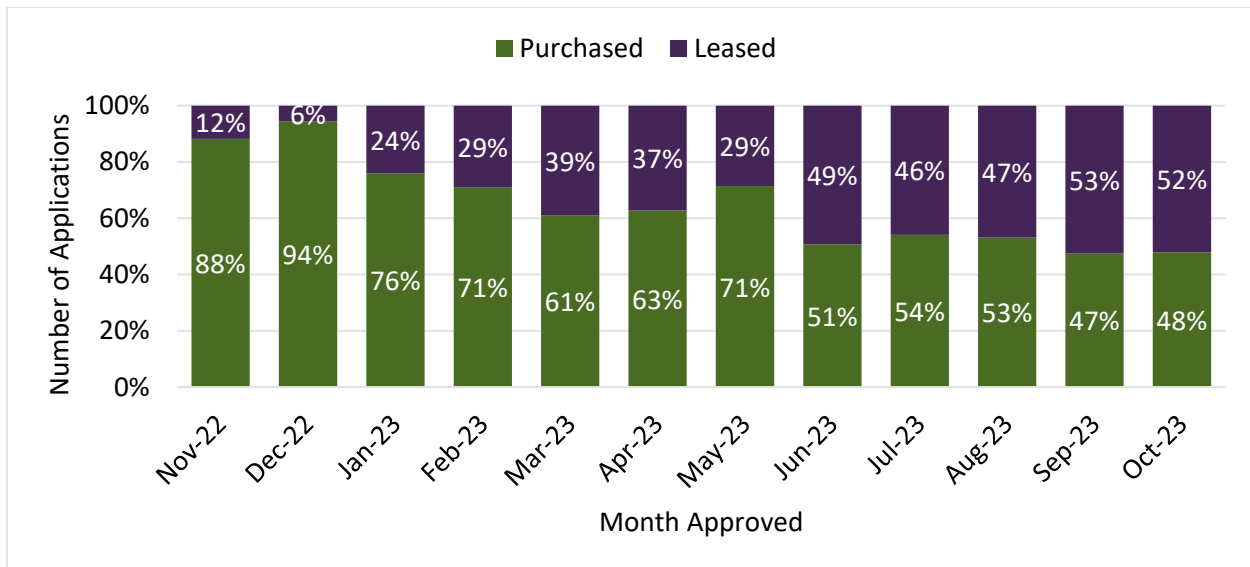


Figure 3 Percent of vehicles purchased vs leased

Participation Compared to Other States

CSE compared Vermont participation in the New PEV program to other state programs CSE administers on the East Coast. New York and New Jersey have much higher participation per resident, with over two approved applications per 1,000 residents. However, Vermont ranked higher than Connecticut and Massachusetts for participation per resident.

Program / State	2023 Population ²	Approved Applications (Nov 22-Oct 23)	Approved applications per 1,000 Residents
CHEAPR (CT)	3,617,176	3,369	0.93
MOR-EV (MA)	7,001,399	8,460	1.21
Vermont New PEV	647,464	914	1.41
Drive Clean (NY)	19,571,216	39,344	2.01
Charge Up New Jersey (NJ)	9,290,841	19,083	2.05

Table 10 Approved applications by state

² <https://www.census.gov/>

Repeat Participation

Program data was examined for repeated names with repeated addresses to determine a count of repeat applicants. This included approved New PEV applicants the complete duration of CSE administration, as well as all applicants from the previous program administered by VEIC. 121 applicants were found to have been approved for two or more incentives, seven were approved for three, and one was approved for four (CarShare Vermont was eligible for up to five purchases under old program guidelines). Of repeat applicants, 69 repurchased the same vehicle and the average time between purchases was 2.26 years.

Participation by Geography

Figure 4 shows program participation by county for applications approved from November 1, 2022, to October 31, 2023. Chittenden County received the highest number of approved applications at 31%, an increase from last year's report of 25%. Washington County had the second-highest number of applications at 15% followed by Rutland County at 11%. Applications are relatively well spread across the state, with strong participation from counties with High Environmental Disparity Index scores, like Rutland and Addison County³ (**Figure 5**).

³ Qing Ren and Bindu Panikkar (2021, Vermont Environmental Disparity Index, University of Vermont. Accessible at: <https://www.arcgis.com/apps/webappviewer/index.html?id=68a9290bde0c42529460e1b8deee8368>

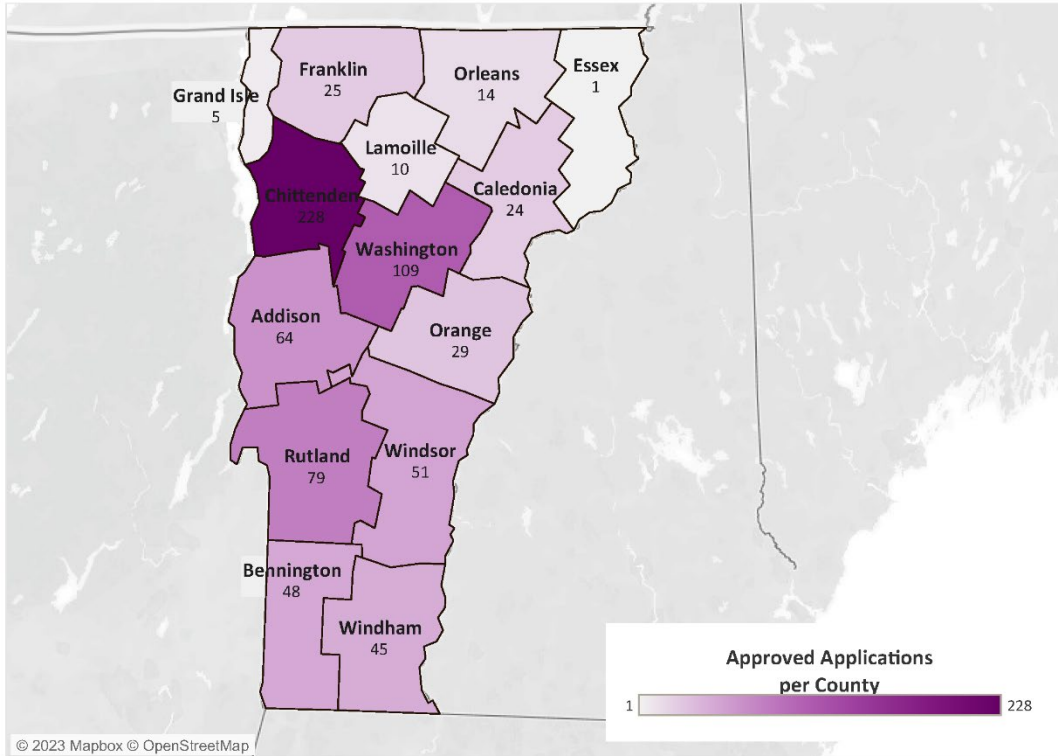


Figure 4 Approved Applications by County

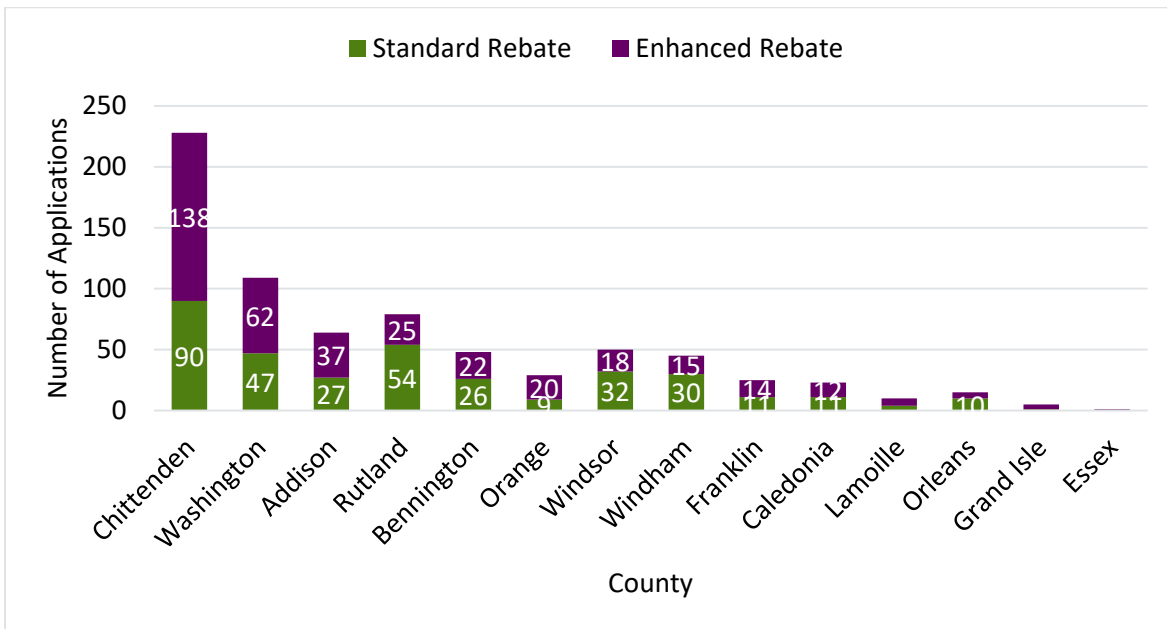


Figure 5 Participation by County and Rebate Type

Normalizing for population, **Figure 6** shows that Washington County received the highest per capita incentive funding at \$96,226 per 10,000 people, while Essex County received the lowest amount of

incentive funds per capita.

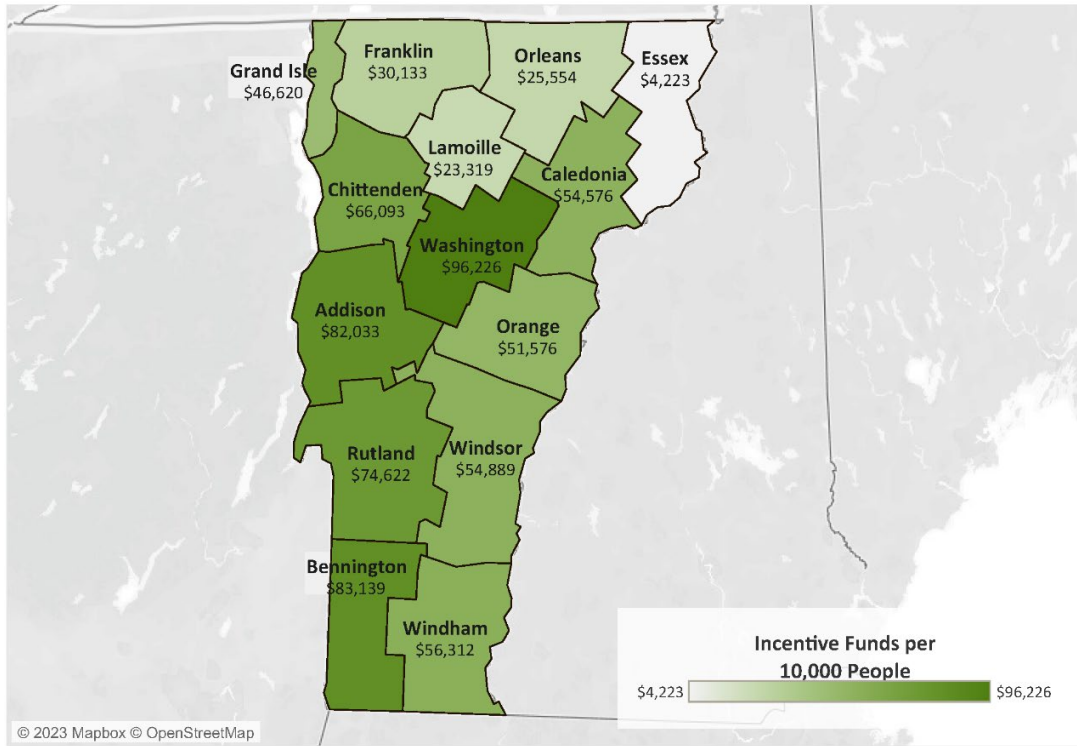


Figure 6 New PEV Incentive Expenditure per Capita by County

Response to Program Changes

In an effort to increase participation, VTrans instituted changes to rebate levels, vehicle eligibility and applicant eligibility for the Enhanced rebate, effective July 1, 2023. These changes had an almost immediate effect, with average monthly application volume increasing by 260% for the period from August 2023 through October 2023, compared to the period from November 2022 through July 2023.

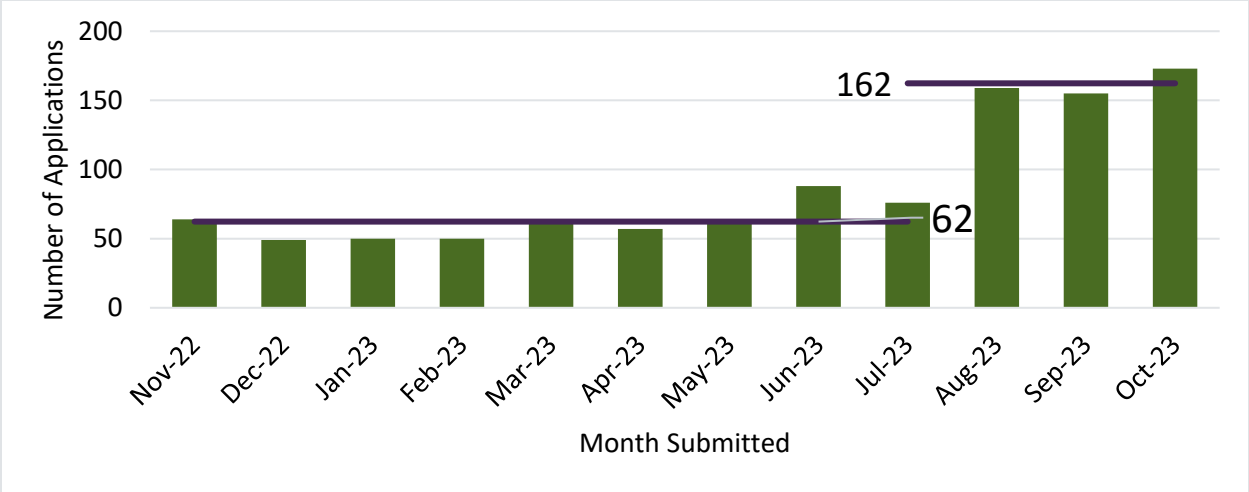


Figure 7 New PEV Application volume by month from November 2022 – October 2023

Processing and Payment Timelines

Approval timelines for New PEV have steadily increased from single digits to a high of 42 in October 2023. 35% of applications were approved within a week or less, and 51% were approved within 2 weeks. Note that these metrics include applications with one or more resubmits.

Month Approved	Average Days Received to Approved	Average Days Approved to Paid	Average Days Received to Paid
Nov-22	8	127	135
Dec-22	7	84	92
Jan-23	12	65	76
Feb-23	11	70	79
Mar-23	11	43	54
Apr-23	4	71	76
May-23	6	79	88
Jun-23	18	46	62
Jul-23	22	87	111
Aug-23	21	55	76
Sep-23	24	76	101
Oct-23	42	57	N/A
Min	0	27	29
Average	16	72	87
Max	184	156	233

Table 11 Payment and Approval Timelines by Month Approved

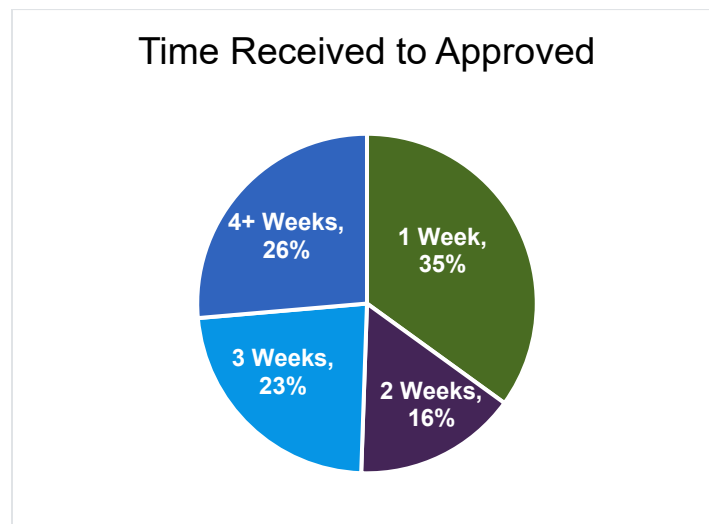


Figure 8 Application Approval Duration

Incentive Batch Payment Timelines

Once monthly, CSE creates and sends an invoice to VTrans for batches of approved incentives (known as batch invoices). Once CSE receives payment for the batch invoice, incentive payments are dispersed to dealers and applicants. The average incentive batch spends 10 days at CSE, 23 days at VTrans, and is paid out to recipients 9 days after CSE receives payment. Payment timelines have varied from a low of 21 days to a high of 69 days. Time spent at VTrans awaiting payment has averaged 23 days.

Replace Your Ride

The RYR program had an increase in participation in the second year. Between November 1, 2022 and October 31, 2023, 53 older internal combustion engine vehicles were scrapped and replaced with either a new plug-in EV, used plug-in EV, or clean mobility card. Twenty-eight (28) applicants paired the RYR incentive with the New PEV incentive, 20 applicants paired the RYR incentive with a used PEV purchase or lease through the MileageSmart Program, and 5 applicants claimed the Clean Mobility Card incentive (**Figure 9**). The pairing of RYR with the New PEV incentive made up a little over half of the program (53%).

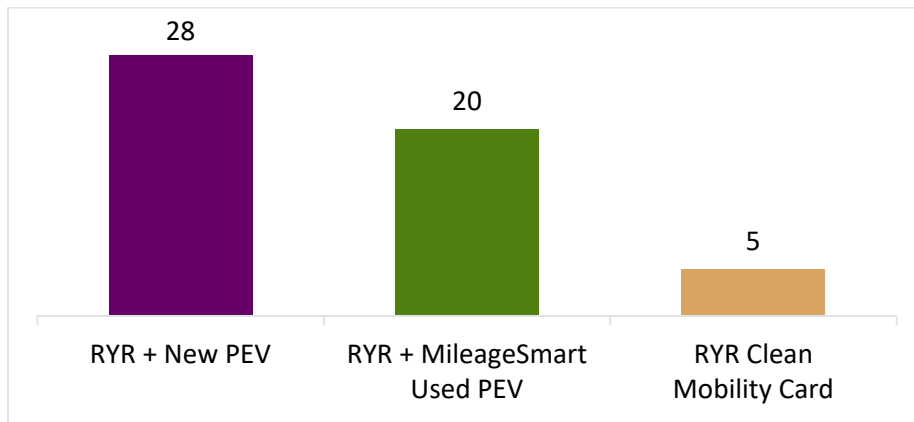


Figure 9 RYR Applications Paired with New PEV, MileageSmart, and Clean Mobility Card

Figure 10 shows the number of applications approved over time. Applications were approved at a steady pace through 2023 with the exception of September.

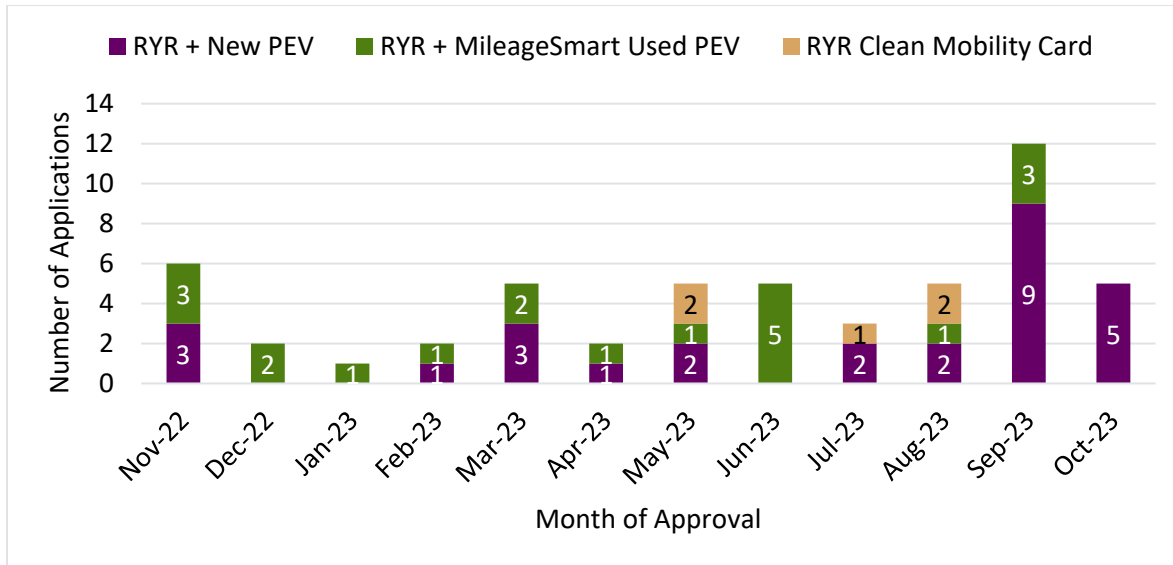


Figure 10 Approved Applications by Month and Replacement Type

Scrapped Vehicles

Applicants scrapped vehicles between model years 1999 and 2012. The most common scrapped model years were 2007, 2008 and 2010, making up nearly half (47%) of all replacements (**Table 13**).

Model Year of Scrapped Vehicle	Number of Scrapped Vehicles	Percent of Scrapped Vehicles
1999	1	2%
2000	1	2%
2001	1	2%
2002	1	2%
2003	2	4%
2004	2	4%
2005	3	6%
2006	4	8%
2007	6	11%
2008	11	21%
2009	4	8%
2010	8	15%
2011	4	8%
2012	5	9%
Total	53	100%

Table 12 Vehicle Model Years Scrapped

There were five approved consumer claim applications that received incentive funds through a Clean Mobility Prepaid Card that can be used at eligible businesses rather than applying the incentive directly

towards the purchase or lease of a vehicle. Consumer Claim applicants were all within 60 miles of Burlington. These participants make up the remaining 9% of the program. In one case, a dealer did not wish to participate in the RYR program. Unable to claim their RYR + New PEV incentive, the applicant applied for consumer claim instead. This applicant was retroactively granted an exception and was mailed a check in lieu of the prepaid card.

Amount Used	Retailer	City
\$308.80	The Great Outdoors	Milton
\$2,957.95	The Great Outdoors	E Montpelier
\$3,000	Frog Hollow Bikes	Waltham
\$3,000	The Gear House	Randolph
*Check sent due to exception.	N/A	Jericho

Table 13 Clean Mobility Prepaid Card purchases

Model Year of Scrapped Vehicle	Number of Scrapped Vehicles	Percent of Scrapped Vehicles
1999	1	2%
2000	1	2%
2001	1	2%
2002	1	2%
2003	2	4%
2004	2	4%
2005	3	6%
2006	4	8%
2007	6	11%
2008	11	21%
2009	4	8%
2010	8	15%
2011	4	8%
2012	5	9%
Total	53	100%

Table 14 Model year of scrapped vehicles

Out of the 48 applicants that acquired a PEV after scrapping their vehicle, 38 applicants purchased or leased an AEV making up 79% of all PEV acquisitions (**Figure 11**). A conventional hybrid was accidentally approved due to a processing error. Corrective actions have been taken to prevent this from reoccurring. Shown in **Table 15**, the most redeemed used PEVs were vehicle model year 2020 (13% of all PEV acquisitions) whereas new PEVs were all 2023 vehicle models.

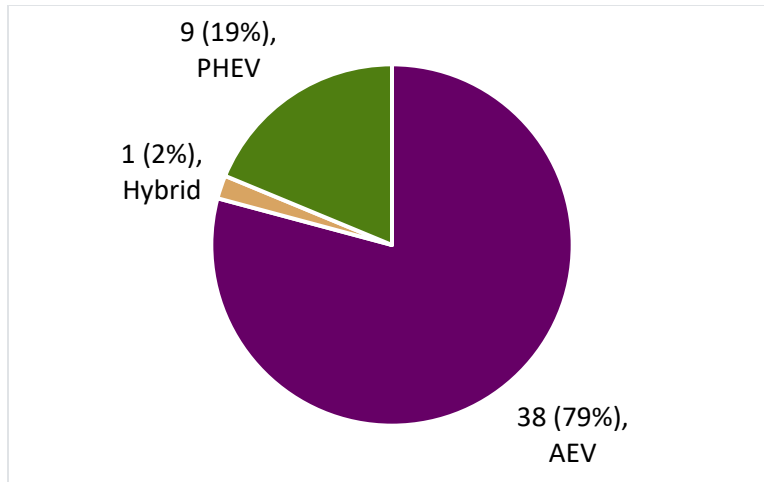


Figure 11 Vehicle Type of Replacement Vehicle

Model Year of Replacement vehicle	New PEV	Used PEV	Total Replacement Vehicles	Percent of Replacement Vehicles
2013	0	2	2	4%
2017	0	4	4	8%
2018	0	2	2	4%
2020	0	6	6	13%
2021	0	4	4	8%
2022	0	2	2	4%
2023	28	0	28	58%
Total	28	20	48	100%

Table 15 Model Year New and Used PEV Replacement Vehicles

Table 17 and Table 18 show the minimum, average, and maximum annual mileage driven before the vehicles were scrapped. The annual mileage for scrapped vehicles were calculated by dividing the final odometer reading of the scrapped vehicle by its age. The vehicle age was determined by calculating the difference between the vehicle model year and the year when the scrapped vehicle application was submitted. For vehicles where the final odometer reading was not reported prior to scrapping, we used the state estimate of 14,850 Vehicle Miles Traveled (VMT) per vehicle. This was calculated using annual

VMT of 7.13 billion miles driven in 2022⁴ divided by the estimated number of vehicles of 480k⁵. Participants that scrapped their vehicle for a used PEV drove nearly 1,000 more miles on average than those who acquired a new PEV, while there was approximately 3,000 miles difference in the maximum annual mileage driven. Only one participant who scrapped their vehicle for the Clean Mobility Prepaid Card reported their final odometer reading, so the relatively high average in annual miles driven is an estimate. There is little difference in the annual driving habits of participants that replaced a scrapped vehicle with an AEV or PHEV. However, due to a limited sample size, further analysis is recommended when additional data is available to verify trends.

Replacement Type for Scrapped Vehicle	Number of Scrapped Vehicles	Minimum Annual Mileage of Scrapped Vehicles	Average Annual Mileage of Scrapped Vehicles	Maximum Annual Mileage of Scrapped Vehicles
New PEV	28	3,551	11,999	16,955
Clean Mobility Prepaid Card	5	12,808	14,442	14,850
Used PEV	20	5,258	12,930	20,210

Table 16 Annual Mileage of Scrapped Vehicles by Incentive Type

Technology Type for Replacement vehicle	Number of Scrapped Vehicles	Minimum Annual Mileage of Scrapped Vehicles	Average Annual Mileage of Scrapped Vehicles	Maximum Annual Mileage of Scrapped Vehicles
AEV	38	3,551	12,409	20,210
Hybrid	1	10,304	10,304	10,304
PHEV	9	5,258	12,525	16,955

Table 17 Annual Mileage of Scrapped Vehicles by PEV Replacement Type

Applicants that replaced the oldest cars (20-24 years old) in the program did so with AEVs. Preliminary results show that applicants that replaced their car with an AEV were equally likely to scrap a car that was 11-14 years old and 15-19 years old, while those that acquired a PHEV were more likely to replace a 11-14 year old car. Further research is recommended when more data is available to determine if this

⁴ HPMS 2022, Extent and Travel Report.

https://vtrans.vermont.gov/sites/aot/files/highway/documents/hsd/VT_VMT_FC_2022.pdf

⁵ The estimated number of vehicles was provided by James Sullivan from the University of Vermont (<https://www.uvm.edu/cems/profiles/james-sullivan>).

trend persists. CSE conducted preliminary analysis on differences between scrapped vehicle age of new and used replacement vehicles, but due to a small sample size the results were inconclusive.

Technology Type of Replacement Vehicle	Replaced a 11-14 Years Old Car	Replaced a 15-19 Years Old Car	Replaced a 20-24 Years Old Car	Number of Scrapped Vehicles
AEV	16	16	6	38
Hybrid	0	1	0	1
PHEV	8	1	0	9
Clean Mobility Card	1	4	0	5
Total	25	22	6	53

Table 18 Scrapped Vehicle Age by Replacement Type

Consumers did not seem to have brand loyalty when replacing their vehicle. Of the 53 replaced vehicle makes, only three were replaced with the same make: one Toyota, one Chevrolet and one Nissan (**Table 18**). Applicants were more consistent in the vehicle body style⁶ they purchased or leased for Sedans versus SUVs. **Table 19** shows the summary of body style differences between scrapped and replacement vehicles. Of the 32 Sedans scrapped, 27 applicants acquired another Sedan. In the SUV class, 9 of the 19 scrapped vehicles were replaced with another SUV.

Make/Model of Scrapped Vehicle	Scrapped Vehicle Body Style	Number of Scrapped Vehicles	Make/Model of Replaced Vehicle	Replacement Vehicle Body Style
Audi A4	Sedan	1	Nissan Leaf	Sedan
Chevrolet Astro	Van	1	Nissan LEAF / LEAF Plus	Sedan
Chevrolet CRZ	Sedan	1	Chevrolet Volt	Sedan
Chevrolet Malibu	Sedan	1	Nissan Leaf Plus	Sedan
Chevrolet Sonic	Sedan	1	Nissan Ariya	SUV
Chrysler Pacifica	SUV	1	Clean Mobility Prepaid Card	
Dodge Durango	SUV	1	Nissan Leaf	Sedan
Ford Escape	SUV	1	Clean Mobility Prepaid Card	
Ford Fusion	Sedan	1	Chevrolet Bolt	Sedan
Honda Civic	Sedan	1	Nissan LEAF / LEAF Plus	Sedan

⁶ Vehicle body styles were determined using the market class identified by Fuel Economy (<https://www.fueleconomy.gov/feg/findacar.shtml>). Vehicles identified as Sedans in the analysis comprise of the following classifications: small cars, family sedans, upscale sedans, luxury sedans, large sedans, hatchbacks, coupes, convertibles, sport/sporty cars, and station wagons. Vehicles identified as SUVs are classified as SUVs, and Vans are comprised of minivans and vans.

Honda CRV	SUV	2	Chevrolet Bolt EUV	Sedan
Honda Element	SUV	1	Clean Mobility Prepaid Card	
Honda Fit	Sedan	3	Chevrolet Bolt EUV Kia EV6 Toyota Prius	Sedan Sedan Sedan
Honda Odyssey	Van	1	Nissan Leaf	Sedan
Honda Pilot	SUV	1	Nissan LEAF / LEAF Plus	Sedan
Hyundai Elantra	Sedan	1	Toyota Prius	Sedan
Lexus ES	Sedan	1	Nissan Ariya	SUV
Mazda MZ3	Sedan	1	Kia Niro	Sedan
Mercury Milan	Sedan	1	Nissan LEAF / LEAF Plus	Sedan
Mitsubishi Outlander	SUV	1	Nissan Leaf	Sedan
Nissan Altima	Sedan	1	Nissan Leaf	Sedan
Nissan Versa	Sedan	2	Ford C-Max Kia Niro PHEV	Sedan Sedan
Nissan VRS	Sedan	1	Kia Optima	Sedan
SAAB 9-3	Sedan	1	Clean Mobility Prepaid Card	N/A
SAAB 9-5	Sedan	1	Clean Mobility Prepaid Card	N/A
Subaru Forester	SUV	4	Nissan Ariya Nissan Leaf Toyota RAV4 Volkswagen ID.4	SUV Sedan SUV SUV
Subaru Impreza	Sedan	3	Chevrolet Bolt Chevrolet Bolt EUV Nissan LEAF / LEAF Plus	Sedan Sedan Sedan
Subaru legacy	Sedan	1	Ford Mustang Mach-E	SUV
Subaru Outback	SUV	2	Nissan LEAF / LEAF Plus Volkswagen ID.4	Sedan Sedan
Toyota Camry	Sedan	1	Chevrolet Bolt EUV	Sedan
Toyota COA	Sedan	1	Kia Optima	Sedan
Toyota Corolla	Sedan	2	Chevrolet Bolt EUV Kia Niro PHEV	Sedan Sedan
Toyota Highlander	SUV	1	Volkswagen ID.4	SUV
Toyota Prius	Sedan	3	Chevrolet Bolt EUV Nissan Leaf Nissan Leaf Plus	Sedan Sedan Sedan
Toyota RAV4	SUV	1	Toyota RAV4 Prime	SUV
Toyota Yaris	Sedan	1	Hyundai Ioniq	Sedan
Volvo V70	Sedan	1	Chevrolet Bolt	Sedan

Volvo XC60	SUV	1	Nissan Ariya	SUV
Volvo XC90	SUV	2	Nissan Ariya Volkswagen ID.4	SUV SUV

Table 19 Comparison of Vehicle Makes from Scrapped to Replaced

Body Style of Scrapped Vehicle	Replaced with a Sedan	Replaced with an SUV	No Replacement Vehicle
Sedan	27	3	2
SUV	7	9	3
Van	2	0	0
Total	36	12	5

Table 20 Body Styles of Scrapped to Replaced Vehicles

eBikes

Participation by Application Status

The Vermont eBike Incentive Program approved a total of 287 applications between July 17, 2023, and October 31, 2023. After application approval, Vermonters receive their incentive voucher and have 60 days from issued date to purchase an eligible eBike at a participating retailer. At the time of this analysis, 16% of all approved applicants have not yet purchased their eBike. Thirty-four percent (34%) of these applicants redeemed their incentive voucher while 50% did not purchase an eBike within the allotted time and their voucher has been cancelled (**Table 20**).

Voucher Redemption Status of Approved Applications	Number of Applications	Percent of Applications
Approved – redeemed voucher	97	34%
Approved – have not redeemed voucher	46	16%
Cancelled	144	50%
Total	287	100%

Table 21 eBike Applications by Application Pathway

By October 31st, 2023, the total funds approved and reserved for applications is \$76,400. Out of the total \$127,982 of incentive funds, \$51,982 remain available. The 97 vouchers redeemed total to \$48,800 incentive funds issued and \$27,600 are reserved for the remaining 46 vouchers that are pending an eBike purchase (**Table 21**).

Voucher Redemption Status	Number of Applications	Funds Reserved/Approved
Redeemed	97	\$48,800
Have not redeemed	46	\$27,600
Total	143	\$76,400

Table 22 Funds Reserved/Approved by Voucher Redemption Status

Participation by eBike Type

Figure 12 shows approved applications by eBike type. A total of 95 standard eBike, 43 cargo eBike, and 5 adaptive eBike vouchers were approved. Incentive amounts varied between eBike type, with standard eBikes eligible for a \$400 incentive voucher while cargo and adaptive eBikes were eligible for a \$800 incentive voucher. Nearly three quarters (74%) of the redeemed vouchers were for the purchase of a standard eBike.

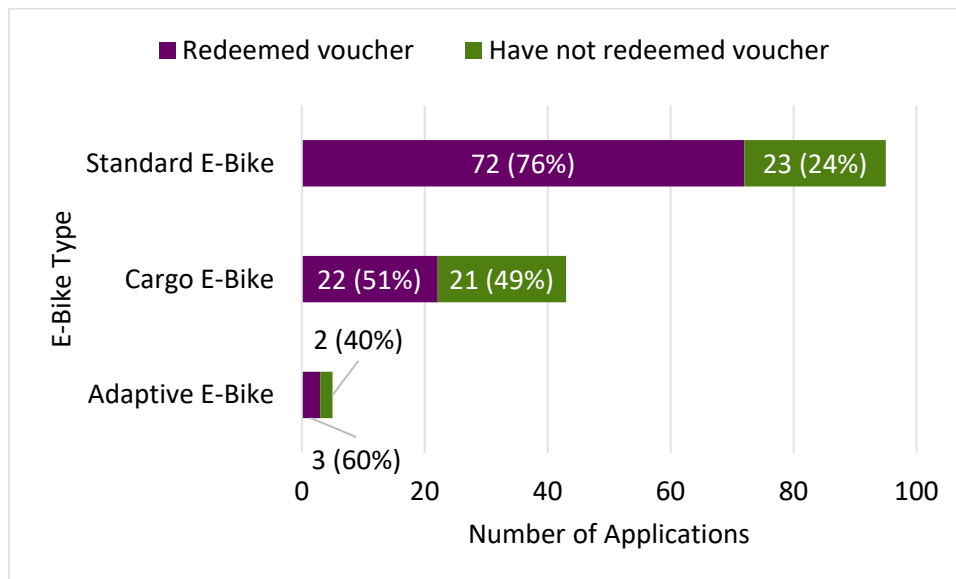


Figure 12 ebike Type by Voucher Redemption Status

Distribution of Applications by eBike Purchase Price

Figure 13 and Table 22 below shows the distribution of redeemed vouchers by eBike type and purchase price where information has been provided by the retailer. Retailers have provided receipts for 90% of applications and CSE continues to follow up with those missing information. The majority of applicants purchased an eBike ranging between \$1,500 and \$1,999. For standard ebikes, the MSRP cap is \$4000, and for cargo ebikes the MSRP cap is \$5000 and there is no MSRP cap for adaptive ebikes.

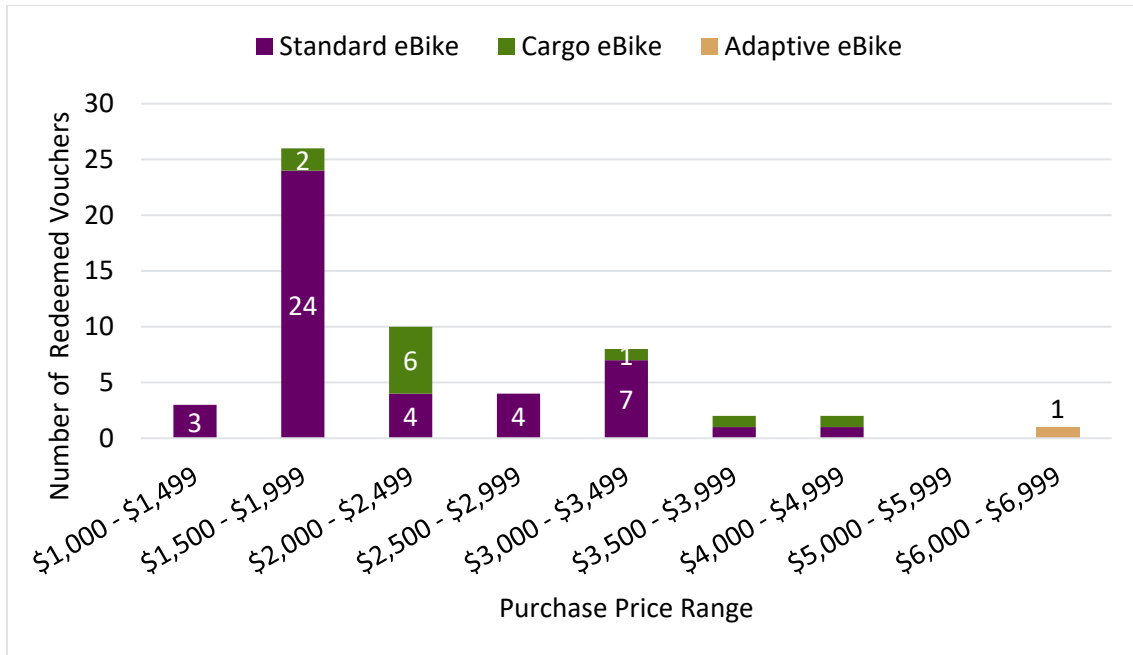


Figure 13 Distribution of Redeemed Vouchers by eBike Type and Purchase Price

Price Range	Standard eBike	Cargo eBike	Adaptive eBike
\$1,000 - \$1,499	3	0	0
\$1,500 - \$1,999	24	2	0
\$2,000 - \$2,499	4	6	0
\$2,500 - \$2,999	4	0	0
\$3,000 - \$3,499	7	1	0
\$3,500 - \$4,000	1	1	0
\$4,000 - \$4,999	1	1	0
\$5,000 - \$5,999	0	0	0
\$6,000 - \$6,999	0	0	1

Table 23 Distribution of Redeemed Vouchers by Purchase Price and eBike Type

Average eBike purchase price of all applications was \$2,345.69 (**Table 23**). On average, the Standard eBike rebate covered 18% of the purchase price while the Cargo eBike rebate covered 31% of the purchase price.

eBike Type	Average eBike Purchase Price	Average Incentive % of Purchase Price
Standard eBike	\$2,192.73	18%
Cargo eBike	\$2,575.81	31%
Adaptive eBike	\$6,545.00	12%
Overall	\$2,345.69	21%

Table 24 Average Purchase Price by EBike Type

Participation by eBike Manufacturers

Figure 14 below shows the eBike manufacturers with more than one redeemed voucher by eBike type where information has been provided by the retailer. The most popular manufacturers was Aventon with 59% of redeemed vouchers, followed by Gazelle at 11% and Specialized at 7% (**Table 24**). So far, the program has approved applications for 13 different eBike manufacturers.

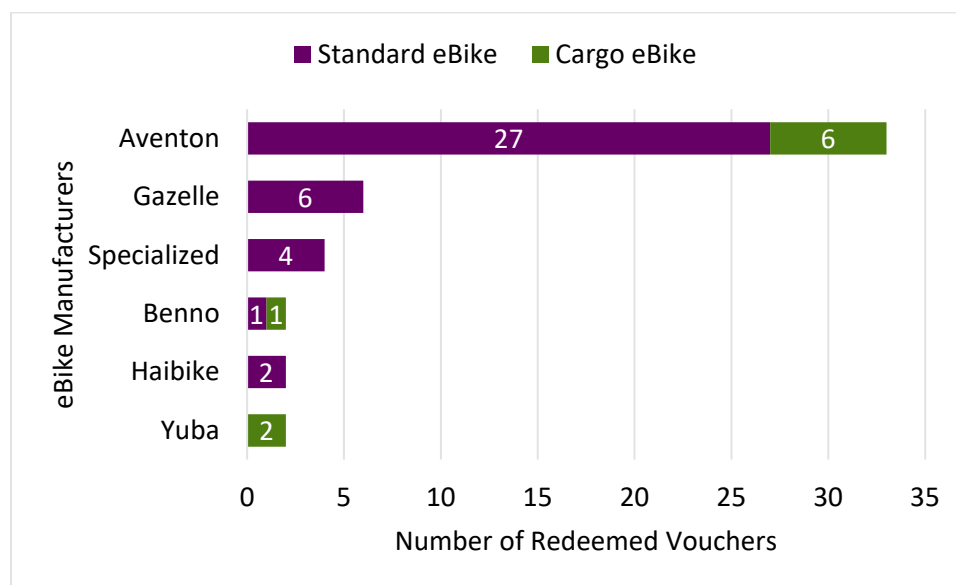


Figure 14 Top 10 eBike Manufacturers by Rebate Type

eBike Manufacturers	Number of Redeemed Vouchers	Percent of Redeemed Vouchers
Aventon	34	40%
Gazelle	6	7%
Specialized	22	26%
Benno	2	2%
Haibike	2	2%
Yuba	2	2%
Diamondback	1	1%
Electric Bike Technologies	1	1%
Giant	1	1%
Hase	1	1%
Kona	3	4%
Surly	2	2%
Trek	3	4%
Yamaha	1	2%
Cannondale	4	5%

Table 25 eBike Manufacturers of Redeemed Vouchers

eBike Program Participation by Geography

Figure 15 displays participation by counties in Vermont from all approved applications. The highest number of approved applications (37%) were from Chittenden County followed by 14% in Windham and 10% in Franklin counties.

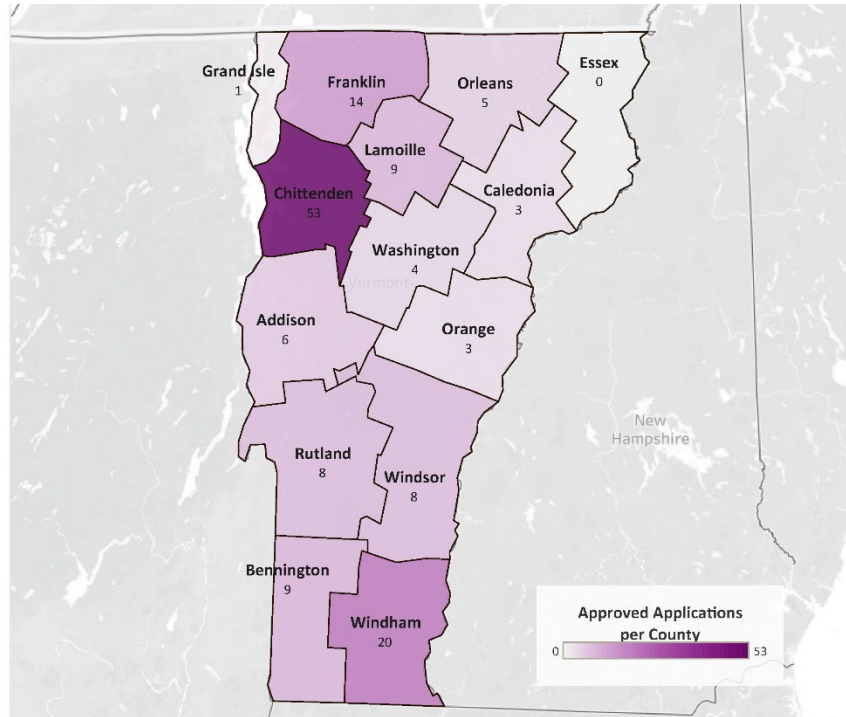


Figure 15 Map of Approved eBike Applications by County

Participation by Approved Retailers

The eBikes Program has 18 participating retailers. **Figure 16** shows the number of redeemed vouchers by 11 participating retailers, where information has been provided by the retailer. Bootlegger Bikes is the leading retailer with 41% of redeemed vouchers at the time of analysis, followed by Brattleboro Bicycle Shop and Bennington Bike Hub, each with 16% of redeemed vouchers.

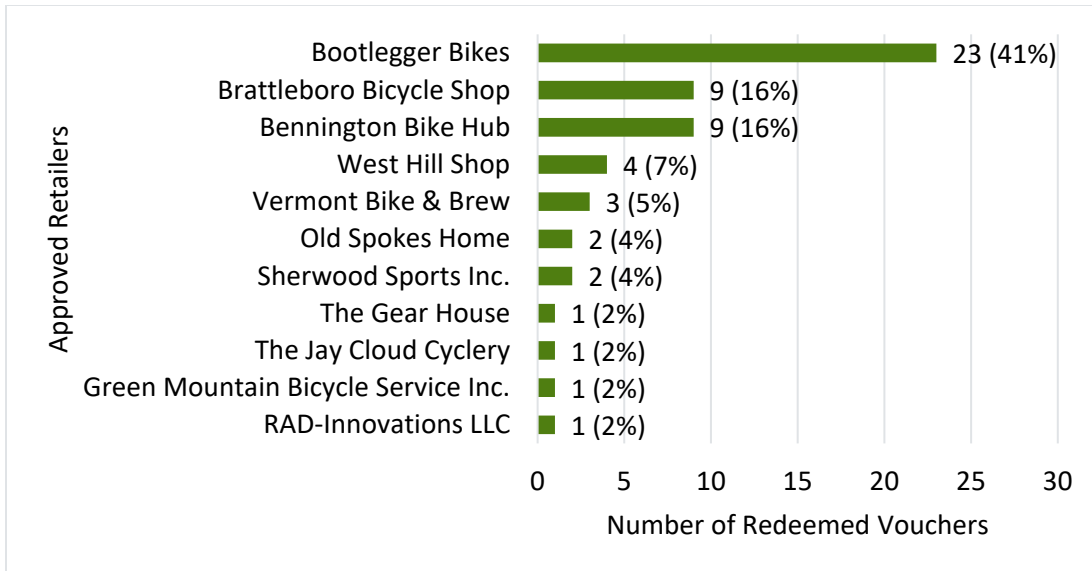


Figure 16 Redeemed Vouchers by Participating Retailers

iv. Summary of Marketing and Outreach Efforts

CSE partners with VEIC to support local engagement and outreach for the New PEV, RYR and eBike incentive programs. VEIC coordinates the Drive Electric Vermont (DEV) program and operates the Efficiency Vermont (EVT) energy efficiency utility. A primary channel for outreach on the incentive offerings is the DEV website. VEIC redesigned the DEV incentive resources in 2022 to include a new page for State incentive information and has continued to update this resource with program changes. CSE has also worked with VTrans to issue press releases announcing important milestones in program availability, resulting in significant earned media value. VEIC developed a marketing and outreach plan in 2023 to guide marketing and engagement efforts.

VEIC has spent approximately \$67,000 on 2023 outreach and education activities through its subcontract with CSE covering the State incentive programs as of November 2023. This work included several updates to DEV website resources on State of Vermont incentives as well as direct outreach to the auto dealer community and Vermonters as described in the sections below covering the New PEV, RYR and eBike programs. To foster equity and accessibility to State Incentive and general Drive Electric Vermont resources, DEV installed a language translation tool on the DEV website and has translated several handouts for limited English proficiency Vermonters interested in the programs. DEV also responded to summer 2023 flood impacts by working with VTrans and CSE to launch enhanced incentives for flood-damaged vehicle replacements. DEV developed a blog post outlining the flood offers to complement the updates to the State Incentives webpage. DEV promoted the flood recovery incentives through Drive Electric Vermont’s e-newsletter and partnered with Efficiency Vermont to disseminate the program information through the EVT website and newsletter as part of their flood recovery outreach.

New PEV

VEIC's marketing and outreach efforts focused on supporting the New PEV incentive program and disseminating information on incentive offerings through the DEV website and promotional materials.

DEV partnered with a local vendor, the Association of Africans Living in Vermont (AALV), to translate the DEV Fact Sheet and Incentives Sheet, which detail the New PEV program, into French, Mandarin, Nepali, and Spanish.

DEV developed a media toolkit for retailers, stakeholders, and partners to use to promote the State Incentive programs, including New PEV.

In addition to website updates, VEIC engaged dealer and retailer stakeholders, facilitated retailer training sessions on each of the State incentive programs and helped recruit dealers to participate in point-of-sale incentive offerings. The Vermont Vehicle and Automotive Distributors Association (VADA) continued to serve as an important partner in communicating with car dealers on changes to incentive program offers and requirements. VEIC delivered two dealer EV incentive training sessions on the new process for dealership point-of-sale incentives in 2023 with 77 dealer staff registrations. These sessions were recorded and provided to all participants and additional dealer staff as needed following the program launch. As of November 2023, 45 new car dealers are participating in the New PEV point-of-sale incentive program.

The partnership with dealers to offer incentives at the point-of-sale streamlines program administration and provides a better customer experience. Lower income purchasers especially benefit in taking advantage of point-of-sale offerings as they increase up-front equity in vehicle purchases or leases, improving financing options and reducing financing costs associated with a mail-in rebate arriving up to two months following incentive application submittals.

Complementary Initiatives

Separate from VEIC's subcontract with CSE supporting the incentive programs, VEIC has engaged in general consumer outreach on PEV purchases through Efficiency Vermont's (EVT) ongoing PEV consumer education and awareness campaign. This included EVT's multi-channel PEV marketing activities enabled by Act 151, which was enacted by the Vermont Legislature in 2020 and has provided electric energy efficiency utilities (EELs) pilot opportunities to support transportation electrification. Act 151 authorized these activities for a three-year period, ending at the close of 2023. EVT invested approximately \$345,000 in 2023 to EV marketing activities that support traffic to the Drive Electric Vermont website, which contains information on the State's clean transportation incentive offerings. Efficiency Vermont PEV Campaign tactics have included:

- Web display advertisements
- Broadcast and online video ads
- Radio live reads
- Social media ads
- Front Porch Forum posts

- Audio ads for radio and audio streaming
- Bus wraps
- BTV airport EV installation
- Seven Days sponsored articles promoting State PEV Incentives
- Efficiency Excellence Network EV dealer point-of-sale materials

Visits to the DEV website incentives page increased 428% since the campaign launched. Google Analytics provides a view of website traffic broken down by the original domain (website or platform) that sent traffic to DriveElectricVermont.com. Top traffic sources were generated via:

- Google keyword search and digital display advertising. *Search ads are sponsored search results focused around strategic keywords that show up at the top of the Google search results page when a user enters a query using the target keyword. Display ads are visual advertisements placed on webpages within Google's network of websites that allow Google advertisements.*
- Paid social ads. *Facebook and Front Porch Forum advertisements. These include video, text, and image-based advertisements.*
- Paid streaming. *These are video and audio advertisements on streaming video or audio service providers such as Pandora, Youtube TV, Hulu, and Amazon.*
- Organic search. *When users enter a query in Google or another search provider and click on a result that is not a sponsored advertisement on the results page. Organic traffic relies on websites' copy, meta descriptions for images and pages, internal and external links, and other tactics that boost a webpage's authority. Search providers can crawl webpages for indicators that the webpage has accurate information related to the user's original search query. When a search provider deems a page as authoritative, it ranks those pages higher on the search results page so it's easier for users to find.*

As of December 2023, Efficiency Vermont has a pending proposal with the Public Utility Commission to continue EV marketing campaign activities through the 2024-2026 Energy Efficiency Utility Demand Resources Plan (DRP). VEIC will work with VTrans and CSE on the outcome of PUC deliberations and will engage in further review of 2024 EV consumer outreach activities and resources as needed.

Stakeholder Engagement

VEIC facilitates quarterly Drive Electric Vermont (DEV) stakeholder meetings where updates regarding RYR, eBike, and PEV incentives are shared. The DEV stakeholder contact list includes approximately 250 individuals, representing more than 130 organizations, most of which are based in Vermont. VEIC also supported 17 in-person PEV-focused events between January and November 2023. These events are frequently organized by local energy committees, and they provided opportunities to promote the State incentives. For the eleven events VEIC was unable to attend in-person, hosts were sent brochures and flyers containing State incentive information for distribution. VEIC also supported a paid partnership with LiveGreenVT which provided opportunities to share insights via their outreach channels.

VEIC has also coordinated regular meetings with Captone Community Action, implementer of the MileageSmart used high-efficiency vehicle incentive program, Green Savings Smart coaches from community action agencies across the state, VTrans, and the Community Rides service operating an all-

electric fleet of vehicles for shared mobility rides in central Vermont. These meetings provide an opportunity to update outreach staff on program changes and for them to offer feedback on the various programs based on their experience working with lower income Vermonters.

Replace Your Ride

VEIC completed maintenance updates to the DEV website with information to support ongoing RYR programmatic updates. The DEV site includes a listing of RYR participating dealers, retailers, and scrapping partners. DEV designed and printed a Replace Your Ride informational postcard to be distributed by partners to consumers. DEV partnered with AALV, Inc. to translate the postcard and Incentives Sheet, which details the RYR program, into French, Mandarin, Nepali, and Spanish. DEV developed a media toolkit for retailers, stakeholders, and partners to leverage to promote the State Incentive programs, including RYR.

eBikes

VEIC completed maintenance updates to the DEV website with information on the eBike incentive offerings and supported outreach to bike retailers to encourage participation in the point-of-sale incentives. DEV partnered with AALV, Inc. to translate the Fact Sheet and Incentives Sheet, which detail the eBike program, into French, Mandarin, Nepali, and Spanish. DEV developed a media toolkit for retailers, stakeholders, and partners to leverage to promote the State Incentive programs, including eBikes.

v. Summary and Key Findings from Consumer Survey

New PEV and RYR Consumer Survey

CSE developed an incentive recipient Consumer Survey for Vermont New PEV and RYR program participants in the last quarter of 2023. Similar to the VEIC survey⁷, responses provide insight into consumer experience with adopting and using their newly acquired PEV and their program participation experience.

Survey Details

The target audience for the State of Vermont New PEV and RYR Consumer Survey are individual incentive recipients who participated in one or more of these State of Vermont programs:

- Incentives for New Plug-in Electric Vehicles (New PEV)

⁷ The full report of the Incentive Recipient Consumer Survey developed by VEIC is available and can be found at: <https://www.driveelectricvt.com/Media/Default/docs/reports/veic-state-of-vermont-ev-incentive-recipient-survey-march-2022.pdf>

- Replace Your Ride and Incentives for New Plug-in Electric Vehicles (RYS + New PEV)
- Replace Your Ride and MileageSmart (RYS + MileageSmart Used PEV)
- Replace Your Ride - Other Clean Mobility Actions (RYS Clean Mobility Card)

Applicants whose applications were canceled or denied were not invited to this survey. Recipients of the MileageSmart incentive program who did not participate in Replace Your Ride are also not included. The objectives of the State of Vermont New PEV and RYS Consumer Survey are to:

- Measure satisfaction with multiple aspects of the State of Vermont programs among incentive recipients to inform program improvements.
- Determine the influence of the incentive from the State of Vermont programs and other incentives on recipients’ decision to adopt a plug-in electric vehicle (EV), scrap an eligible vehicle, or claim a prepaid clean mobility card.
- Understand the motivating factors important in incentive recipients’ decision to adopt a plug-in EV, scrap an eligible vehicle, or claim a prepaid clean mobility card.
- Assess incentive recipients’ travel and plug-in EV charging behavior, if applicable.
- Understand vehicle and household composition and the general demographics of incentive recipients.

As a survey was not conducted by CSE in 2022, the survey was sent to all incentive recipients who were approved for a rebate on or after July 1st, 2022. Results will include responses from this audience. Survey invitations were sent to 932 New PEV and RYS incentive recipients and responses were collected between November 14, 2023, and November 29, 2023. Invitations were sent via email campaigns built into Alchemer (CSE’s survey platform). This survey sample represents applications approved between July 7, 2022, and October 31, 2023. For those participating in a State of Vermont program and acquiring either a new or used PEV, the survey sample represented vehicles purchased/leased between February 24, 2022, and September 18, 2023. In total, 393 completed survey responses were collected (42% response rate).

Relevant Dates	
Survey Responses Collected	11/14/23 – 11/29/23
Incentive Application Approval Dates of Survey Sample	7/7/22 – 10/31/23
Vehicle Purchase/Lease Dates of Survey Sample	2/24/22 – 9/18/23
Population and Response Rates	
Program Population Invited to Survey	932
Survey Responses Received	393
Response Rate	42%

Table 26 New PEV and RYS Consumer Survey Administration Details

Methods

CSE prepared the data to analyze the key insights by removing partial responses and validating responses. Response validity was determined using a quarantine feature in Alchemer that flags responses for:

- Speeding: flags the fastest 6% of responses collected
- Straight-lining/patterned responses (selecting the same answer in option grid question types)
- Gibberish in open-ended text boxes
- All checkboxes (selecting all options on “select all that apply” questions)

The quarantine process flagged 55 responses. A manual review of the responses found no consistent pattern of straight-lining or evidence of speeders providing false responses. No responses were removed.

At the time analysis began, 42% of the program population (393/932) submitted a survey response. After a review of the responses by specific program participation, CSE determined to apply post-stratification weights for participation in New PEV, which includes those who participated in RYR and acquired a new PEV. The method was not used for participation in RYR paired with MileageSmart or RYR Clean Mobility Prepaid Card due to the limited number of responses (N=7 and N=1 respectively). Instead, the analysis will report using unweighted data. Future survey analysis will be reviewed for validity of comparison across segments when there is an adequate sample size.

The post-stratification method uses iterative proportional fitting to make results more representative of the full program population by assigning each survey response a weighted value. The value is based on whether the program population is over/underrepresented in the survey data based on the specific strata. The strata used for weighting were incentivized PEV model, county of vehicle registration, purchase versus lease, and party that claimed the incentive (applicant or dealership). One record was excluded from the program population during the weighting process because no corresponding survey response was received to represent one or more strata used to weight⁸. See Appendix B: Consumer Survey Weighting Strata for details on how weighting strata proportions differed between the program population and the full survey sample.

Values reported were created using weighted data unless otherwise specified and excluded those who did not respond to a question or select “Prefer not to answer” to certain required questions. The key findings section below used weighted data (unless otherwise specified) to determine differences across interest segments. Those segments include:

⁸ One participant acquired a Chrysler Pacifica Hybrid and did not submit a survey response. Therefore Chrysler Pacifica Hybrids were not represented at all in the survey and therefore removed for the purposes of weighting.

- Vehicles replaced by new PEV purchases/leases
- Driving behavior and related weekly miles driven
- Charging behavior
- Satisfaction with the rebate programs
- Influence of the incentives
- Dealership knowledge

Key Findings and Insights

CSE explored several survey questions for differences in responses between segments of interest from program participants to determine if responses to key questions varied by particular characteristics (e.g., demographic, PEV type, location of residence). The following questions were evaluated and resulted in similar distributions or did not have enough data to compare, hence no meaningful difference.

- Evaluated used PEV acquisition responses by different segments of interest
 - “Please estimate the percentage of the [incentivized vehicle] miles you drive during a typical week doing the following activities.”
 - Cross-comparing “Approximately how many miles do you drive your [incentivized vehicle] during a typical week (e.g., commuting, errands, recreation)?” with the questions “Do you currently have solar panels that produce electricity at your residence?”, “Are you enrolled in a 100% renewable energy program with your utility?”
 - “Where do you currently charge your [incentivized vehicle]?”
 - “How satisfied were you with the process of applying for and receiving the State of Vermont incentive?”
- Evaluated both new and used PEV acquisition responses by vehicle type (AEV/PHEV)
 - “Do you currently have solar panels that produce electricity at your residence?”
 - “Are you enrolled in a 100% renewable energy program with your utility?”
- Evaluated new PEV acquisitions with participation in RYR responses by age and income
 - “If the State of Vermont’s New PEV and RYR incentive didn’t exist, what do you think you would have done?”
- Evaluated used PEV acquisition responses by age and income
 - “If the State of Vermont’s RYR incentive didn’t exist, what do you think you would have done?”
- Evaluated responses from Black, Indigenous and People of Color and Non-binary communities to those who did not identify as part of these communities
 - “How knowledgeable was your dealer or retail store representative about the following topics?”

Vehicle Replaced by New PEV Acquisition

Survey respondents who participated solely in the New PEV program (did not scrap a vehicle) were asked whether their newly acquired PEV replaced or will replace another household vehicle or added to

their household fleet if they indicated they have two or more cars in the home⁹. A series of follow-up questions captured information about the vehicle they replaced. Respondents who participated in RYR and New PEV were known to replace another household vehicle, and scrapped vehicle information was captured as part of their RYR participation. The following analysis includes information captured from both of these groups.

A total of 90% of respondents who acquired a new PEV replaced another car in the home (**Figure 17**).

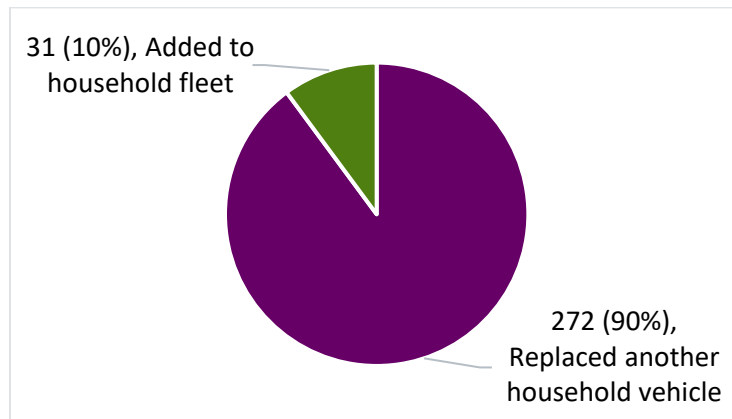


Figure 17 Added To or Replaced Household Vehicle with New PEV

The top vehicle makes with 5% or more replacements are listed in **Table 26**. The Nissan LEAF was the most replaced vehicle model by respondents, followed by the Toyota Prius (9% and 8%, respectively).

Table 27 lists the vehicle models with 2% or more replacements.

Vehicle Makes	Number of Replacements	Percent of Replacements
Toyota	61	22%
Subaru	42	16%
Nissan	29	11%
Honda	29	11%
Volkswagen	22	8%
Chevrolet	14	5%
Ford	13	5%

Table 27 Top Vehicle Makes Replaced with a New PEV

⁹ Survey respondents who indicated they have only one vehicle in the household were not asked whether their new PEV acquisition replaced another household vehicle or added to their household fleet. These responses were excluded from question analysis.

Vehicle Makes	Number of Replacements	Percent of Replacements
Nissan LEAF	25	9%
Toyota Prius	21	8%
Subaru Forester	15	6%
Honda CR-V	10	4%
Subaru Crosstrek	9	3%
Subaru Outback	9	3%
Toyota RAV4	8	3%
Chevrolet Bolt EV	8	3%
Honda Civic	8	3%
Subaru Impreza	7	3%
Volkswagen Golf	7	3%
Ford Escape	6	2%
Honda Fit	6	2%
Toyota Prius Prime	6	2%

Table 28 Top Vehicle Models Replaced with a New PEV

The vehicle model year 2013 was the most common replaced model year from respondents, followed by the 2015 model year (**Figure 18**). Forty-five percent (45%) of all models replaced were ten (10) years old or older (**Table 28**), with 11 out of 122 replacements from participation through RYR (4% of all replaced vehicles with a new PEV). The spike in replacement for 2020 models may be correlated with the end of vehicle lease agreements, which are typically two to three years.

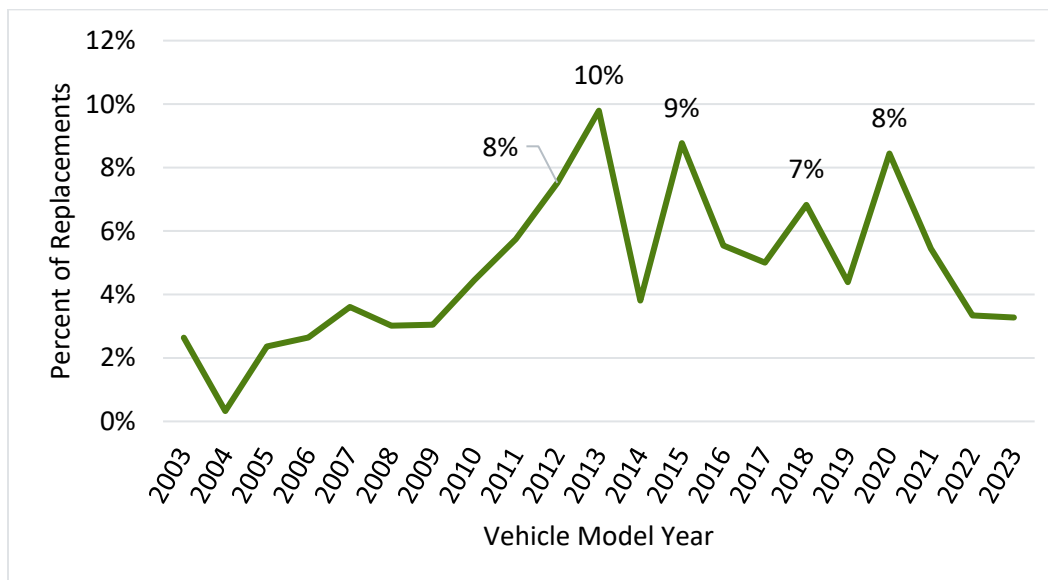


Figure 18 Vehicle Model Year Replaced with a New PEV

Vehicle Model Year	Number of Replacements	Percent of Replacements
2003 -2013	122	45%
2014	10	4%
2015	24	9%
2016	15	6%
2017	13	5%
2018	18	7%
2019	12	4%
2020	23	8%
2021	15	5%
2022	9	3%
2023	9	3%
Total	269	100%

Table 29 Vehicle Model Years Replaced with a New PEV

Weekly Miles Travelled by Driving Behavior

Findings show similar miles traveled per week for respondents of new AEV or PHEV acquisitions. The difference in miles ranged between 2.5 to 5.3 miles for the following activities: commuting, running errands, and other activities (**Figure 19**). New PHEV owners are slightly more likely to drive more for recreational activities than new AEV owners.

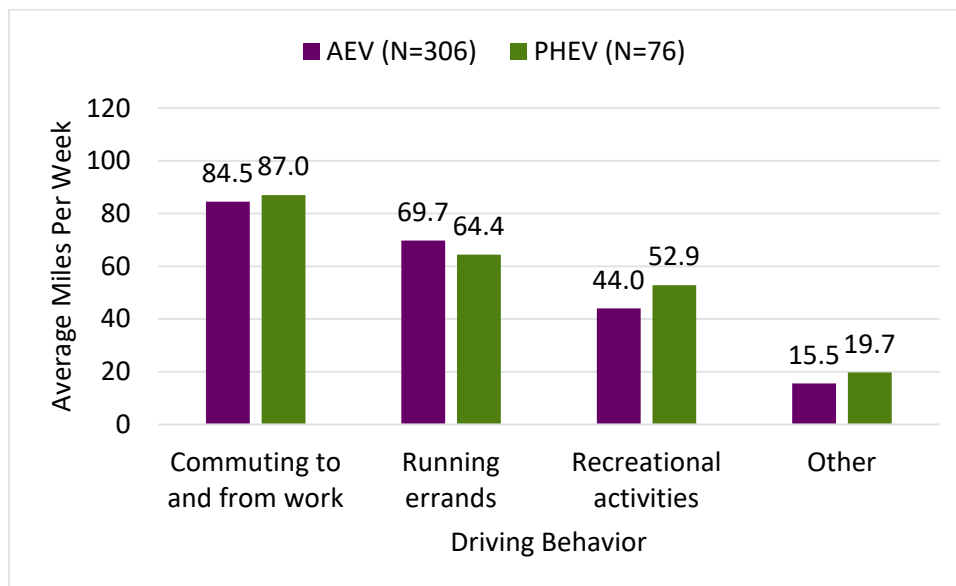


Figure 19 Average Miles Driven Weekly by Driving Behavior and Vehicle Type for New PEV Acquisitions

The average weekly miles driven by age group differed the most between those ages 59 or under and 60 years or older for commuting and running errands. Commuting distance per week increased per age

group up to age 59 and then significantly decreased for those 60 years old and older, suggesting that respondents in this age group have retired and are no longer commuting (**Figure 20**).

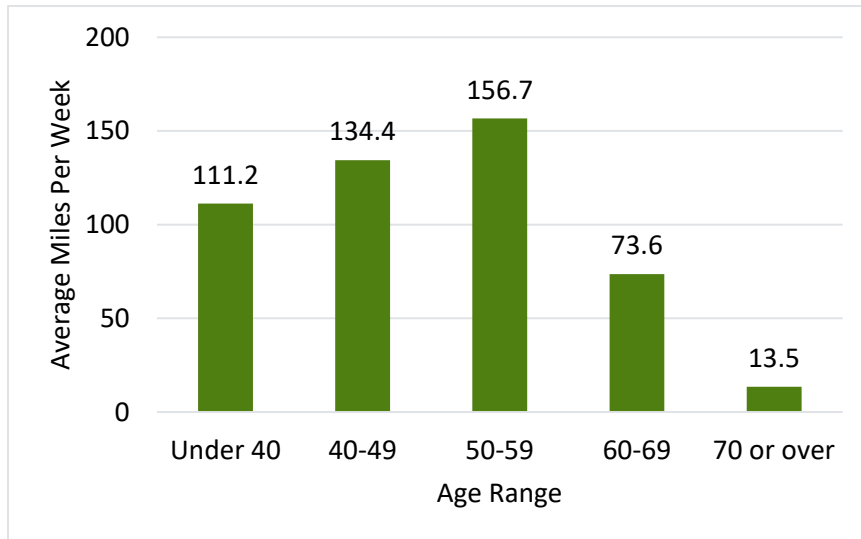


Figure 20 Average Miles Driven Per Week for Work Commute by Age Range for New PEV Acquisitions

The average miles driven per week for running errands were steady through age 59 but increased for those ages 60 and over (**Figure 21**). Miles traveled for recreational activities remained consistent for all ages (**Figure 22**), while other activities varied slightly per age group (**Figure 23**).

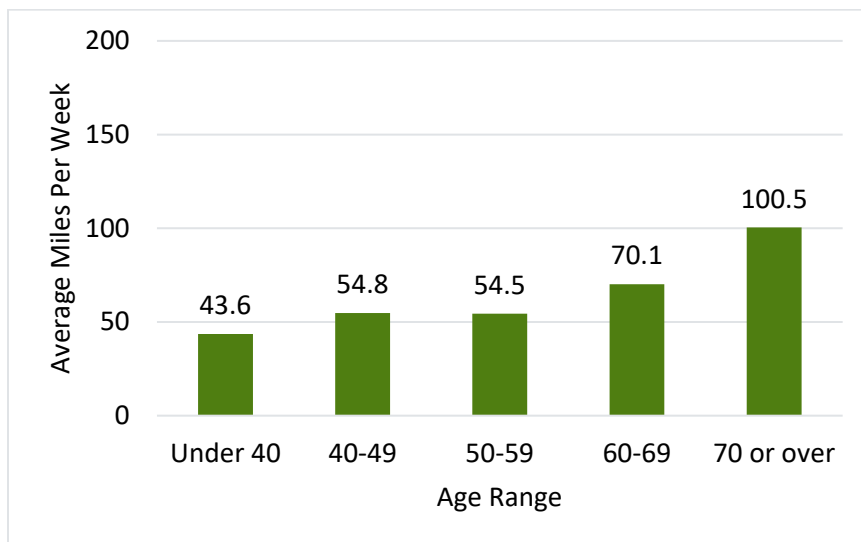


Figure 21 Average Miles Driven Per Week for Running Errands by Age Range for New PEV Acquisitions

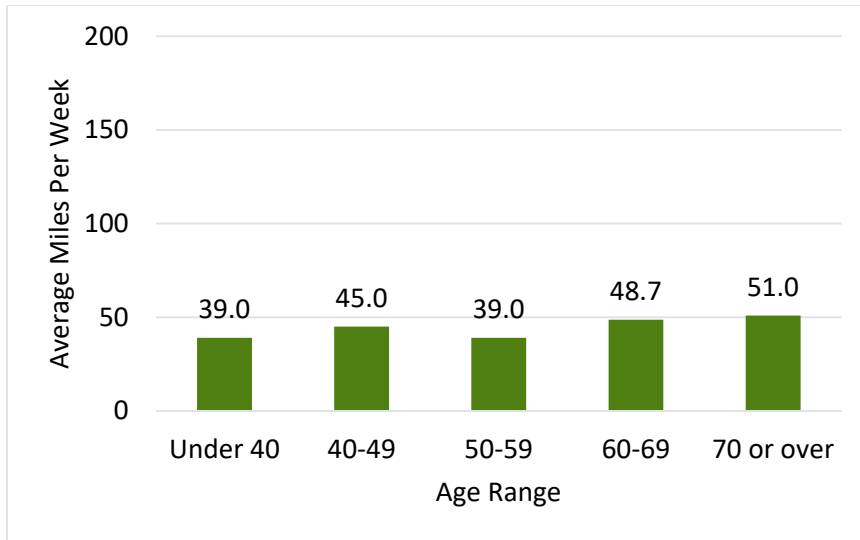


Figure 22 Average Miles Driven Per Week for Recreational Activities by Age Range for New PEV Acquisitions

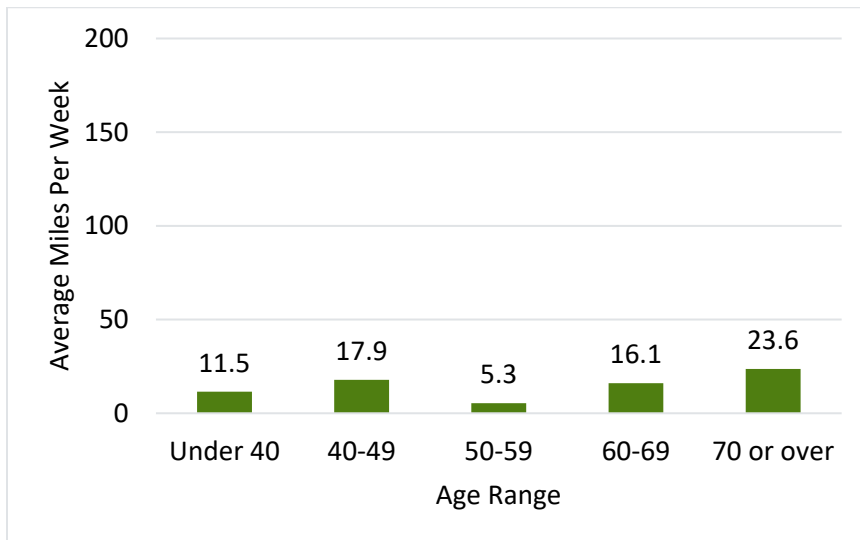


Figure 23 Average Miles Driven Per Week for Other Activities by Age Range for New PEV Acquisitions

Male respondents drove slightly more than female respondents with their New PEV purchase or lease for commuting and running errands (**Figure 24¹⁰**).

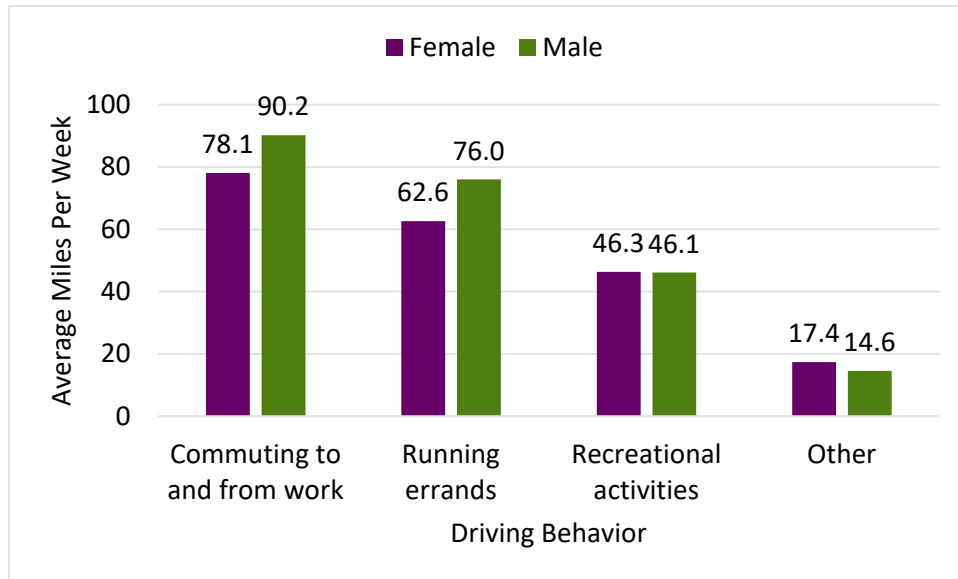


Figure 24 Average Miles Driven Per Week by Driving Behavior and Gender for New PEV Acquisitions

The following figures display results of the average weekly miles traveled by county represented by 16 or more respondents¹¹. Respondents residing in Rutland County drive the most miles per week for commuting, averaging 126.1 miles, followed by those residing in Addison County with an average of 111.6 miles of work commute (**Figure 25**). Respondents residing in Windham and Windsor drive an average of less than 70 miles per week for commuting.

¹⁰ Due to a limited number of responses from other gender categories (N=3), comparison would not be valid and thus left off from this analysis.

¹¹ Counties with 15 or less responses were excluded from the analysis.

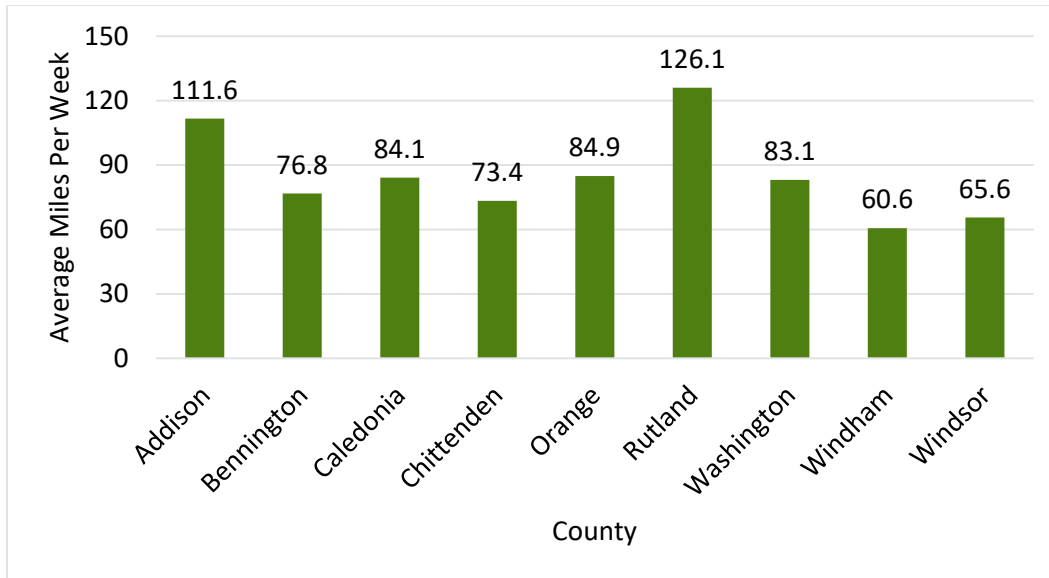


Figure 25 Average Miles Driven Per Week for Commuting To and From Work by County for New PEV Acquisitions

Orange County had the highest average miles traveled per week for running errands at 90.8 miles, followed by Caledonia at 86.8 miles and Windsor with 84.2 miles (**Figure 26**).

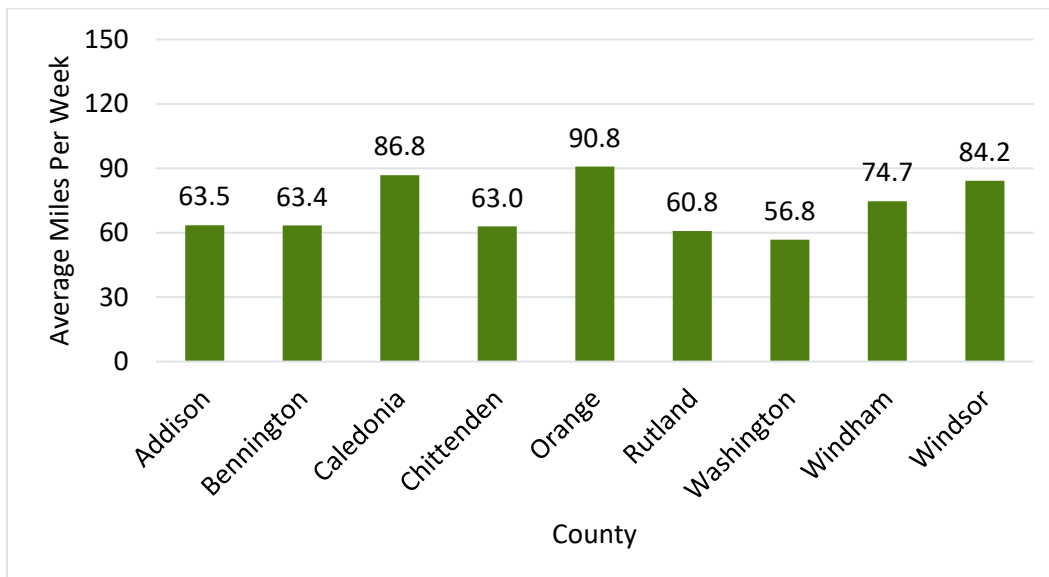


Figure 26 Average Miles Driven Per Week for Running Errands by County for New PEV Acquisitions

Figure 27 shows the miles traveled for recreational activities per week. There were incremental differences between counties, with Bennington County respondents driving the least (average of 33.7 miles) and Caledonia County respondents driving the most (average of 61 miles). Weekly driving mileage for other activities also had minor differences, with all counties driving less than 25 miles (**Figure 28**).

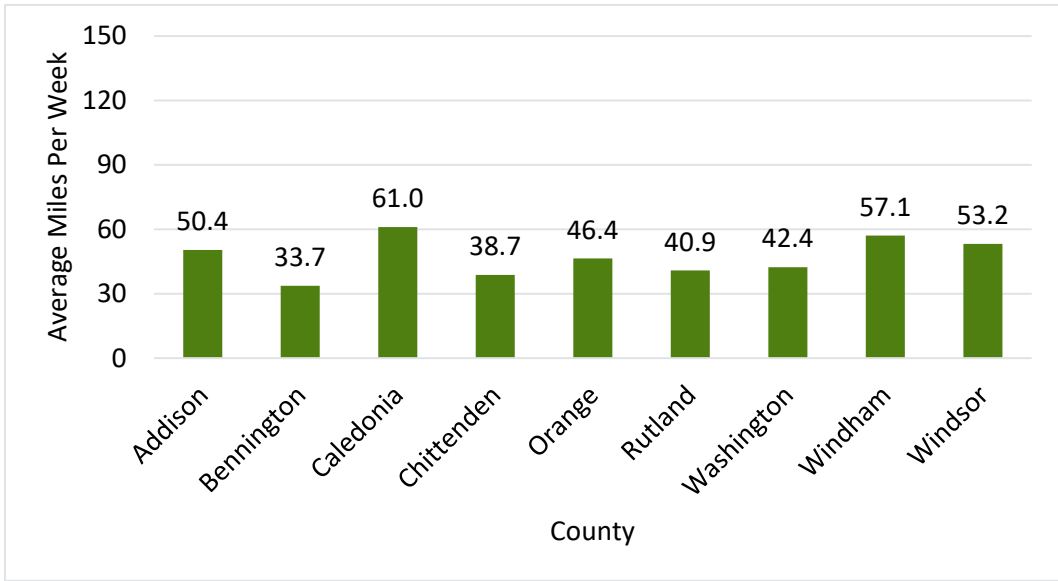


Figure 27 Average Miles Driven Per Week for Recreational Activities by County for New PEV Acquisitions

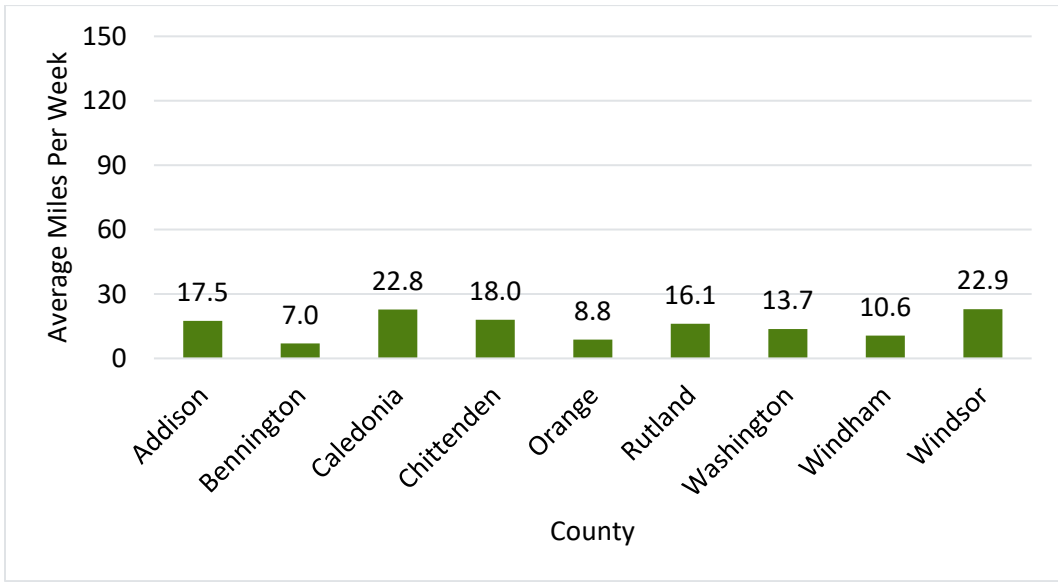


Figure 28 Average Miles Driven Per Week for Other Activities by County for New PEV Acquisitions

Respondents who participated in RYR and acquired a used PEV drove significantly fewer miles for commuting than those who acquired a new PEV. **Figure 29** shows the unweighted average miles driven per week from new and used PEV purchases or leases.

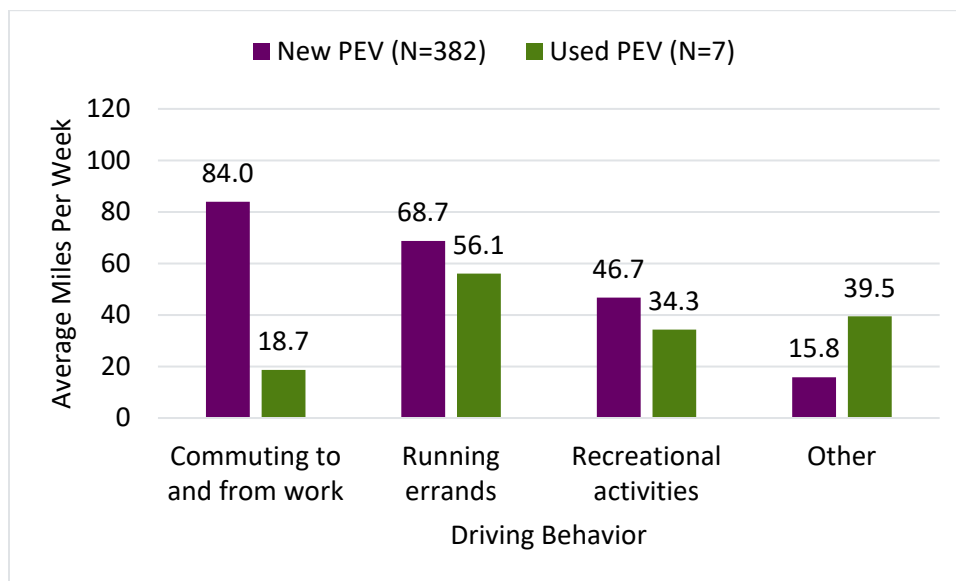


Figure 29 Average Miles Driven Weekly by Driving Behavior for New and Used PEV Acquisitions

Weekly Miles Traveled by Home Renewable Energy Source

There was little indication that respondents who acquired a new PEV and installed solar panels at their residence drove more miles in a week than those who do not currently have solar panels at home (**Table 29**), with a difference in average miles driven per week of 6.5 miles. However, there is a difference in the average miles driven per week between respondents who are enrolled in 100% renewable energy with their utility and who have acquired a new PEV. Respondents who are enrolled in the renewable energy program with their utility drive about 74.3 miles more than those who are not enrolled in the renewable energy program, and 77.3 miles more than those who are unsure if they are enrolled (**Table 30**).

Have Home Solar Panels	Average Miles Driven Per Week
Yes	220.7
No & In-process of being installed	214.2

Table 30 Average Miles Driven Per Week by Existence of Residence Solar Panels for New PEV Acquisitions

Enrolled in 100% Renewable Energy with Utility	Average Miles Driven Per Week
Yes	283.5
No	209.2
Unsure	206.2

Table 31 Average Miles Driven Per Week by Enrollment in Utility Renewable Energy for New PEV Acquisitions

Responses from new PEV acquisitions were nearly identical between AEV and PHEV respondents when asked whether solar panels are installed at their residence and whether they enrolled in a 100% renewable energy program with their utility, thus the comparisons are not shown. Two-third (60%) of respondents who acquired a new PEV have solar panels installed at their residence that produce electricity for home use (**Figure 30**). Out of the seven (7) used PEV respondents, two (2) indicated they have solar panels installed at their residence, while five (5) do not.

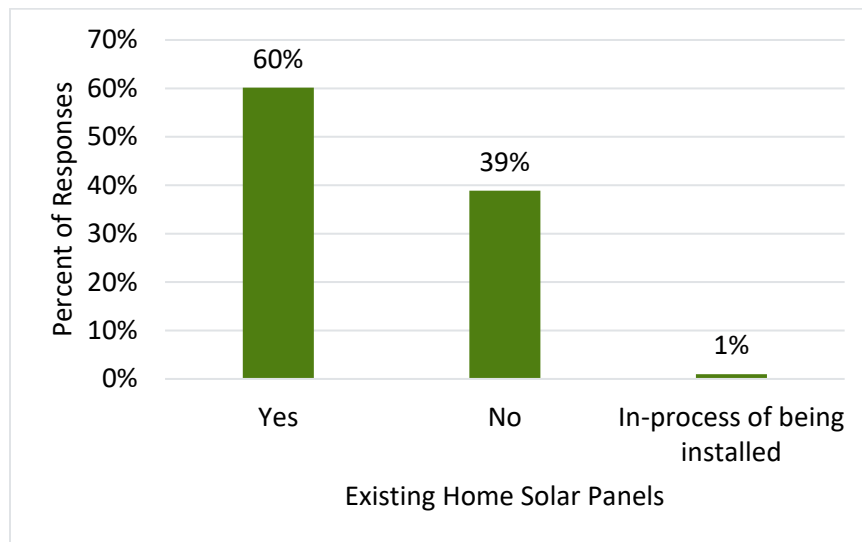


Figure 30 Existence of Residence Solar Panels for New PEV Acquisitions

Nearly two-fifths (39%) of new PEV respondents are enrolled in a 100% renewable energy program with their utility (**Figure 31**). Six of the seven used PEV respondents stated they are not enrolled in a 100% renewable energy program with their utility, and one was unsure.

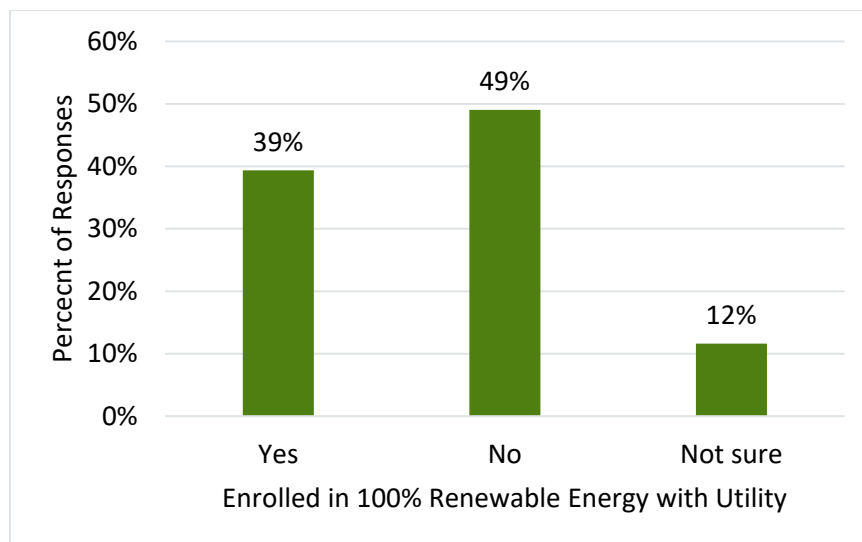


Figure 31 Enrollment in Utility Renewable Energy for New PEV Acquisitions

Charging Behavior

The following tables¹² show the distribution of respondents who purchased or leased a new PEV and charge their car either at home or at public charging locations (Level 2 or DC Fast Charger). In their respective order, Chittenden, Washington, and Rutland counties have the highest number of respondents that charge at home and at both Level 2 and DC Fast public charging locations (**Table 31**, **Table 32**, **Table 33**). Chittenden county also had the highest percent of respondents that charge at work (24%, N=12).

County	Number who charge at home	Percent who charge at home
Chittenden	102	28%
Washington	59	16%
Rutland	38	11%
Addison	32	9%
Windsor	30	8%
Bennington	22	6%
Windham	22	6%
Caledonia	15	4%
Orange	14	4%
Franklin	13	4%

Table 32 Use of Home Charging by County for New PEV Acquisitions

County	Number of Responses	Percent of Responses
Chittenden	33	27%
Washington	25	21%
Rutland	10	9%
Bennington	10	8%

Table 33 Use of Level 2 Public Charging by County for New PEV Acquisitions

County	Number of Responses	Percent of Responses
Chittenden	45	29%
Washington	27	17%
Rutland	16	10%
Addison	13	8%
Windsor	13	8%

Table 34 Use of DC Fast Charging by County for New PEV Acquisitions

¹² Counties with less than 10 responses are excluded from the statistics.

A majority of new PEV respondents charge at home. Nearly all homeowners (96%) and renters (82%) stated they charge their new PEV at home (**Table 34**¹³). Despite a large majority of home charging, respondents who rent are more likely to supplement their EV charging at public charging locations than those who own their homes.

Own or Rent	Home	Work	Level 2 public charging	DC Fast public charging
Own (N=351)	96%	13%	29%	39%
Rent (N=23)	82%	6%	61%	66%

Table 35 Use of Charging Locations by Home Ownership for New PEV Acquisitions

The supplement of EV charging at public charging locations is more defined for new PEV owners when looking at the residence type, as seen in **Table 35**¹⁴. There is a 35% difference in home charging when comparing respondents who live in an attached or detached home versus those living in an apartment or condominium (97% and 62%, respectively). DC Fast Charging is likely a preferred charging method for apartment or condominium residents when using a public charger (72% as compared to 55% for Level 2 public charging use).

Residence Type	Home	Work	Level 2 public charging	DC Fast public charging
Detached house (N=317)	97%	13%	29%	37%
Attached house (N=31)	97%	6%	33%	45%
Apartment/condo (N=26)	62%	15%	55%	72%

Table 36 Use of Charging Locations by Residence Type for New PEV Acquisitions

Table 36 and **Table 37** show the distribution charging location usage from respondents who acquired a used PEV by home ownership and residence type. All five respondents charge at home regardless of home ownership and residence type.

Own or Rent	Home	Work	Level 2 public charging	DC Fast public charging
Own (N=2)	2	0	0	1
Rent (N=3)	3	1	1	0

Table 37 Use of Charging Locations by Home Ownership for Used PEV Acquisitions

¹³ New PEV respondents who indicated they neither own nor rent their residence were not included in the analysis due to the limited number of responses.

¹⁴ New PEV respondents who indicated their residence is a manufactured/mobile home were not included in the analysis due to the limited number of responses.

Residence Type	Home	Work	Level 2 public charging	DC Fast public charging
Detached house (N=4)	4	0	0	1
Apartment/condo (N=1)	1	1	1	0

Table 38 Use of Charging Locations by Residence Type for Used PEV Acquisitions

Program Satisfaction

The net promoter score is 82% for the new PEV program, with the score calculated by subtracting the percent of detractors from the percent of promoters (**Table 38**). Of the seven respondents who acquired a used PEV, six were promoters, while one was a detractor. The respondent that participated in the Clean Mobility Prepaid Card pathway was a promoter.

Promoter Score	Frequency	Percent
Detractors (0 to 6)	17	4%
Neutral (7 to 8)	36	9%
Promoters (9 or more)	329	86%
Total	382	100%

Table 39 Net Promoter Score for the New PEV Program

Figure 32 shows the level of satisfaction with applying for and receiving the state incentive from respondents who acquired a new PEV by income range. For households earning \$75k or less, an average of 96% of respondents stated they were satisfied or very satisfied with the application process. Satisfaction decreased to 88% for households earning between \$75k and \$100k, which may indicate that the application process was slightly more challenging for this group. The average slightly increased to 92% for households earning \$100k or more. Six of the seven respondents who acquired a used PEV indicated they were satisfied with the program, while one was slightly satisfied. The respondent that participated in the Clean Mobility Prepaid Card pathway was not at all satisfied with applying for and receiving the incentive. They stated that they needed to resubmit their application multiple times and the entire process took approximately six months before they received their Clean Mobility Prepaid Card.

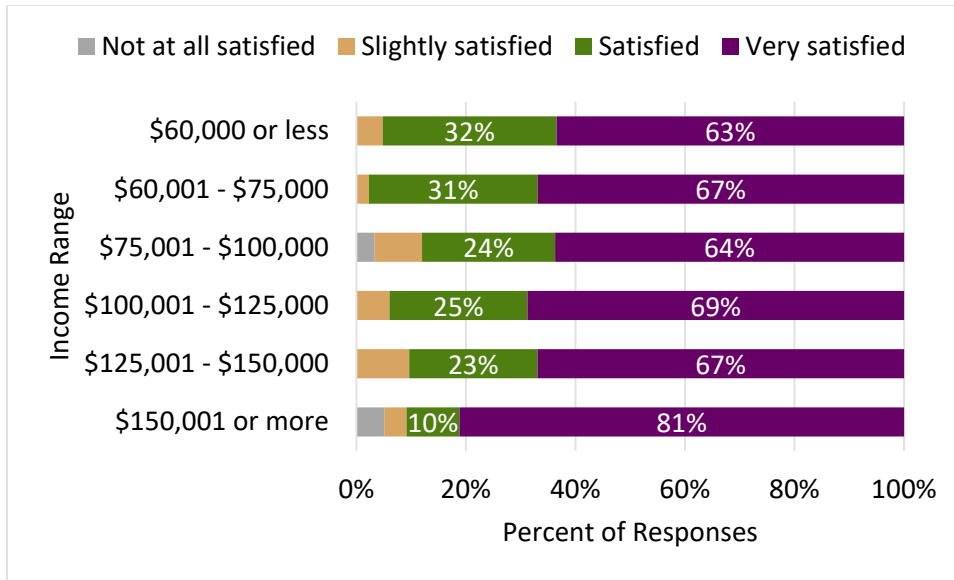


Figure 32 Program Application Satisfaction by Income Range

Incentive Influence

More than half (57%) of all New PEV program respondents who did not participate in RYR would not have acquired their PEV without the state incentive, however, this varied by age group. Those under the age of 40 were more likely than other age groups not to have purchased or leased their new PEV without the incentive and are identified as rebate essential (**Figure 33**). Rebate essential respondents are those who find the incentive to be an essential part of their new PEV purchase or lease.

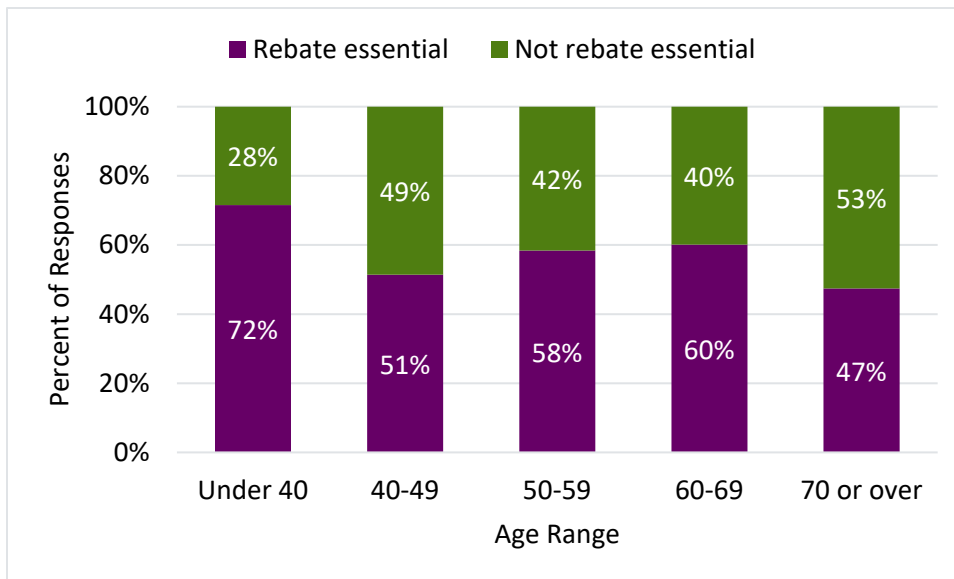


Figure 33 Rebate Essentiality by Age Range of New PEV Participants

There was variance between income levels of New PEV respondents who did not participate in RYR as seen in **Figure 34**, with households earning \$75K or less slightly more likely not to have acquired their PEV without the incentive. An average of 60% of households earning \$75k or less were rebate essential. Households earning between \$75k and \$125k had an average of 56% rebate essentiality, and percent of respondents decreased to 52% for those earning between \$125k and \$150k. As survey responses are self-reported, some respondents indicated their income was more than \$150k despite the income limits for participating in the program. Nonetheless, 66% of those earning more than \$150k found the incentive an essential part of their purchase, perhaps indicating that the incentive availability encouraged these households to adopt an EV.

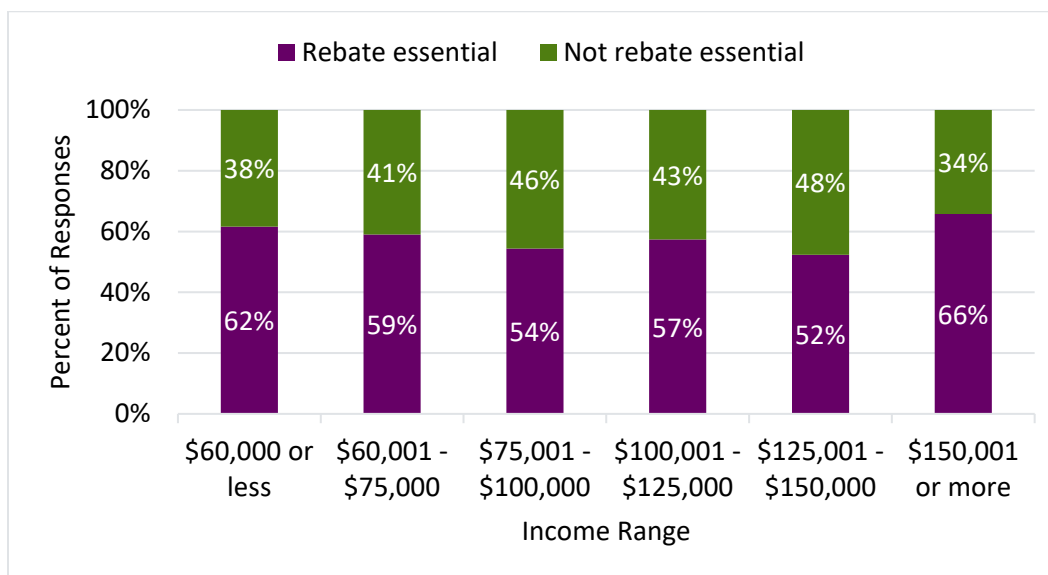


Figure 34 Rebate Essentiality by Income Range of New PEV Participants

Ten (10) respondents who participated in New PEV and RYR (N=11) would not have acquired their PEV without state incentives for scrapping an older vehicle and the purchase or lease of a new electric car (**Figure 35**). Five (5) respondents who participated in RYR and MileageSmart (N=7) would not have acquired their used PEV without both incentives for scrapping an older vehicle and the purchase or lease of a used electric vehicle.

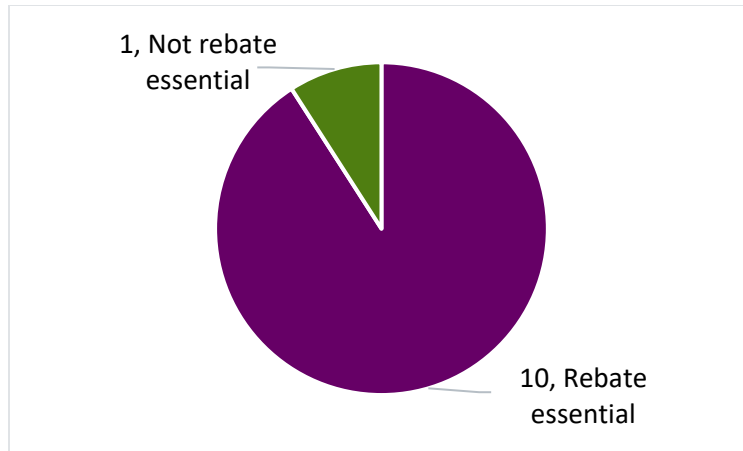


Figure 35 Rebate Essentiality of RYR + New PEV Participants

Survey respondents who stated they would not have purchased or leased their car were asked a follow-up question about their vehicle acquisition decision if the incentives were unavailable. Nearly a third (29%) of New PEV program respondents who did not participate in RYR would not have acquired a car, while a little less than half (48%) would have acquired either a conventional hybrid or gasoline/diesel car (Figure 36).

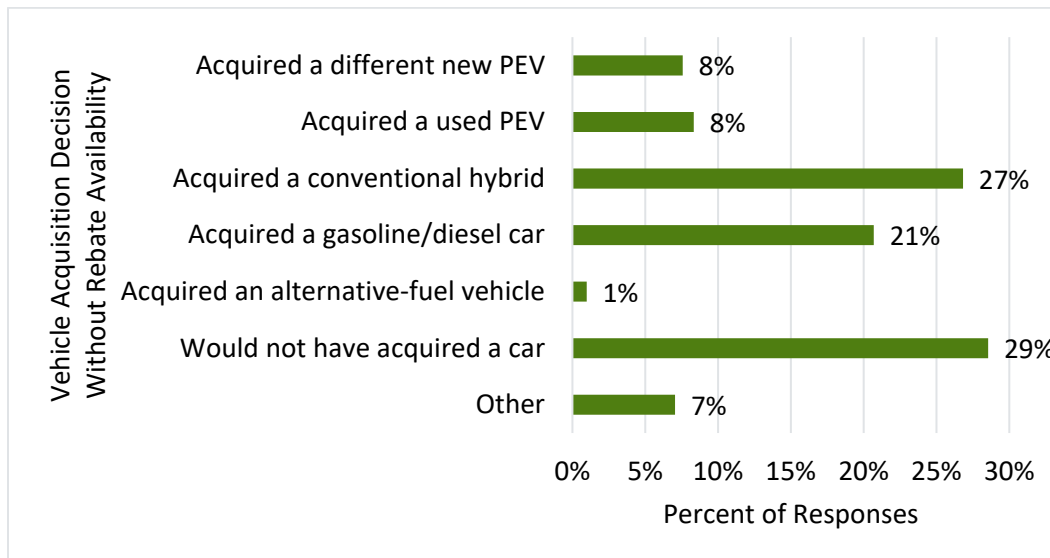


Figure 36 Vehicle Acquisition Decision of New PEV Participants Without the Incentive

Two (2) respondents who participated in New PEV and RYR would not have acquired a car if the incentives were unavailable (Figure 37). Similarly, two respondents who participated in RYR and MileageSmart would not have acquired a car without the incentives being available (N=4).

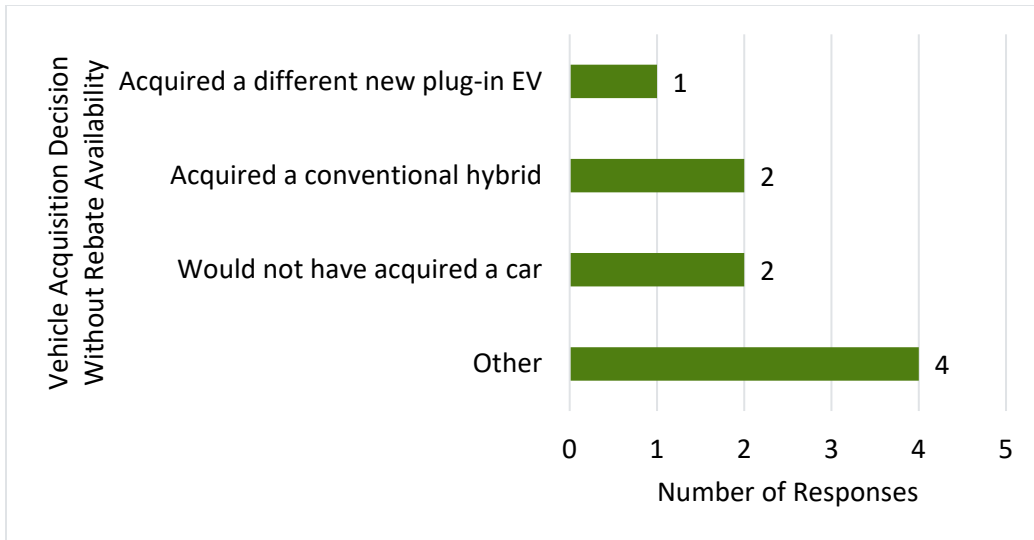


Figure 37 Vehicle Acquisition Decision of RYR + New PEV Respondents Without the Incentive

Respondents who participated in RYR (N=18) were asked to rank the importance of the RYR incentive in their decision to scrap their vehicle. Fifteen respondents answered the RYR incentive was “very” or “extremely important” while three answered the incentive was “slightly” or “moderately important”. When asked about their decision to scrap their vehicle without the incentive, 15 respondents stated they would not have scrapped their vehicle. These respondents were then asked what they would have done with the vehicle they scrapped. Five answered they would have continued to drive their car, two would have traded in the vehicle when they acquire a new car, four would sell it privately, and two would have kept the car and drive it less frequently or not at all. One respondent selected “Other” and specified they would have donated the car while one respondent did not provide an answer.

Dealership Knowledge from a Consumer Point-of-view

Respondents who purchased or leased a new PEV were asked to rank their level of knowledge on specific topics during their interaction with the dealership or retail store representative. The topic that respondents find dealers or retail store representatives to have less knowledge about is the cost of electricity for home charging, where nearly half (49%) marked that the salesperson was not at all or not very knowledgeable (**Figure 38**). Two fifths (41%) indicated a knowledge gap about away-from-home charging, including knowledge about available charging networks and public charger locations. Analysis of dealership knowledge from respondents who acquired a used PEV did not demonstrate meaningful results and can be reported in future reports when there is a larger sample size.

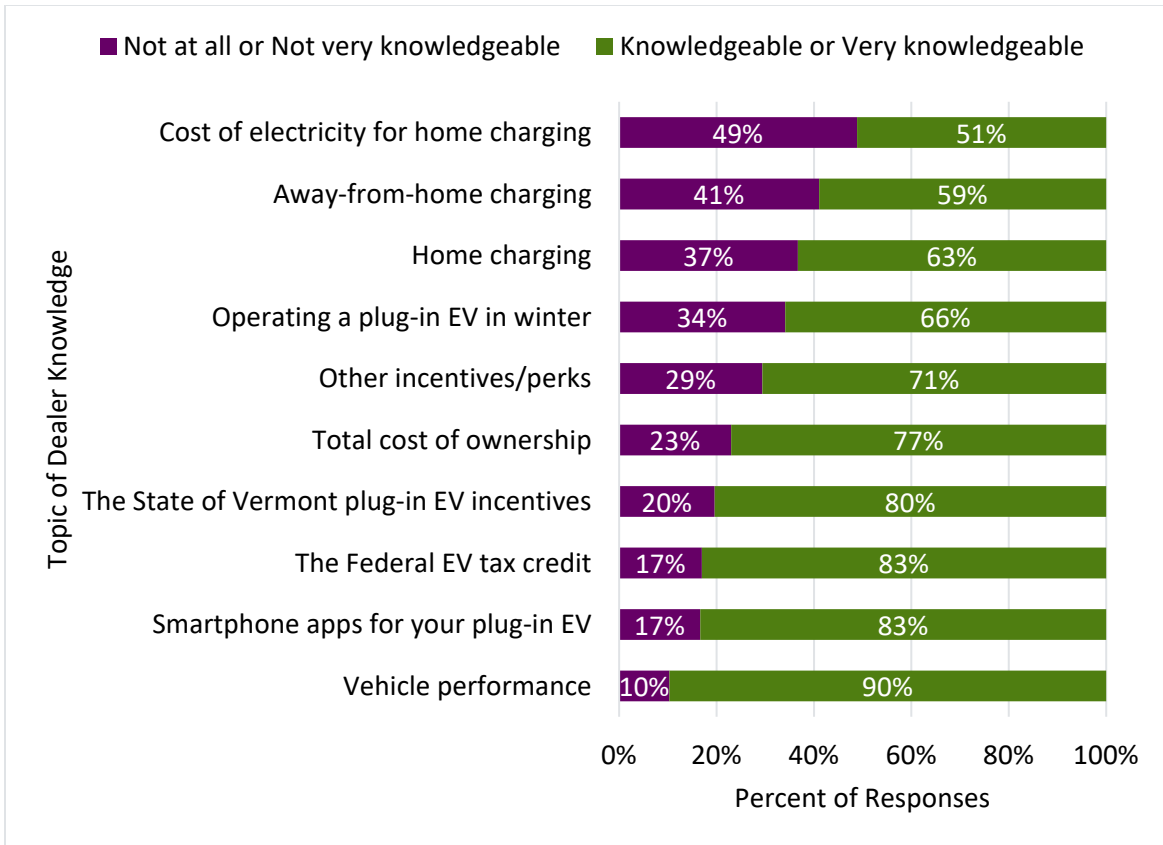


Figure 38 Level of Dealership Knowledge for New PEV Acquisitions

eBike Consumer Survey

Survey Details

The State of Vermont eBike Incentive Consumer Survey's target audience is individuals who were approved for an incentive voucher and have redeemed it with the purchase of an eBike. Applicants who were approved and later canceled, as they did not redeem their incentive voucher within the allotted timeframe, were invited to an abridged survey with questions about card redemption. Applicants whose applications were denied or were marked incomplete for missing documents and later automatically canceled were not invited to this survey.

Of the 144 total approved-to-canceled applicants, 41 responded to the survey. These applicants claimed that the incentive amount was not enough to offset the cost of the eBike (n=23) or that they preferred to shop through online retailers (n=20). Notably, 11 applicants selected that there was another reason than the ones provided for not getting an eBike, 8 of which claimed there was not enough time to search or purchase a bike (**Figure 39**). One applicant claimed to have not received their Clean Mobility Prepaid Card despite asking twice.

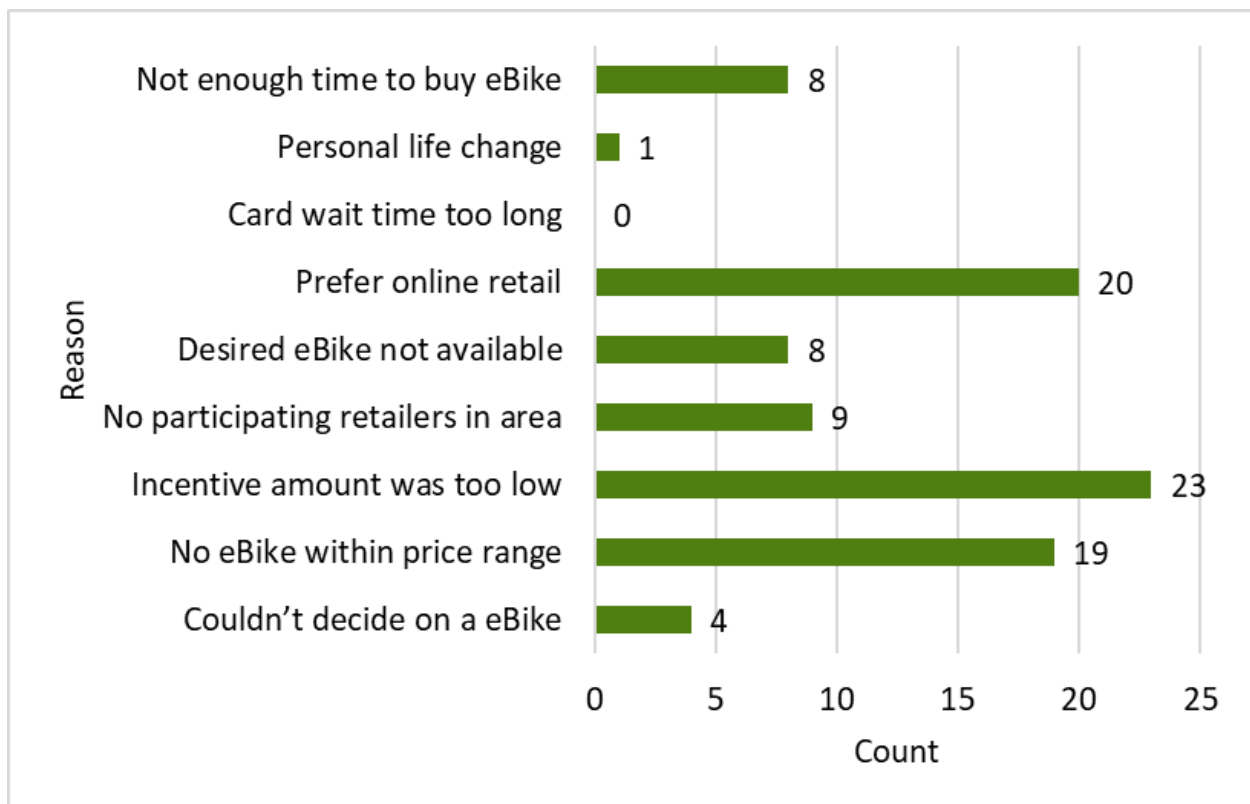


Figure 39 Reasons for Not Redeeming the eBike Incentive Voucher

The objectives of the survey are to:

- Measure incentive recipient satisfaction with multiple aspects of the State of Vermont eBike Incentive Program to inform program improvements
- Determine the impact of the State of Vermont eBike Incentive Program on recipients’ decisions to adopt an eBike
- Understand the motivating factors that were important in their decision to adopt an eBike
- Measure the change (or planned change) in recipients’ behaviors as a result of acquiring an eBike
- Understand the demographics of incentive recipients

The survey was sent to all 143 incentive recipients who were approved and redeemed their voucher to purchase an eBike. Survey invitations were sent via email campaigns built into Alchemer, and responses to the Vermont eBike Incentive Consumer Survey were collected between November 14th, 2023 and November 27th, 2023. The consumer survey received a 45% response rate. In year two of the eBike program, the rebate amounts were adjusted based on eBike type. Cargo and Adaptive eBikes received an \$800 voucher, while Standard eBikes received a \$400 voucher. Standard vouchers were the most popular and had the highest number of responses on the survey (**Table 39**).

Rebate Type	Approved Applicants	Survey Responses	Response Rate
Adaptive eBike (\$800 voucher)	4	2	50%
Cargo eBike (\$800 voucher)	43	16	37%
Standard eBike (\$400 voucher)	95	47	49%
Grand Total	143	65	45%

Table 40 eBike Response Rate by Rebate Type

Methods

CSE prepared the data for the analysis of the key insights by removing partial responses and validating responses. Similar to the New PEV and RYR Consumer Survey, response validity was determined using a quarantine feature in Alchemer. The quarantine process flagged six (6) responses, and the manual review found no consistent pattern of straight-lining or evidence of speeders providing false responses. No responses were removed.

CSE applied post-stratification weights for participation in the eBike program, as not all participants responded to the survey. The strata used for weighting were eBike Type and County. Nine records were excluded from the program population during the weighting process because no corresponding survey

response was received to represent one or more strata used to weight¹⁵. See Appendix B: Consumer Survey Weighting Strata for details on how weight strata proportions differed between the program population and the survey sample.

Values reported were created using weighted data unless otherwise specified and excluded those who did not respond to a question or selected “Prefer not to answer” to certain required questions. In the key findings section below, CSE explored differences in responses to reasons for purchasing an eBike by age range, county of residence, gender, and income range.

Key Findings and Insights

CSE explored differences in responses for segments of interest in the Vermont eBike incentive program based on key demographics. The following questions were evaluated, but because there were not enough data within certain demographics to validly compare results, no deeper analysis was conducted.

- How did you hear about the availability of the Vermont eBike Incentive Program?
- How satisfied were you with each of the following aspects of the Vermont eBike program?
- If the State of Vermont eBike incentive did not exist, what do you think you would have done?

Survey respondents were asked to select their top three reasons for purchasing an eBike. Most respondents indicated that they purchased their eBikes to reduce or replace vehicle use, exercise, or reduce their environmental impact (**Table 40**).

Purchasing Decision	Weighted Responses	Percent of Weighted Responses
Reducing or replacing vehicle use	43	67%
Exercise	32	49%
Reducing environmental impacts	26	40%
Ease of riding efforts	23	35%
Quality of life improvements	21	32%
Saving money	15	23%
Convenience of transportation	12	18%
Medical need for eBike	11	17%
Recreation	9	14%
Other reason	0	0%

Table 41 eBike Purchasing Decisions

¹⁵ Nine participants reside in Essex or Grand Isle county and no survey responses were received from these participants. Therefore, they were not represented in the survey and therefore removed for the purposes of weighting.

Respondents of ages 70-79 purchased an eBike to reduce driving miles (n=11) most often (**Figure 40**), while respondents of ages 60-69 stated they bought an eBike for exercise (n=11) or to reduce their environmental impact most (n=9) most often (**Figure 41** and **Figure 42**).

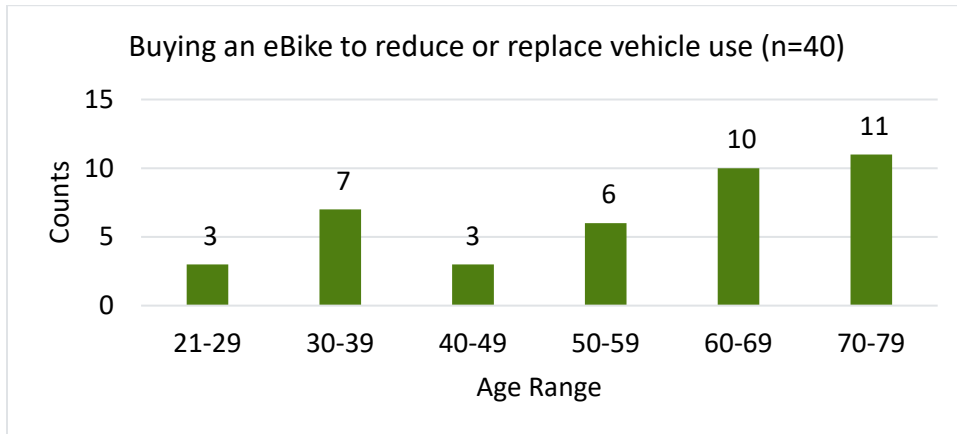


Figure 40 Reduce or Replace Vehicle Use by Age Range

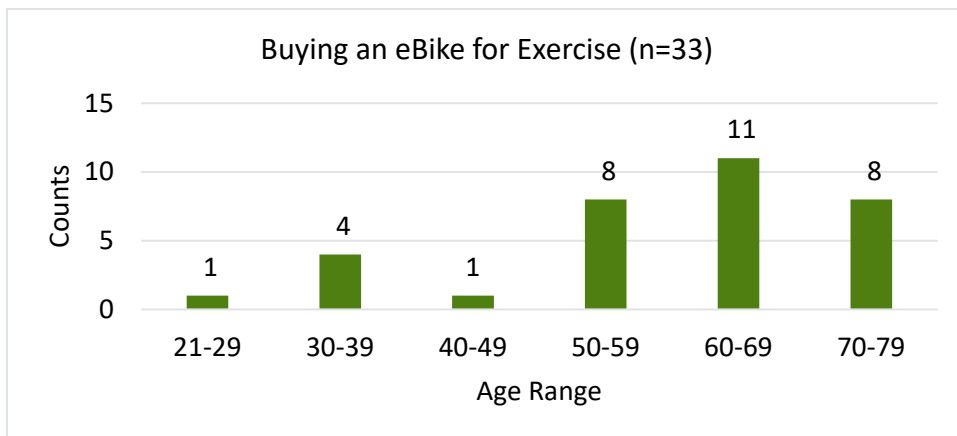


Figure 41 Exercise Use by Age Range

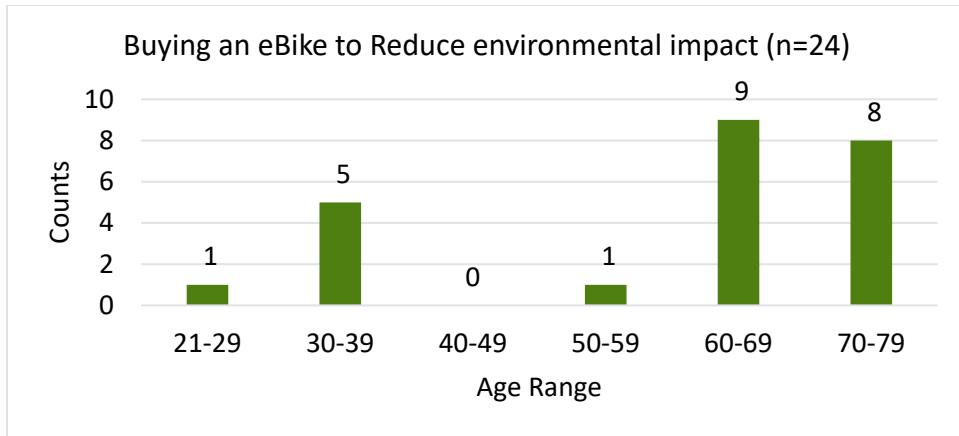


Figure 42 Reduce Environmental Impact by Age Range

Applicants who use their eBike to reduce or replace vehicle driving (n=10) and to exercise (n=8) most often live in Chittenden County, while those who want to reduce their environmental impact most often lived in Bennington County (n=6) and Windham County (n=6). The tables below show the breakdown of the top three reasons for purchasing an eBike by county.

County	Purchase decision to reduce or replace vehicle use	Total Percentage
Chittenden	10	24%
Windham	9	22%
Bennington	5	12%
Rutland	4	10%
Franklin	3	7%
Addison	2	5%
Caledonia	2	5%
Orange	2	5%
Washington	2	5%
Windsor	2	5%
Total	41	100%

Table 42 Reduce or Replace Vehicle Use by County

County	Purchase decision to exercise	Total Percentage
Chittenden	8	24%
Franklin	7	21%
Addison	3	9%
Bennington	3	9%
Windsor	3	9%
Rutland	2	6%
Windham	2	6%
Caledonia	1	3%
Lamoille	1	3%
Orange	1	3%
Orleans	1	3%
Washington	1	3%
Total	33	100%

Table 43 Exercise Use by County

County	Purchase decision to reduce environmental impact	Total Percentage
Bennington	6	25%
Windham	6	25%
Chittenden	5	21%
Rutland	3	13%
Addison	1	4%
Orange	1	4%
Orleans	1	4%
Windsor	1	4%
Total	24	100%

Table 44 Reduce Environmental Impact by County

Twenty-two male respondents said they were using their eBike to reduce or replace driving (Figure 43), while an almost equal number of male and female respondents used their eBike to exercise (Figure 44). Slightly more male respondents than female or non-binary respondents said they bought their eBike to reduce their environmental impact (Figure 45).

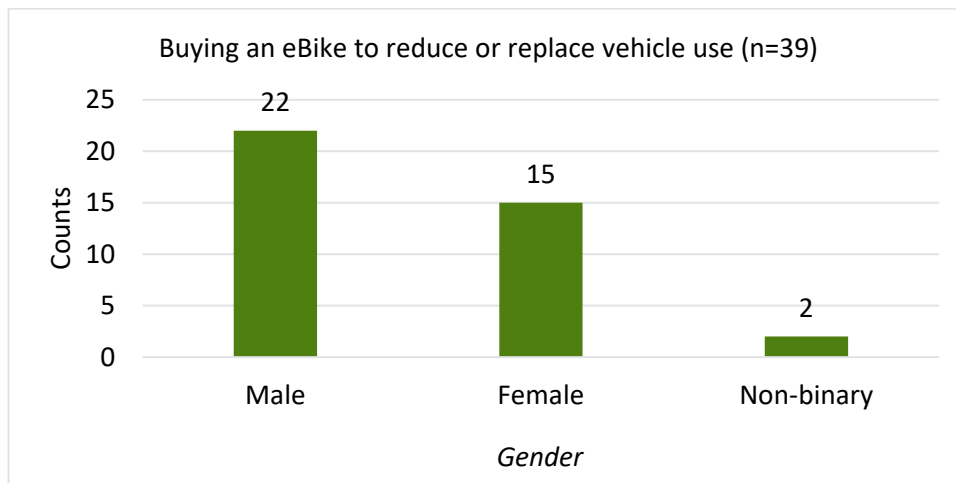


Figure 43 Reduce or Replace Vehicle Use by Gender

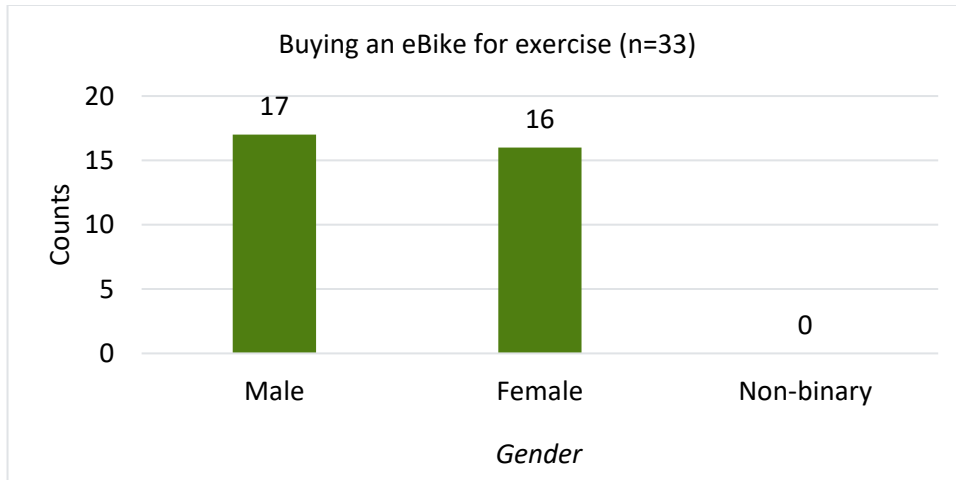


Figure 44 Exercise Use by Gender

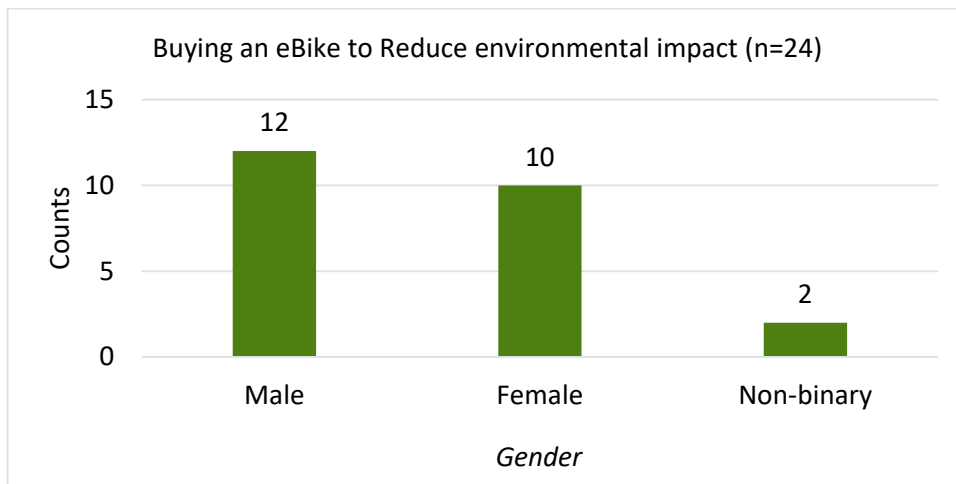


Figure 45 Reduce Environmental Impact by Gender

Applicants that had a household income between \$25k and \$50k most often stated they purchased their eBike for exercise (n=15), while those that earn between \$50k and \$75k most often stated they bought an eBike to reduce or replace vehicle use (n=19) or reduce environmental impact (n=11). The figures below display the top reasons for respondents to acquire their eBike by income distribution.

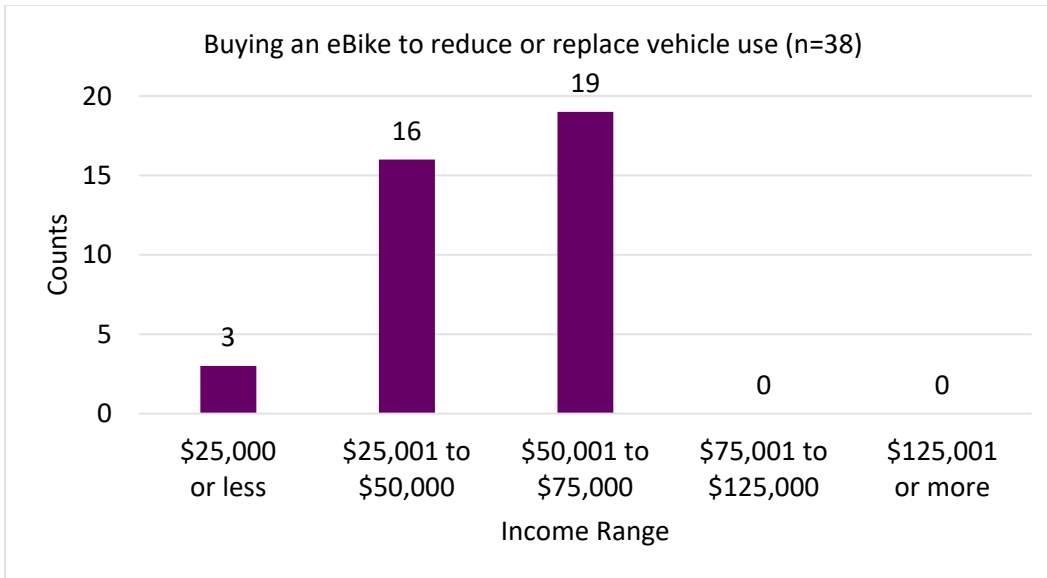


Figure 46 Reduce or Replace Vehicle Use by Income Range

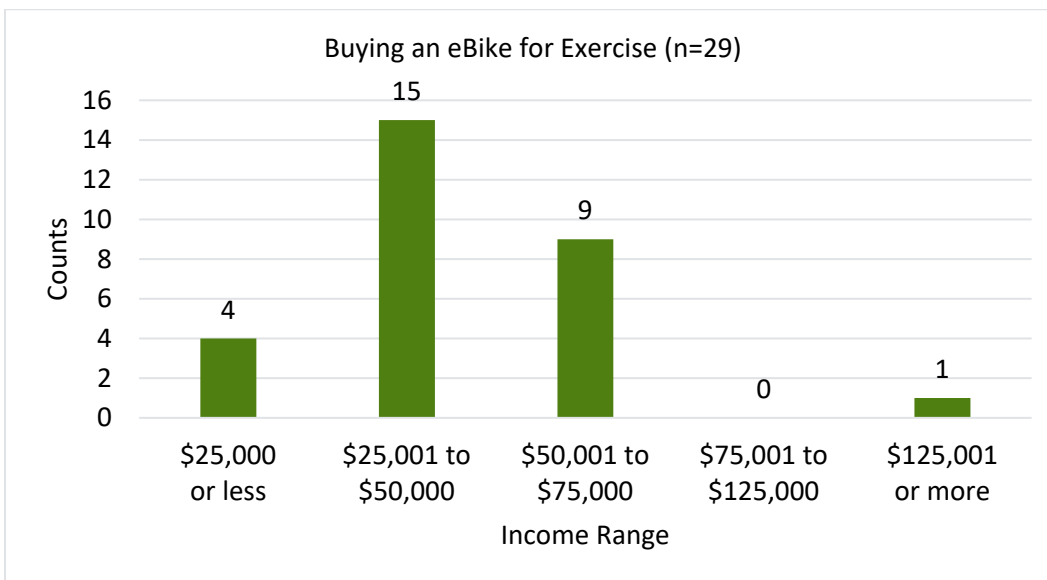


Figure 47 Exercise Use by Income Range

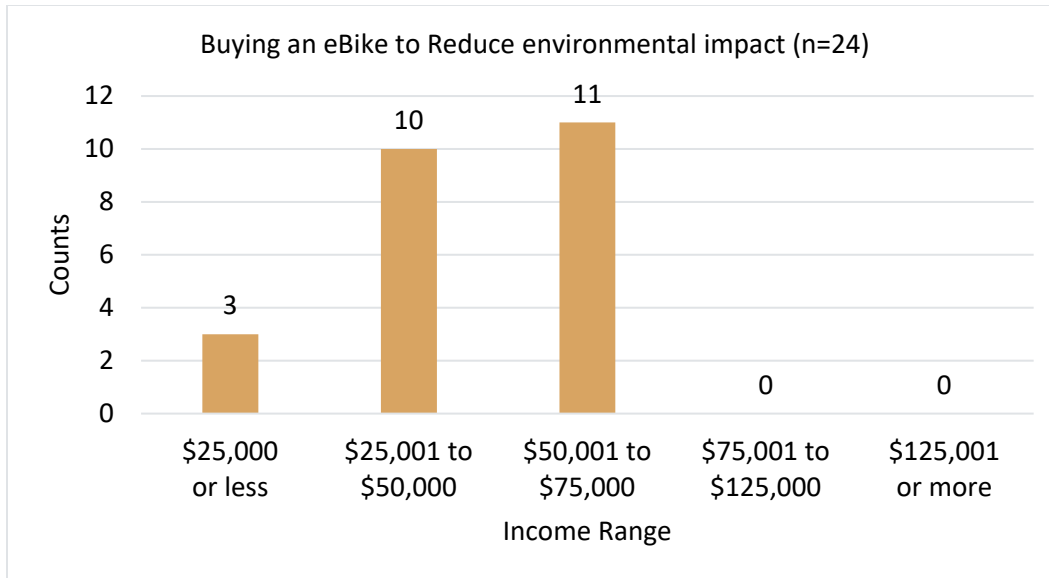


Figure 48 Reduce Environmental Impact by Income Range

vi. Greenhouse Gas Analysis

New PEV & RYR

The difference between the CO₂e footprints of the EVs, and a calculated baseline determined the calculation of the GHG emission reductions. EV footprint is calculated based on annual regional grids, with the grid year aligned with the EV purchase year. The gas and electric components of hybrid vehicles are calculated separately, with EPA fuel economy data informing the weight of each. Baseline footprints are calculated for vehicle model years and are matched to applications based on application model years. RYR EVs are compared instead against the carbon footprint of the respective scrapped vehicles' CO₂e emissions. Some scrapped vehicles were omitted from the analysis due to insufficient EPA fuel efficiency data. The provided model name could not be matched with certainty to existing EPA fuel consumption data in these cases. All CO₂e calculations are based on a Vehicle Miles Traveled (VMT) scenario of 14,850 miles per vehicle. This was calculated using state estimates. The annual VMT of 7.13 billion miles driven in 2022¹⁶ was divided by the estimated number of vehicles of 480k¹⁷.

GHG reduction estimates total approximately 2,760 metric tons of CO₂-equivalent emissions for applications approved between July 1, 2022 and October 31, 2023. Approximately 92% of those reductions are through the New PEV program. It should be noted, however, that this reflects program participation more than effectiveness: on a per-vehicle basis, New PEV reduces 2.87 MT CO₂e on average per participant vehicle, while RYR, which scraps the vehicles being replaced, is estimated to have reduced 4.9 MT CO₂e per vehicle. By vehicle type, AEVs reduces 3.19 MT CO₂e on average per participant vehicle with PHEVs at 2.15 MT CO₂e per vehicle. Combined, both programs are estimated to have reduced 2.98 MT CO₂e per vehicle.

Program	Vehicles Rebated	GHG Reduction per Vehicle (Metric Ton)	Total GHG Reductions (Metric Ton)
New PEV	880	2.87	2,528.78
RYR	47	4.88	229.24
Total	927	2.98	2,758.03

Table 45 New PEV and RYR GHG Reductions

¹⁶ HPMS 2022, Extent and Travel Report.

https://vtrans.vermont.gov/sites/aot/files/highway/documents/hsd/VT_VMT_FC_2022.pdf

¹⁷ The estimated number of vehicles was provided by James Sullivan from the University of Vermont (<https://www.uvm.edu/cems/profiles/james-sullivan>).

Vehicle Type	Vehicles Rebated	GHG Reduction per Vehicle (Metric Ton)	Total GHG Reductions (Metric Ton)
AEV	738	3.19	2,351.70
PHEV	189	2.15	406.33
Total	927	2.98	2,758.03

Table 46 GHG Reductions by Vehicle Type

eBike

The following analysis uses the same 65 survey responses received by eBike incentive recipients referenced in this report's eBike Consumer Survey section. To account for uncertainty around actual riding behavior and possible overestimation of eBike activity inherent in self-reported data, we calculated GHGs using two scenarios. In both scenarios, per-mile emissions estimates were calculated for both eBikes¹⁸ and the vehicle respondents identified as the vehicle eBike mileage would offset. Vehicle per-mile emissions estimates were calculated based on the technology type of the vehicle participants identified^{19,20}. The final vehicle mile GHG calculation is then subtracted by the eBike mile GHG calculation to find the level of reduced CO₂e. Scenarios differ in the way we determined the amount of vehicle mile offsets:

Self-reported: Vehicle miles offset by eBike riding were calculated by multiplying the self-reported number of eBike miles respondents planned to travel by the percentage of those miles planned to offset vehicle miles.

Expected: Vehicle mile offset by eBike riding was calculated using survey respondents reported annual VMT from the survey and assumes 10% of annual VMT will be offset by eBike usage. Ten percent was determined using research from the Transportation Research and Education Center at Portland State University²¹.

Nine responses were excluded from the calculations due to an outlier in response to the vehicle miles traveled in a week or had no response to either the weekly miles driven in their vehicle, or the percent

¹⁸ McQueen, M., MacArthur, J., Cherry, C. (2020). The E-Bike Potential: Estimating regional e-bike impacts on greenhouse gas emissions. *Transportation Research Part D: Transport and Environment, Volume 80*. <https://doi.org/10.1016/j.trd.2020.102482>

¹⁹ U.S. Department of Energy. *Data Sources and Assumptions for the Electricity Sources and Fuel-Cycle Emissions Tool*. Alternative Fuels Data Center. https://afdc.energy.gov/vehicles/electric_emissions_sources.html

²⁰ U.S. Environmental Protection Agency. *Emissions & Generation Resource Integrated Database (eGRID)*. <https://www.epa.gov/egrid>

²¹ McQueen M., MacArthur J., & Cherry C. (2019). *The E-Bike Potential: Estimating the Effect of E-bikes On Person Miles Travelled and Greenhouse Gas Emissions* [White paper]. Transportation Research and Education Center. https://ppms.trec.pdx.edu/media/project_files/E-bike_Potential_Paper_05_15_19_Final.pdf

of the miles ridden on their eBike that replaces vehicle travel. The following results will be based on the remaining 56 valid responses.

Figure 49 shows estimated eBike miles traveled. Overall, respondents indicated they would use their e-Bikes for a total of 315,294 miles ridden annually. Respondents said they would most use their e-Bikes for exercise, followed by commuting and recreational activities.

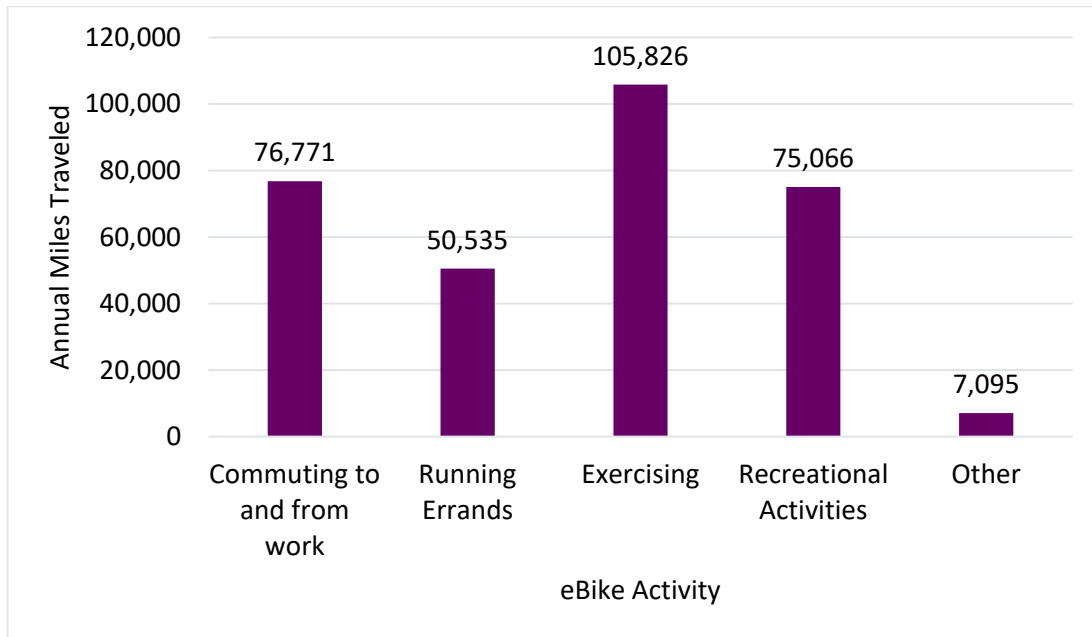


Figure 49 Annual eBike Miles Traveled by Activity

Figure 50 below shows anticipated eBike use based on eBike type. Adaptive eBike riders anticipated riding 6,829 annual miles, Cargo eBike riders anticipated riding 63,330 miles, and Standards eBike riders planned on riding 245,135 miles annually. Standard eBikes make up the majority of reported miles and, therefore, contribute more miles to all activities overall, but Cargo eBike users indicated they would use their bike for commuting more often than Standard eBike owners.

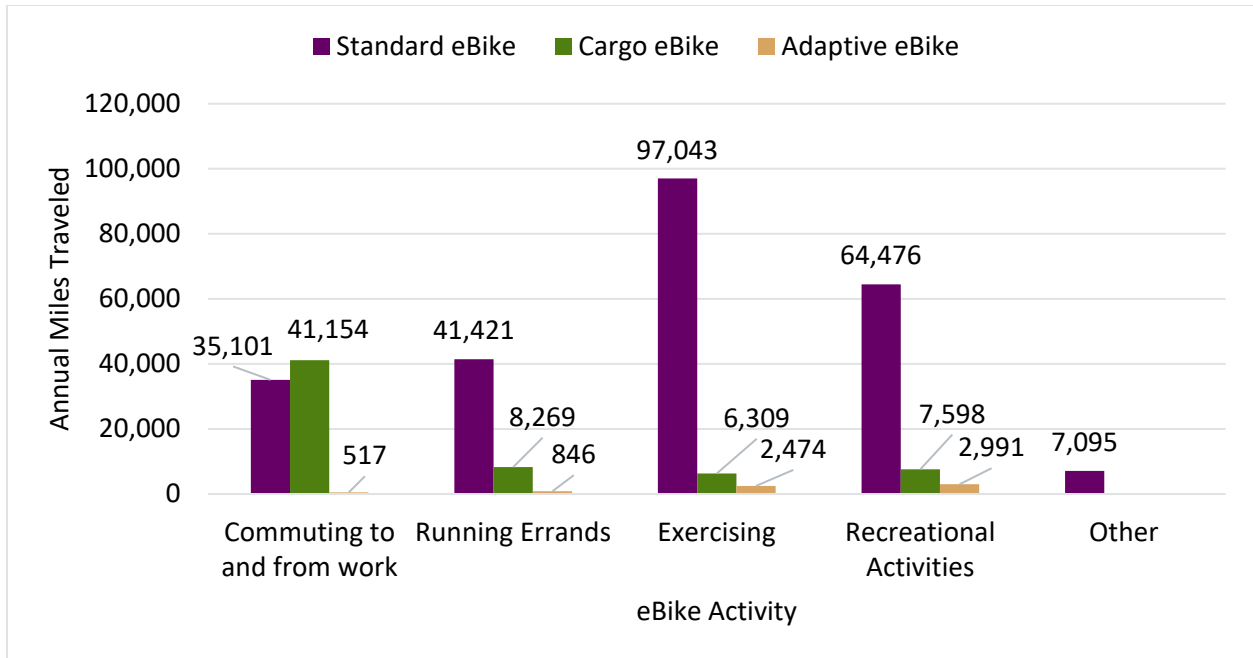


Figure 50 Annual eBike Miles Traveled by Activity and Rebate Type

Survey respondents indicated they will offset about 103,723 vehicle miles with their eBikes overall, while the expected offset will be 24,216 miles (**Table 46**). Those who purchased Cargo eBikes plan to offset nearly half (49%) of their vehicle miles traveled, though the expected offset is around 9%. Vehicle mile offsets lead to an estimated reduction of 99,889 pounds (45.3 metric tons) of CO₂e annually based on self-reporting and an estimated reduction of 21,979 pounds (9.97 metric tons) of CO₂e annually using expected vehicle mile offsets (**Figure 51**). Most vehicle miles being offset are from Standard eBike users.

eBike Type	Number of Respondents	Total eBike Miles Travelled	Vehicle Mile Offsets (Self-report)	Percent of eBike Miles Offsetting Vehicle Travel (Self-report)	Vehicle Mile Offsets (Expected)	Percent of eBike miles Offsetting Vehicle Travel (Expected)
Adaptive eBike	2	6,829	0	0%*	0	0%
Cargo eBike	10	63,330	30,893	49%	5,881	9%
Standard eBike	44	245,135	72,830	30%	18,335	7%
Overall	56	315,294	103,723	35%	24,216	8%

*Responses from both Adaptive eBike recipients indicate they did not drive a car prior to purchasing their eBike, thus having zero percent offset for vehicle miles traveled.

Table 47 Vehicle Miles Offset by eBike Type

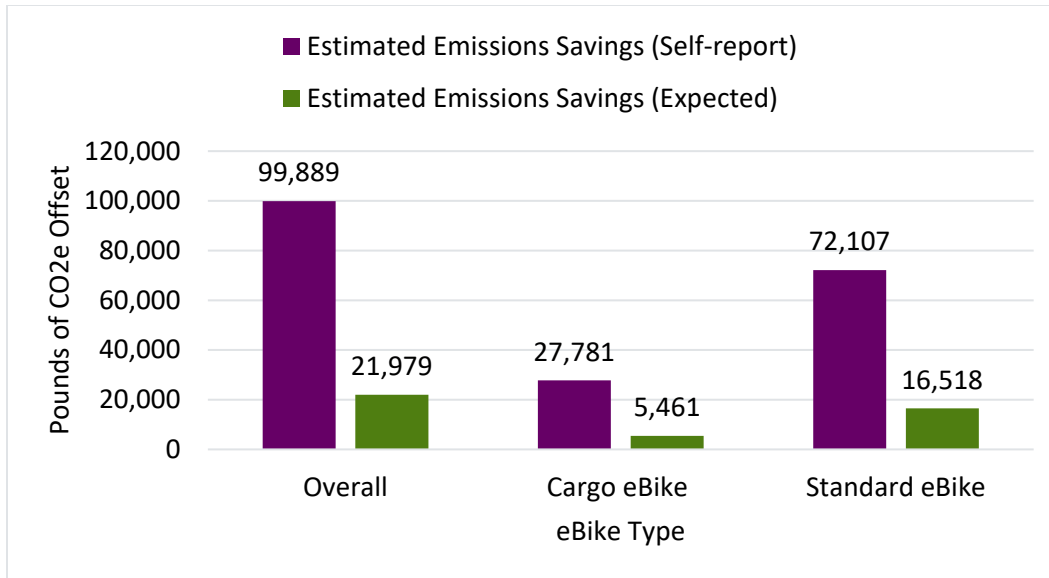


Figure 51 Estimated GHG Reductions from Offset Vehicle Miles by eBike Type

vii. Challenges and Recommended Program Improvements

New PEV

Funding Levels

As discussed in Section III, the New PEV program experienced a 260% increase in application volume, beginning in August 2023. This trend has sustained through December 2023.

While this increase in participation is encouraging, and consistent with the goals of programmatic changes implemented in July 2023, it is cause for concern that authorized funding will not be sufficient to fund the program through 2025. For the four-month period from August through November 2023, the program received an average of just over \$500,000 in valid rebate claims (after accounting for ineligible or cancelled rebate claims). As of December 2023, the program has approximately \$6,750,000 in incentive funds remaining, or approximately 13.5 months of runway at current application volumes. If this higher volume is sustained, New PEV program funds could be exhausted by January 2025.

Additionally, there is much uncertainty in the EV market as major changes to the federal tax credit take effect on January 1, 2024. First, the tax credit will become reimbursable at the point-of-sale, making it more affordable to consumers to purchase EVs whereas, dealerships receive the tax credit from IRS after the sale is completed. It also unlocks the full value of the tax credit for lower-income Vermonters who may not have had sufficient tax liability. This should significantly increase demand for EVs. As a

counterbalance, the IRS recently issued guidance on the exclusion of vehicles for which battery components or critical minerals have been sourced from Foreign Entities of Concern (FEOC), which will result in fewer EVs eligible for the tax credit and could potentially lead to disruption of supply chains.

The precise impact of these changes is difficult to predict. CSE recommends closely monitoring program participation as the impact of these changes to the Federal tax credit become evident over Q1 2024. To the extent possible, VTTrans should ask the Vermont legislature for flexibility in adapting program rules and incentive levels in response to changing market dynamics, with an eye to ensuring continuity of program funding. If application volume remains high, VTTrans may wish to make one or more of the following changes:

- Decrease incentive levels – potentially reverting to the previous Enhanced Rebate amount.
- Modifying applicant eligibility requirements – potentially reinstating more restrictive income levels required to qualify for the Enhanced Rebate.
- Modified vehicle eligibility requirements – consider a more restrictive MSRP cap. This should be accompanied by careful analysis of EV market offerings, and what popular models qualify for a partial or full Federal tax credit, to ensure sufficient choice for program participants.

Plug in Hybrids – CSE recommends that VTTrans continue to consider the potential phase-out of PHEVs from the program. PHEVs play an important role as a bridge technology, especially for cold-weather drivers who cover longer distances and may still suffer from “range anxiety”. However, Vermonters appear to be getting more comfortable with AEVs: PHEVs represented 28% of applications for the period from July 2022 through November 2022, but only 19% of applications for the period from November 2022 through October 2023.

Additionally, PHEVs have less impact on GHG emission reductions than AEVs. Plug-in hybrids utilize both an electric motor and an internal combustion engine. The GHG savings of these vehicles only occurs when the vehicle is traveling on all-electric mode, thus is limited both by the range and efficiency of the electric drive (measured in Miles-Per-Gallon Equivalent). Compared to dedicated All-Electric vehicles, PHEVs have considerably lower MPGe. Of Program approved vehicles, PHEVs averaged 24 MPGe worse than AEVs (**Table 47**).

Modifications to the PHEV requirements could include:

- Increased minimum range requirement
- Minimum MPGe requirement
- Lower incentive amounts
- Removal of the PHEV incentive from the program

Vehicle Price Requirement – CSE recommends reevaluating the MSRP cap requirement, and potentially applying the MSRP cap at the trim-level, rather than determining eligibility by the MSRP of the lowest

trimline. Many OEMs offer a wide range of trim levels, with a significant spread of prices. For example, Hyundai offers its popular Ioniq 5 at a range of trim levels with starting prices between \$41,650 and \$53,350. While a trim-level MSRP cap would increase complexity for applicants and dealers in understanding if a vehicle qualifies, it would also prevent incentives from going to higher priced vehicles with extensive packages and add-ons, many of which can exceed \$70,000.

Drive	Make	Model	MPGe	Average
PHEV	BMW	330e PHEV	73	86
PHEV	Chrysler	Pacifica PHEV	82	
PHEV	Dodge	Hornet PHEV	77	
PHEV	Ford	Escape PHEV	101	
PHEV	Hyundai	Ioniq PHEV	119	
PHEV	Hyundai	Tucson PHEV	80	
PHEV	Kia	Sorento PHEV	79	
PHEV	Kia	Sportage PHEV	84	
PHEV	Mazda	CX-90 PHEV	56	
PHEV	Mitsubishi	Outlander PHEV	64	
PHEV	Toyota	Prius Prime PHEV	127	
PHEV	Toyota	RAV4 Prime PHEV	94	
AEV	Audi	Q4 e-tron	79	
AEV	Chevrolet	Bolt	120	
AEV	Chevrolet	Bolt EUV	115	
AEV	Ford	e-Transit Van	N/A	
AEV	Ford	F-150 Lightning	70	
AEV	Ford	Mustang Mach-E	103	
AEV	Hyundai	Ioniq 5	110	
AEV	Hyundai	Ioniq 6	135	
AEV	Hyundai	Kona EV	120	
AEV	Kia	EV6	117	
AEV	Kia	Niro Electric	113	
AEV	Mini	Cooper SE	110	
AEV	Nissan	Ariya	103	
AEV	Nissan	LEAF / LEAF Plus	111	
AEV	Polestar	2	107	
AEV	Subaru	Solterra	104	
AEV	Tesla	Model 3	132	
AEV	Tesla	Model Y	123	
AEV	Toyota	BZ4X	131	
AEV	Volkswagen	ID.4	107	
AEV	Volvo	XC40 Recharge	106	

Table 48 Summary of Eligible PHEV and AEVs

Replace Your Ride (RYR)

The RYR program showed promising signs of increased participation in the second half of 2023, in response to program changes implemented in July 2023. As described in last year’s annual report, this program faces challenges in garnering high levels of participation due to the relatively high residual value of used vehicles as compared to the RYR incentive for recycling.

Reduce eligibility barriers – The combination of income and vehicle eligibility requirements limit availability of this program to a relatively small pool of applicants. Opening up the used PEV program to moderate income non-Mileagesmart participants could drive more participation.

Relax Inspections Requirement – There is a requirement that scrapped vehicles must have passed an annual inspection within the past year. This could put a low-income applicant in the position of having to pay for maintenance on their vehicle to pass an inspection, only to subsequently scrap the vehicle. The wording of this requirement also needs to be clarified, since “past year” could mean the prior calendar year or the prior 12-months. CSE Recommends adapting the emissions inspection requirement to allow those with recently expired inspections to participate in the program.

eBikes

Program funding

- Allocate sustained funding to keep the program operational year-round, especially in the spring season when many bicycles are purchased.
- Due to the relatively small budget for the eBike program, and limited administrative budget for the eBike program, maximum efficiency is essential to be able to administer the program. Even seemingly minor modifications to application intake forms and review SOPs can be challenging to accommodate when administrative funds are so limited. Moving forward, CSE recommends repurposing existing resources, to the extent possible, and allocating additional administrative resources if more significant program changes are required.

Voucher redemption rates

- Approximately half of the eBike vouchers issued went unredeemed and were subsequently cancelled. While these funds cycle back into the program, this is an inefficient use of scarce program funding, and also creates additional administrative expense related to reviewing voucher applications that ultimately are not redeemed. CSE recommends exploring why voucher redemption rates have been low, to inform potential changes in program design. This would require additional administrative resources to perform this analysis.

Appendix A: Full Program Statistics

New PEV Incentives Issued to Date

CSE re-launched the New PEV incentive program on July 1, 2022, with a total incentive budget of \$648,700 remaining from the utility-administered program. This was supplemented by an additional \$10,200,000 from the 2022 Transportation Bill, for a total incentive budget of \$10,848,700. Since that time, CSE has approved 911 incentive applications for a total of \$2,824,500. This is inclusive of the New PEV incentives that are stacked with the RYR incentive.

Month	Applicant Post-Purchase		Dealer Point-of-Sale		Total	
	Count	Sum	Count	Sum	Count	Sum
Jul 2022	18	\$54,000	0	\$0.00	18	\$54,000
Aug 2022	19	\$60,000	51	\$153,500	70	\$213,500
Sep 2022	13	\$41,500	40	\$121,500	53	\$163,000
Oct 2022	7	\$20,000	31	\$91,500	38	\$111,500
Nov 2022	25	\$64,500	60	\$190,000	85	\$254,500
Dec 2022	14	\$40,000	22	\$76,000	36	\$116,000
Jan 2023	16	\$42,500	38	\$121,500	54	\$164,000
Feb 2023	10	\$30,500	28	\$84,500	38	\$115,000
Mar 2023	19	\$51,000	45	\$135,000	64	\$186,000
Apr 2023	22	\$61,500	29	\$84,500	51	\$146,000
May 2023	14	\$44,000	21	\$64,000	35	\$108,000
Jun 2023	13	\$39,500	56	\$178,000	69	\$217,500
Jul 2023	14	\$37,500	47	\$143,000	61	\$180,500
Aug 2023	26	\$81,500	85	\$268,500	111	\$350,000
Sep 2023	13	\$43,500	46	\$162,000	59	\$205,500
Oct 2023	13	\$45,000	56	\$194,500	69	\$239,500
Grand Total	256	\$756,500	655	\$2,068,000	911	\$2,824,500

Table 49 New PEV Approved Incentives through October 31, 2023

Month	Standard Rebate	Enhanced Rebate
Jul 2022	\$23,000	\$31,000
Aug 2022	\$68,500	\$145,000
Sep 2022	\$47,000	\$116,000
Oct 2022	\$46,500	\$65,000
Nov 2022	\$83,500	\$171,000
Dec 2022	\$32,000	\$84,000
Jan 2023	\$72,000	\$92,000
Feb 2023	\$48,000	\$67,000
Mar 2023	\$95,000	\$91,000
Apr 2023	\$71,500	\$74,500
May 2023	\$41,000	\$67,000
Jun 2023	\$79,500	\$138,000
Jul 2023	\$80,500	\$100,000
Aug 2023	\$136,000	\$214,000
Sep 2023	\$70,500	\$135,000
Oct 2023	\$71,500	\$168,000
Grand Total	\$1,066,006	\$1,758,500

Table 50 New PEV Approved Applications through October 31, 2023, by Rebate Level

Replace Your Ride Incentives Issued to Date

RYR launched with an initial incentive budget of \$1,200,000 from the 2021 Transportation Bill. The first budget amendment added an additional \$2,550,000. Of this, \$5000 went to fund the administrative costs of the first round of the eBike program. The second budget amendment reallocated \$552,000 in incentive funds to the Electrify your Fleet and second eBike program. This leaves a total of \$3,197,500 in incentive funding for RYR.

Month	RYR + New PEV		RYR + Used PEV		Consumer Claim		Total	
	Count	Sum	Count	Sum	Count	Sum	Count	Sum
Sep 2022	0	\$0	0	\$0	0	\$0	0	\$0
Oct 2022	1	\$3,000	0	\$0	0	\$0	1	\$3,000
Nov 2022	3	\$9,000	3	\$9,000	0	\$0	6	\$18,000
Dec 2022	0	\$0	2	\$6,000	0	\$0	2	\$6,000
Jan 2023	0	\$0	1	\$3,000	0	\$0	1	\$3,000
Feb 2023	1	\$3,000	1	\$3,000	0	\$0	2	\$6,000
Mar 2023	3	\$9,000	2	\$6,000	0	\$0	5	\$15,000
Apr 2023	1	\$3,000	1	\$3,000	0	\$0	2	\$6,000
May 2023	2	\$6,000	1	\$3,000	2	\$6,000	5	\$15,000
Jun 2023	0	\$0	5	\$15,000	0	\$0	5	\$15,000
Jul 2023	2	\$6,000	0	\$0	1	\$3,000	3	\$9,000
Aug 2023	2	\$8,000	1	\$5,000	2	\$8,000	5	\$21,000
Sep 2023	9	\$40,000	3	\$15,000	0	\$0	12	\$55,000
Oct 2023	5	\$25,000	0	\$0	0	\$0	5	\$25,000
Grand Total	29	\$112,000	20	\$68,000	5	\$17,000	54	\$197,000

Table 51 RYR Incentive Totals from Initial Launch on September 14, 2022

eBikes Incentive Expenditures

This program was allocated \$127,500 in incentive funds, plus the remaining \$482 leftover from the previous year. The program launched in June and started out strong, with funding fully allocated by August. However, not all of the PEX cards were spent and expired after 60 days. A large number of incentives expired in October and those funds were returned to the program.

Month	Paid		Used		Cancelled	
	Incentive Funds	Count	Incentive Funds	Count	Incentive Funds Taken Back	Count
Jun-23	\$0	0	\$0	0	\$0	0
July-23	\$80,000	152	\$6,800	14	\$0	5
Aug-23	\$43,600	80	\$21,200	45	\$400	22
Sept-23	\$4,400	8	\$14,800	28	\$5,995	22
Oct-23	\$20,400	35	\$4,000	7	\$45,600	85
Grand Total	\$148,400	275	\$46,800	94	\$51,995	134

Table 52 eBikes Count and Dollar Value of Approved Incentives

Administrative Expenditures

A total of \$623,634 in administrative expenses for all three programs were incurred from the start of the contract March 1, 2022, through November 30, 2022, against a total three-year administrative budget of approximately \$2,342,000. Administrative expenses by program are as follows in **Table 52** below:

Program	Incentives issued to date (\$)	Administrative expense to date (\$)	Total expenditures to date (\$)	Administrative expense as % of total expenditures to date
New PEV	\$2,824,500	\$891,250.10	\$3,715,750.10	24%
RYR	\$197,000	\$404,001.46	\$601,001.46	67%
eBikes	\$138,818	\$34,999.58	\$173,817.58	20%
Grand Total	\$3,068,300	\$1,317,637.58	\$4,385,937.58	30%

Table 53 Incentive and Administrative Expenditures by Program

Appendix B: Consumer Survey Weighting Strata

The following tables show the proportion of weighting strata between the survey responses and program population. If the “Unweighted Survey Frequency” is lower than the “Program Population Frequency”, this indicates that the population was under-represented in the survey sample. If the “Unweighted Survey Frequency” is higher than the “Program Population Frequency”, this indicates that the population was over-represented in the survey sample.

New PEV & RYR Consumer Survey

Purchase versus Lease

Strata	Unweighted Survey Frequency	Program Population Frequency
Lease	31.43%	32.64%
Purchase	68.57%	67.36%

Rebate Claimed by

Strata	Unweighted Survey Frequency	Program Population Frequency
Applicant	30.13%	28.24%
Dealer	69.87%	71.76%

County of Registration

Strata	Unweighted Survey Frequency	Program Population Frequency
Addison	7.79%	8.57%
Bennington	5.45%	5.82%
Caledonia	4.16%	4.07%
Chittenden	31.95%	29.67%
Essex	0.26%	0.11%
Franklin	2.60%	3.41%
Grand Isle	1.56%	0.88%
Lamoille	1.82%	1.54%
Orange	4.68%	4.07%
Orleans	2.08%	2.09%
Rutland	8.05%	10.77%
Washington	15.32%	15.38%
Windham	7.27%	5.93%
Windsor	7.01%	7.69%

Incentivized Vehicle

Strata	Unweighted Survey Frequency	Program Population Frequency
Chevrolet Bolt	10.13%	8.90%
Chevrolet Bolt EUV	16.10%	17.91%
Chrysler Pacifica Hybrid	0%	0.11%
Ford Escape PHEV	1.04%	1.21%
Ford F-150 Lightning	0.78%	0.44%
Ford Mustang Mach-E	1.04%	0.99%
Hyundai Ioniq 5	7.27%	6.37%
Hyundai Ioniq 6	0.26%	0.11%
Hyundai Kona EV	4.16%	3.63%
Hyundai Santa Fe PHEV	1.30%	1.65%
Hyundai Tucson PHEV	2.86%	2.97%
Kia EV6	1.82%	1.43%
Kia Niro Electric	1.04%	0.99%
Kia Niro PHEV	1.04%	1.32%
Kia Sorento PHEV	0.78%	0.44%
Kia Sportage PHEV	0.78%	0.66%
Mazda CX-90	0.26%	0.11%
MINI Cooper SE	0.78%	0.88%
Mitsubishi Outlander PHEV	1.04%	0.66%
Nissan Ariya	2.34%	3.19%
Nissan LEAF / LEAF Plus	9.09%	12.20%
Subaru Crosstrek Hybrid	1.30%	1.10%
Subaru Solterra	3.38%	2.53%
Tesla Model 3	1.82%	2.64%
Tesla Model Y	0.78%	0.66%
Toyota BZ-4X	0.78%	0.55%
Toyota Prius Prime	3.64%	4.95%
Toyota RAV4 Prime	5.97%	5.38%
Volkswagen ID.4	18.44%	16.04%

eBike Consumer Survey

eBike Type

Strata	Unweighted Survey Frequency	Program Population Frequency
Adaptive eBike (voucher amount of \$800)	3.08%	3.84%
Cargo eBike (voucher amount of \$800)	24.62%	33.42%
Standard eBike (voucher amount of \$400)	72.31%	62.74%

County of Residence

Strata	Unweighted Survey Frequency	Program Population Frequency
Addison	4.62%	4.12%
Bennington	10.77%	9.62%
Caledonia	3.08%	5.49%
Chittenden	27.69%	32.69%
Essex	0%	0.27%
Franklin	13.85%	4.95%
Grand Isle	0%	1.92%
Lamoille	3.08%	4.40%
Orange	4.62%	4.12%
Orleans	1.54%	4.40%
Rutland	6.15%	8.52%
Washington	3.08%	5.49%
Windham	16.92%	9.07%
Windsor	4.62%	4.95%

Appendix C: RYR Consumer Claim Participating Businesses

Business Name	Address
Bennington Bike Hub	160 Benmont Ave, Bennington, VT 05201
Betty's Bike Shop	193 St. Paul Street Burlington, Vt. 05401
Bicycle Express	23 Commercial Dr, Waterbury Village Historic District, VT 05676
Bike Hub	160 Benmont Avenue, Suite 36, Bennington, VT 05201
Bootlegger Bikes	60 Main St, Jeffersonville, VT 05464
Bootlegger Bikes 2	82 N Main St, St Albans, VT 05478
Brattleboro Bicycle Shop	165 Main Street, Brattleboro, VT 05301
Burrows Specialized Sports	105 Main St. Brattleboro, VT 05301
CarShare Vermont	131 Saint Paul St, Burlington, VT 05401
First Stop Ski and Bike Shop	8474 US-4, Killington, VT 05751
Frog Hollow Bikes	74 Main St, Middlebury, VT 05753
Great Outdoors	Varies
Green Mountain Bikes	105 N Main St, Rochester, VT 05767
Hanover Adventure Tours	713 US Route 5, Norwich, VT 05055
Hitchhiker Bike Shop	394 Mountain Rd #6, Stowe, VT 05672
Lamoille Valley Bike Tours	19 Creamery St, Johnson, VT 05656
North Star Sports	100 Main St, Burlington, VT 05401
Old Spokes Home	331 North Winooski Avenue, Burlington, VT 05401
Power Play Sports	35 Portland St, Morrisville, VT 05661
RAD Innovations LLC	2170 Vermont Rte 125 Suite A, Cornwall, VT 05753
Ski Rack	85 Main St, Burlington, VT 05401
The Gear House	16 Pleasant St, Randolph, VT 05060
The Great Outdoors - Enosburg Falls	162 Main Marketplace, Enosburg Falls, VT 05450
The Great Outdoors - Morrisville	65 Northgate Ave # 2, Morristown, VT 05661
The Great Outdoors - Newport	117 Waterfront Plaza, Newport, VA 05855
The Jay Cloud Cycle	91 Main St, Montgomery Center, VT 05471
Vermont Bike & Brew	242 Academy Rd, Thetford, VT 05074
West Hill Shop	49 Brickyard Lane, Putney, VT 05346



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VTrans Program Status Update
MileageSmart
December 15, 2023

Overview

The warming of our planet calls for urgent action. Transportation is the largest contributor to Vermont's Greenhouse gas emissions and requires new approaches to moving toward a clean energy fleet. Transportation is also one of the greatest barriers to moving people out of poverty. Low-income Vermonters may be trapped in poverty without access to jobs, healthcare, or childcare, or they may be driving expensive and inefficient vehicles and often cannot afford necessary inspection requirements.

Capstone Community Action, in collaboration with VTrans, operates a program, initiated by the VT State Legislature (Act 59 of 2019, sec. 34), to assist low-income Vermonters in need of reliable and affordable used transportation that is also environmentally friendly. The MileageSmart Program's mission is to improve the economic vitality of low income Vermonters and reduce carbon emissions in the State by incentivizing the purchase of used high efficiency vehicles.

How does it work?

MileageSmart helps Vermonters with low incomes, access energy efficient cars by providing an incentive that covers 25% of the cost - up to \$5,000 - of a used, 40+ MPG/MPGe vehicle. Starting in January 2024, MileageSmart will offer participants who receive 3Squares/SNAP benefits the full \$5,000 to put towards an eligible vehicle. In order to qualify for the incentive, participants must apply online at www.mileagesmartvt.org. Once approved, they are then encouraged to shop for an eligible vehicle at a Vermont-based dealership and, if required, apply for a loan. Participants may secure the financing of their choice with any lending institution, preferably via one of the green vehicle loan programs offered by local banks and credit unions. After the vehicle has been approved and financing has been secured, the dealer includes the MileageSmart incentive amount in the purchase and sales agreement. Upon receipt of an executed purchase and sales agreement, a commitment letter is sent by the program manager to both the MileageSmart participant and the dealer, stating that the funds have been committed and the sale is completed.

Program Qualifications

The MileageSmart program is designed to assist Vermonters who are at or below 80% of area median income, based on household size (see below). In order to qualify for the program, the applicant must be a Vermont resident with a valid Vermont driver's license, must be 18 years of age, and must not be claimed as a dependent. The incentive may only be used once per licensed driver.

Number of Persons in Household	Annual	Monthly
1	\$55,050.00	\$4,587.50
2	\$62,900.00	\$5,241.67
3	\$70,750.00	\$5,895.83
4	\$78,600.00	\$6,550.00
5	\$84,900.00	\$7,075.00
6	\$91,200.00	\$7,600.00
7	\$97,500.00	\$8,125.00
8	\$103,800.00	\$8,650.00

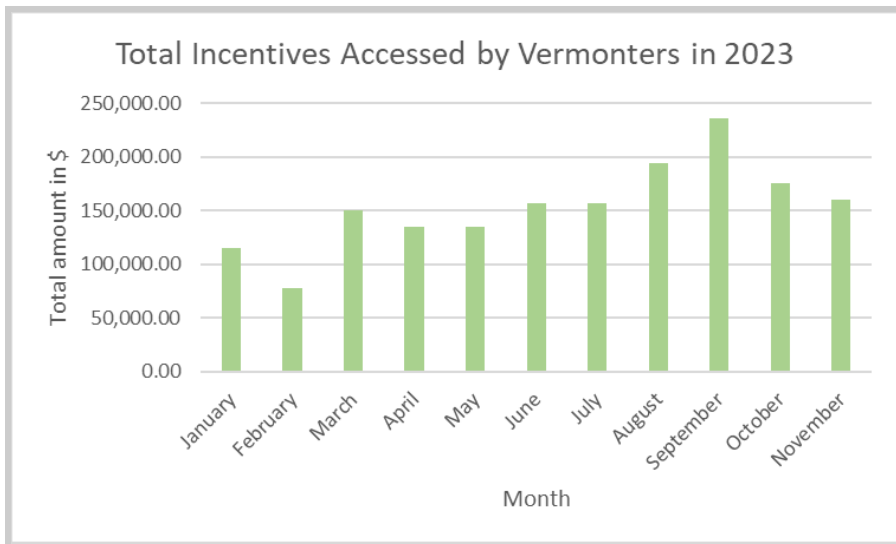
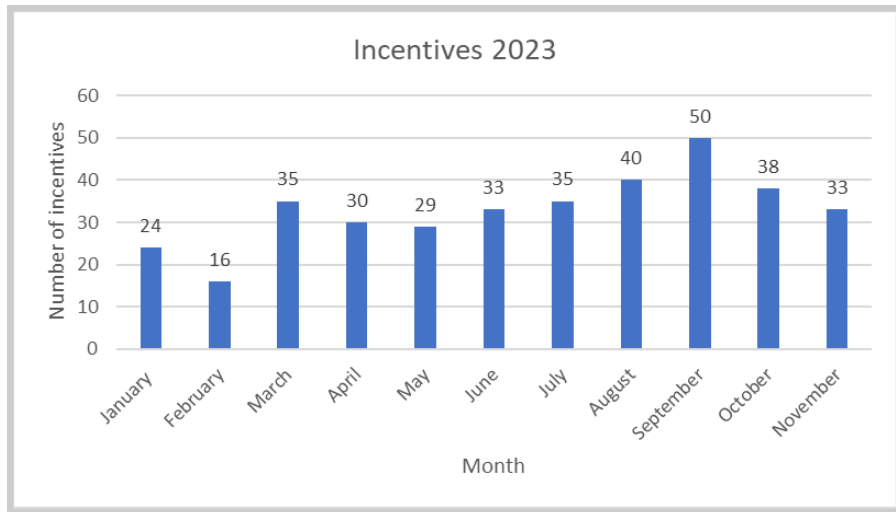
In order for a prospective vehicle to be eligible under the program guidelines it must have an EPA combined MPG/MPGe rating of 40 or greater and be purchased at a Vermont dealership at or below J.D Power's current clean retail value. Starting January 2024, the price of the vehicle must also be less than \$40,000.

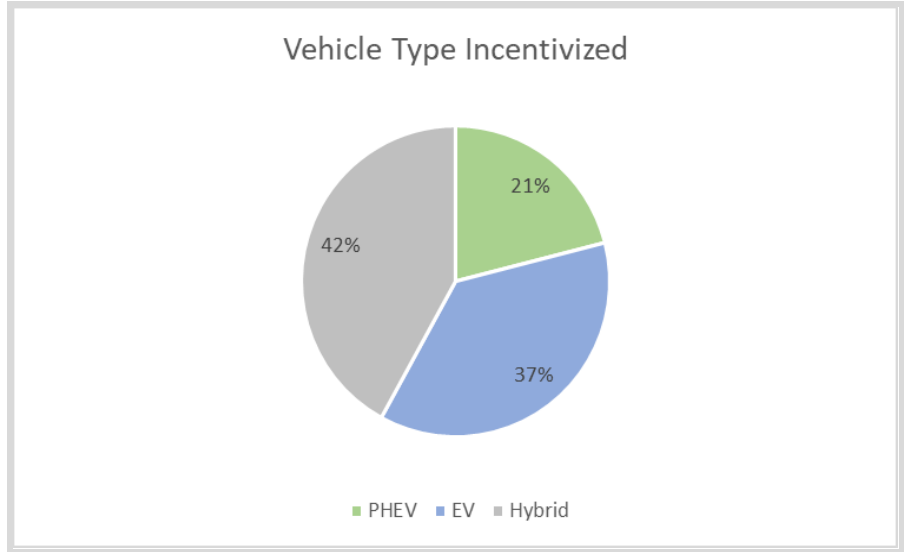
If the applicant is financing the vehicle, the interest rate on the loan must not exceed 12%.

Status Update

Calendar year to date as of 11/30/2023, 363 Vermonters have accessed a total of \$1,694,653 with an average MileageSmart incentive of \$4,668. Activity peaked in September when 50 Vermonters gained access to cleaner vehicles, making it the busiest month of the program since the inception. The surge in both applications and incentives likely came as a result of

VTrans modifying rules to all of the statewide vehicle incentive programs, to speed recovery for households whose vehicles were damaged in the flood.





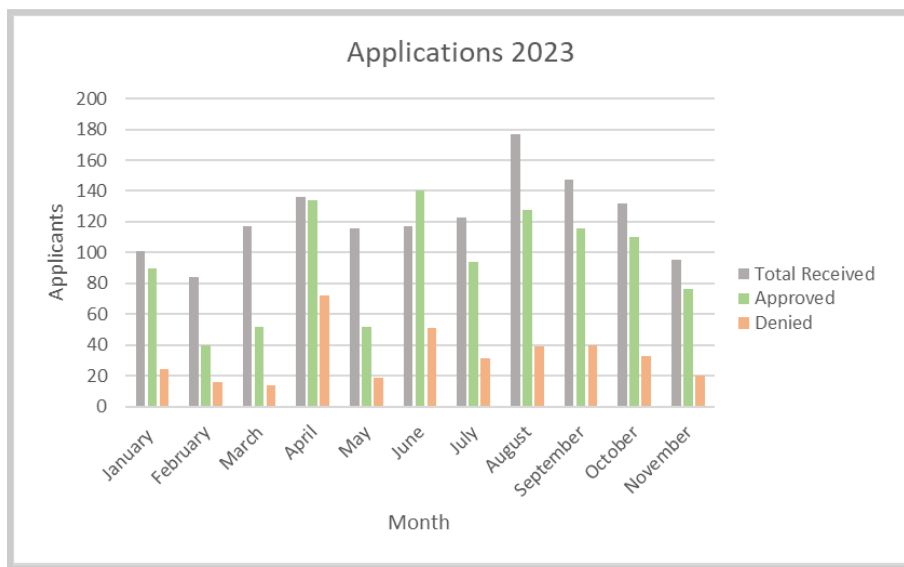
Since the inception of the program, MileageSmart has engaged with 90 Vermont dealerships, collaborating to process deals and get applicants into clean vehicles. (Table 1, pages 13-15, includes a detailed list of our participating dealerships). Maintaining strong relationships with our partnering dealers has been critical to keeping marketing costs low. It has been communicated, by the dealers, that some participants are unaware of the program until walking into the dealership. Information regarding the program is then provided by the dealerships. In some circumstances, applicants are able to apply for the program at the dealership, get approval, and walk away with a high efficiency vehicle that day.

In addition to the MileageSmart incentive, applicants are encouraged to look into other electric vehicle incentives provided at both the State and Federal level. State incentives such as Replace Your Ride and EV-related incentives provided by local utilities can all be stacked together to provide applicants an even greater savings.

Applications Received, Approved, and Denied

Calendar year to date as of 11/30/2023, MileageSmart received a total of 1,345 applications. Of those applications, 1,032 applications have been approved and 359 applications have been denied. Of the applicants who have been denied, 85% of them were denied from the program because they made above 80% State Median Income based on household size. Another 11% were unresponsive to follow up questions regarding their application. The remaining 4% of applicants either misunderstood the program, had already purchased a vehicle and were attempting to apply the incentive retroactively, or bought a vehicle outside of the program.

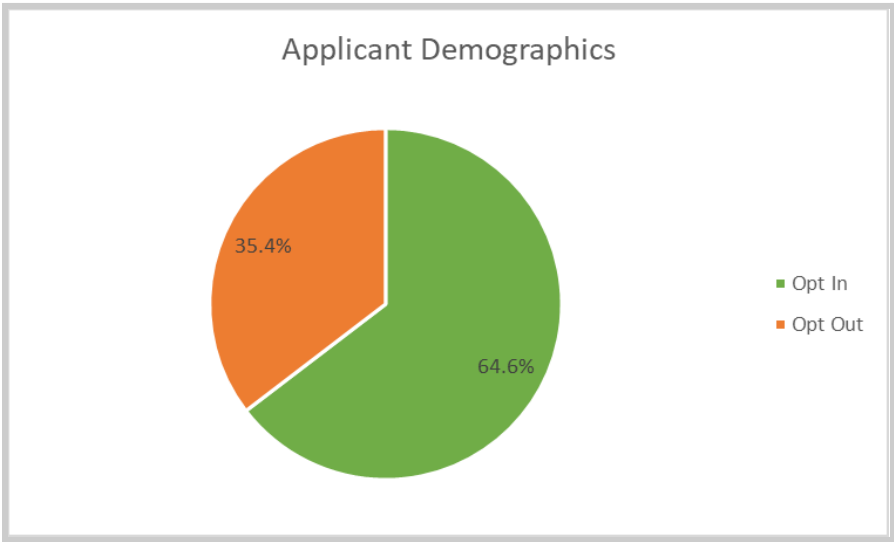
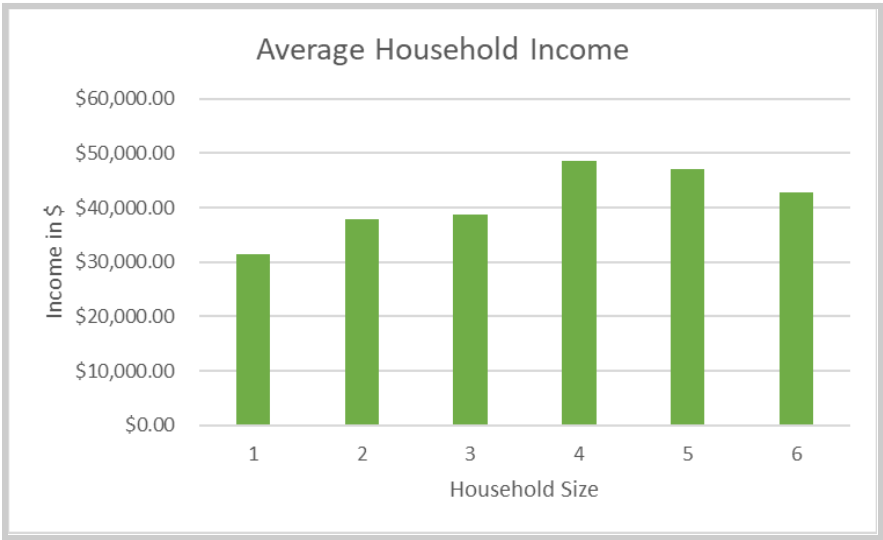
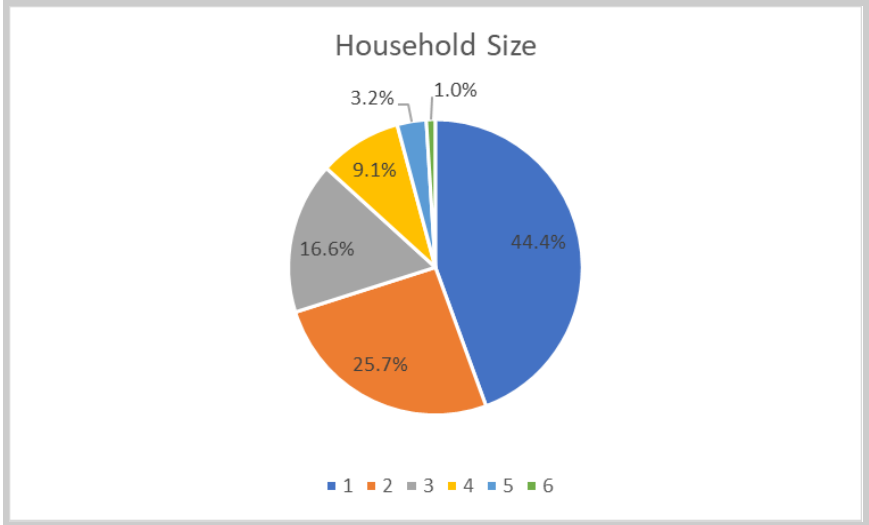
It is important to note that an applicant can be approved (eligible) for the program, but later marked as denied if one of the following situations occurred: the applicant misunderstood the program, the applicant already purchased an eligible vehicle and the deal was not processed at the point of sale, or the applicant bought a vehicle outside of the program. When this information is communicated to the program manager, the applicant is then marked as denied. A final circumstance to note, is that some folks started the application, but were unable to complete it because they did not meet the program requirements. For example, if they were under 18 years of age or they were marked as a dependent on someone else's tax return, the form would not allow them to complete and submit an application.



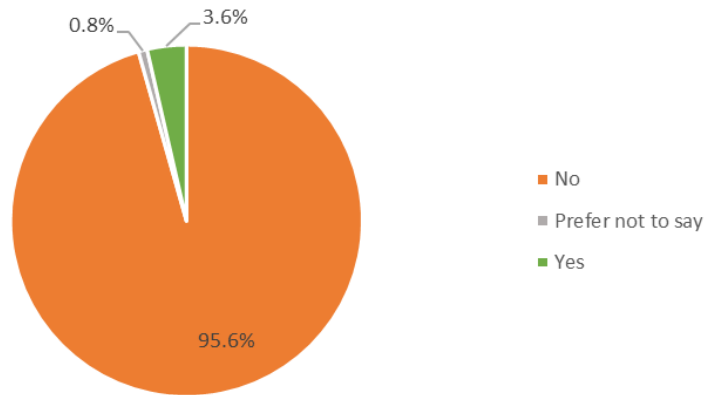
Of the 1,032 applicants approved in 2023, 363 were able to find and purchase an eligible vehicle and make use of the MileageSmart incentive. In sum, 35% of approved applicants moved forward with the purchase of a qualifying high-efficiency vehicle as of November 30, 2023.

Incentive Recipient Demographics

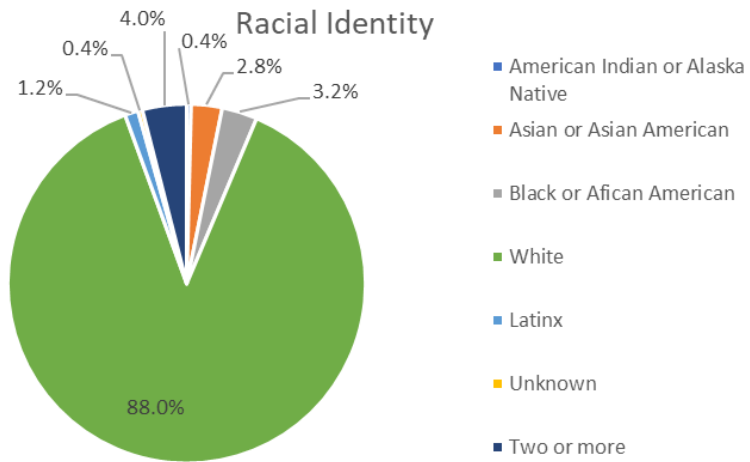
The following data on applicant demographics are calendar year to date, as of November 30, 2023.

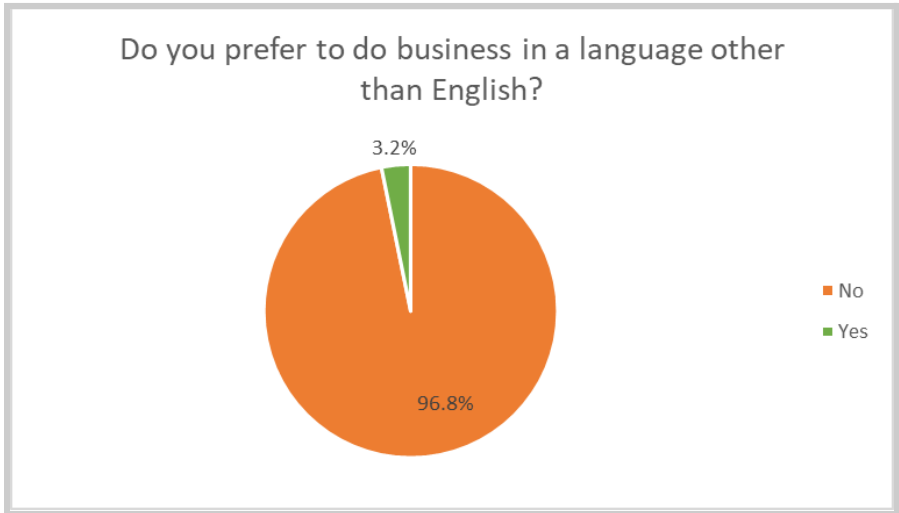
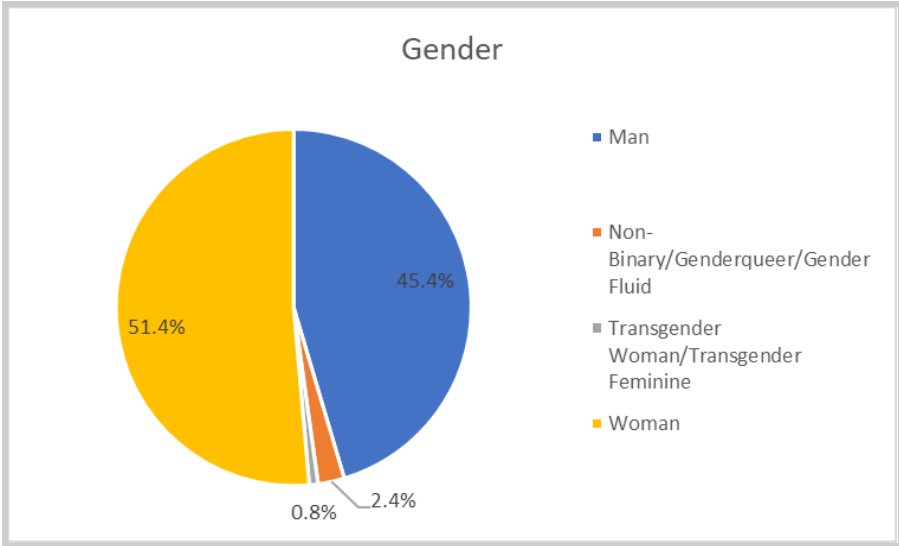
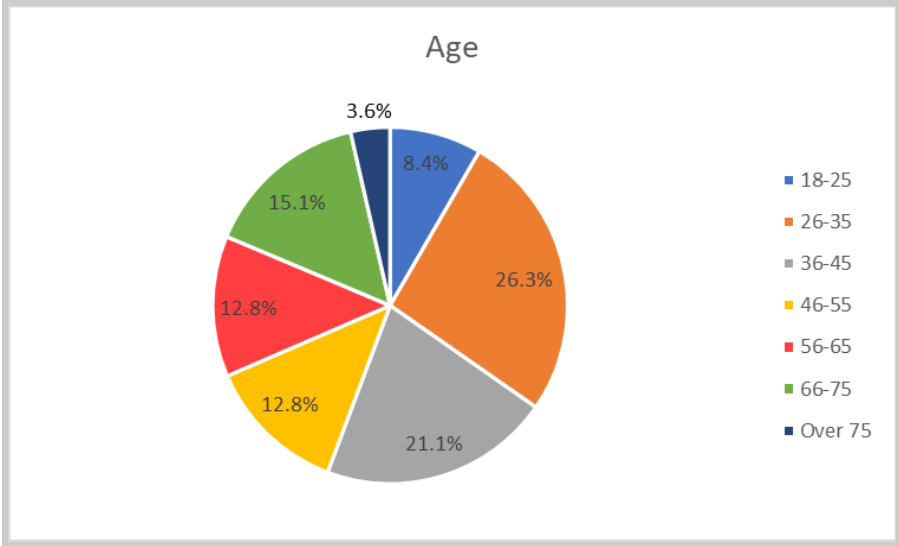


Hispanic, Latino, or Spanish Origin



Racial Identity





Expenses

Current year to date (starting September 1, 2023), as of November 30, 2023 administrative expenditures are 6.7% of the total incentive expenditures. The majority of administrative costs incurred to date are labor invested. MileageSmart is currently serving the entire state with only one staff person dedicated to managing the work flow between participants and dealers, and our monthly throughput continues to grow. With the program adding tiered incentives to better support the lowest income participants, additional staff will be hired for the increased workflow. The MileageSmart program also employs a part time consultant that supports the monthly marketing through all of the social channels to maintain the flow of new applications.

Current year to date (09/01/2023-11/30/2023) total expenditures: \$615,348.93

Inception to date total expenditures: \$4,069,357.72

Collaboration, Outreach & Marketing

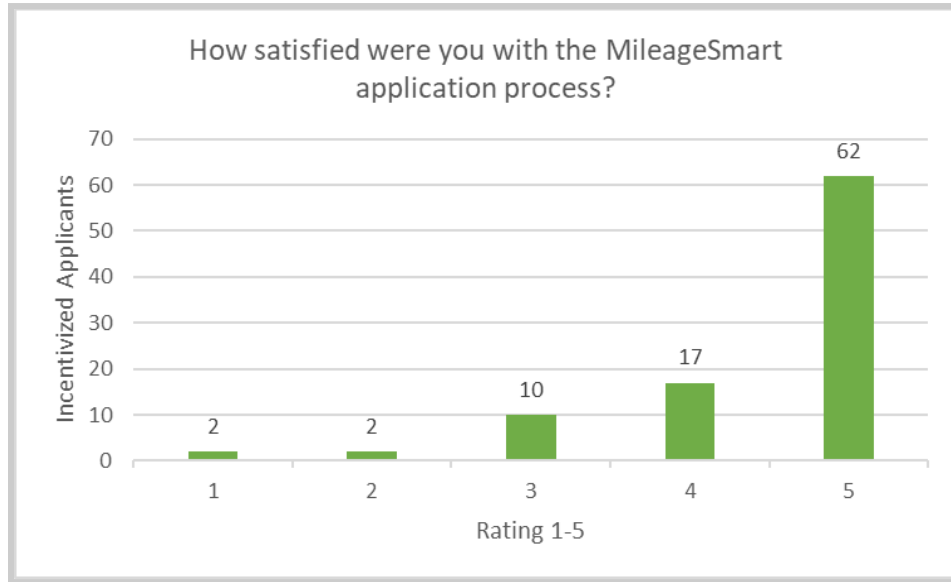
The MileageSmart application asks applicants how they learned about the program. The leading three responses are: via an online search, referred by a friend, and by the dealership. For applicants who were referred by a friend, it remains particularly important that the applicant experience and application process continues to be positive, as this is largely the reason that a participant would refer another individual to the program. In addition, maintaining strong relationships with participating dealers has a critical impact on how the program is marketed. A recent example is with Springfield GMC Cadillac. In just two weeks after signing them on and working through the dealer resources, three eligible applicants were able to purchase high-efficiency vehicles. This is a typical success story.

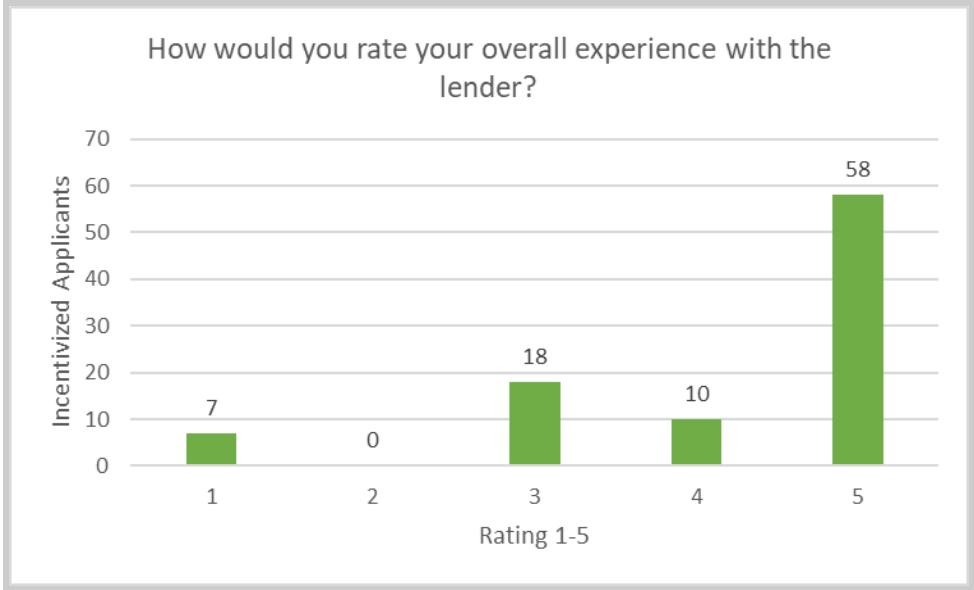
As stated previously, the MileageSmart program also employs a part time consultant that supports the monthly marketing through all of the social channels.

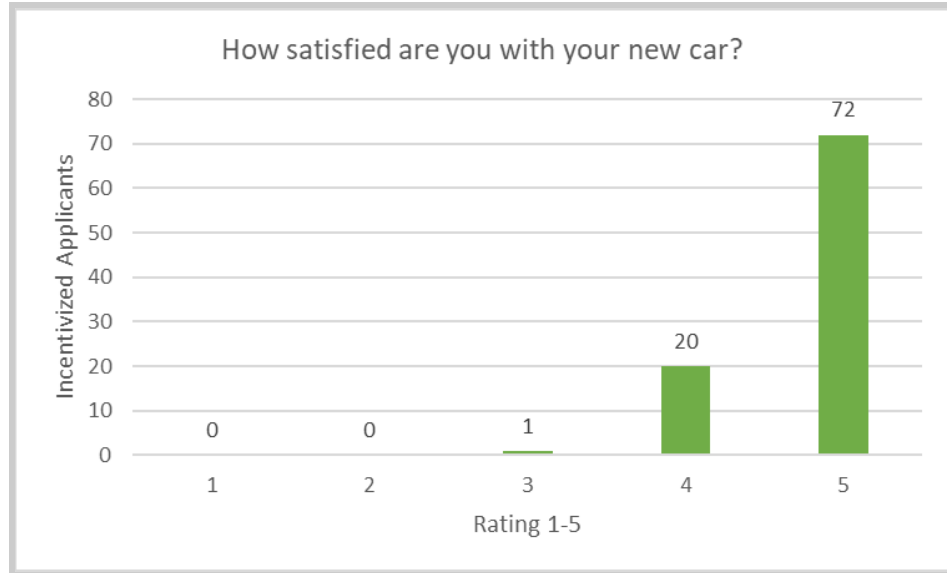
Moving forward, MileageSmart will continue working through the Vermont Auto Dealers Association to connect with dealers to inform them of program updates and provide training on the application process so that they can quickly and efficiently support participants.

Applicant Feedback

After a participant receives their new vehicle, they are encouraged to fill out a survey rating their experience with the MileageSmart program as well as their experiences with dealers and lenders. Calendar year to date as of November 30, 2023, we have received feedback from 93 out of the 363 participants who completed a purchase.







Given the applicant feedback, the majority of applicants who purchased a vehicle through the program were satisfied with the application process, the lender experience, the dealer experience, and their new vehicle. One participant wrote:

My friend told me about MileageSmart last year and I was instantly envious of her new-to-her Prius. From start to finish, working with MileageSmart was a breeze. When I was approved, I couldn't wait to find a qualifying vehicle to replace my 2010 Honda Civic, which I'd planned on driving into the ground on my educator's salary. I'm now the proud new owner of a 2021 Prius Prime: a plug-in hybrid that qualified me for additional rebates through Burlington Electric, but gave me the flexibility I was looking for as a renter without a place to charge at home. I'm looking forward to learning more about the world of electric vehicles. I am genuinely more excited for my commute to work, and have already started to spread the word so that more Vermonters can take advantage of this opportunity!

Table 1 - Participating Dealer List

Dealer	Community
802 Honda	Berlin
802 Toyota	Berlin
Alderman's Chevrolet Inc.	Rutland
Alderman's Toyota	Rutland
Autosport/Imported Car Center Inc.	South Burlington
Ayer Auto Sales	Barre
Barrette Ford	Alburgh
Bennington Chevrolet, Buick, Cadillac, Inc.	Bennington
Bennington Nissan Inc.	Bennington
Benson's Chevrolet	Ludlow
Berlin City Kia/Berlin City Used Car Superstore	Williston
Bouffard Auto Sales + Service	Colchester
Brattleboro Ford (Kirste Motor Company LLC)	Brattleboro
Burlington Hyundai	Burlington
Burlington Mitsubishi	South Burlington
Burlington Subaru	Burlington
Capitol City Imports	Montpelier
Carters Cars	South Burlington
Classic Auto Exchange	Berlin
Cody Chevrolet	Montpelier
Coggins Ford of Bennington	Bennington
Coggins Honda Bennington	Bennington
Coggins Toyota Bennington	Bennington
Crossway Motors II Inc./Green Cars Vermont	Montpelier
CVP Auto	Williston
Dave's Foster Care Auto	New Haven
Earthycars	Williston
East Barre Auto Sales	East Barre
East Creek Motors	Rutland
Eastman's Auto	Montpelier

Fair Haven Motors Inc	Fair Haven
Faith's Toyota Ford	Westminster
Formula Ford - Rutland	Rutland
Formula Nissan - Barre	Barre
Freedom Nissan	South Burlington
Garvey Nissan	Clarendon
Goss Dodge	South Burlington
Haddad Subaru of St. Albans	St. Albans
Handy Buick, GMC, Cadillac	St. Albans
Handy Cars Williston Road	South Burlington
Handy Chevrolet Inc.	St. Albans City
Handy Toyota	St. Albans City
Heritage Ford	Burlington
Heritage Toyota	Burlington
Key Chevrolet Buick GMC Cadillac of South Burlington	South Burlington
Key Chevrolet of White River	White River Junction
Key Honda of Rutland	Rutland
Kingdom Auto Brokers	St. Johnsbury
Lamoille Valley Chevrolet	Hyde Park
Lamoille Valley Ford	Hardwick
Langway of Manchester	Manchester Center
Lawson's Auto	Rutland
Lowery's Auto Sales	Barre
Lundgren Subaru	Bennington
Maple Center Motors	St. Johnsbury
Marty's Auto	Milton
McGee CDJR of Barre	Barre
McGee Chrysler, Jeep, Dodge Ram of Springfield	Springfield
McGee Family Used Cars	White River Junction
McGee Ford of Montpelier	Montpelier
McGee Hyundai of Barre	Barre

MD Motors	Williston
Midstate Auto Group (Central Vermont AutoMart)	Montpelier
Moore Quality Cars	St. Albans
Nucar Saint Albans	St. Albans
Oliver Automotive Group	Rutland
Poulin Auto Sales	Barre
Preston's Kia	Montpelier
Prim Auto	Colchester
Progressive Auto Sales	Swanton
Quality Mitsubishi St Johnsbury	St. Johnsbury
Saint J Subaru	St. Johnsbury
Snowfire Auto LTD	Waterbury
Springfield GMC Cadillac	North Springfield
The Automaster	Shelburne
Tony's Used Autos INC	Hartland
Twin City Subaru	Berlin
Twin State Ford	St. Johnsbury
Upper Valley Honda	White River Junction
Vermont Auto Service, LLC	South Burlington
Village Car Company	Hinesburg
VPEX Motor Company/Shearer Volkswagen	South Burlington
Wheelz Wholesale Inc	Rutland
White River Subaru	White River Junction
White River Toyota	White River Junction
Williston Economy Motors	Williston
Wimette Trading Company	Salisbury

Caret®-EV Analysis of Vermont State PEV Rebate Programs

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Sustainable
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List of Acronyms

\$M = Million dollars

ACC2 = Advanced Clean Cars II

AGI = Adjusted Gross Income

BEV = Battery Electric Vehicle

CSE = Center for Sustainable Energy®

EV = Electric Vehicle; used here interchangeably with PEV

GHG = Greenhouse Gas

GVWR = Gross Vehicle Weight Rating

ICEV = Internal Combustion Engine Vehicle

IRA = Inflation Reduction Act of 2022

IVCAP = Initial Vermont Climate Action Plan

kWh = kilowatt-hours

MAGI = Modified Adjusted Gross Income¹

MMT CO₂e = Million Metric Tons of Carbon Dioxide Equivalent (used with GHG measurements)

MSRP = Manufacturer Suggested Retail Price (of a vehicle)

PEV = Plug-in Electric Vehicle; generally, BEVs and PHEVs

PHEV = Plug-in Hybrid Electric Vehicle

VT = Vermont

VTrans = Vermont Agency of Transportation

ZEV = Zero-Emission Vehicle

¹For consistency with IRA income eligibility requirements, MAGI is used in Caret®-EV; to enable this, CSE calculated an ensemble average relation between gross income and AGI ($AGI \approx 0.985 * \text{gross income}$) using public data compiled by the Internal Revenue Service (Statistics of Income – Individual Income Tax Returns Complete Report for Tax Year 2018, Publication 1304, Section 4, Table 1.4) and making the additional assumption that adjusted gross income (AGI) and MAGI are approximately equivalent.

Introduction

The Caret® EV Planner (Caret®-EV) is a patent-pending EV incentive policy modeling and forecasting platform for the light-duty transportation sector developed by Center for Sustainable Energy® (CSE). This document addresses the impact of Vermont's current and proposed suite of PEV rebates, including the effects of the federal EV tax credits provided by the Inflation Reduction Act of 2022 (IRA) and a preliminary treatment of the Advanced Clean Cars II (ACC2) program. The methodologies and outputs of Caret®-EV are summarized below.

Caret®-EV Modeling Methodology

To forecast the light-duty vehicle market, Caret®-EV calculates EV market share growth as a function of both the available incentives and the market share. The model is calibrated using data from the U.S. and around the world and can be refined over time with the latest data sets as they become available. Caret®-EV models the total program cost, greenhouse gas (GHG) emissions reduction, EV adoption, and other factors as far as 30 years into the future, based on a palette of incentive types, amounts, and schedules.

Modeling the long-term adoption of new technologies, such as EVs, is difficult since past data are not likely to reflect the future market conditions as the technology becomes better known and accepted. Common approaches rely on consumer choice models and estimates of price elasticities and cross-price elasticities of demand [1][2][3][4]. These models rely solely on historical data, assume that consumers are highly rational about vehicle adoption, and assume that adoption depends only on product attributes (e.g., cost). As such, these approaches are only useful for very near-term projections, when both the state of the technology and consumer acceptance will be similar to the recent past. To successfully model the adoption of a new technology spanning the entire market transformation (which typically lasts several decades) requires mathematical approaches that go beyond short-term consumer choice or price elasticity models [5][6][7][8][9][10][11]. The ideal approach to modeling EV adoption is not only grounded in data but also accounts for the sociotechnical barriers to adoption, captures the dynamic forces inherent in technology diffusion, and allows for modeling a variety of potential policy interventions directed at different stakeholders.

To model the EV market transformation, Caret®-EV implements a logistic growth function of adoption over time, as observed in a variety of other technologies [7][8], parameterized by a Bass diffusion model customized to the EV market. At its foundation, the model is calibrated using five years of data from sixteen EV incentive programs in the United States and other countries around the world, relating incentive dollars to the corresponding increase in EV sales. By using EV market data and regression techniques to model sales over time, this approach gives a more complete picture of the relationship

between incentive levels, time, and EV adoption than could be provided using price elasticity or choice models over the same long timeframe. Finally, Caret[®]-EV incorporates a learning algorithm, in which model predictions are replaced by data as they become available, which allows the projections to stay on track with reality and fine-tunes the model predictions over time.

Primary outputs of Caret[®]-EV include:

- The annual total costs of the EV incentive policy, as well as totals by policy component (e.g., new EV incentives, used EV incentives, income-qualified add-on incentives, etc.).
- Annual EV market share and number of EVs purchased (both incentivized and not incentivized).
- Annual reduction in light-duty transportation sector GHG emissions.

Because of the data-rich nature of the modeling process, numerous additional outputs can be obtained, such as annual fleet composition and age distributions, co-benefits and return-on-investment, electricity and gasoline consumption, and so on.

Sociotechnical Transitions

The science of sociotechnical transitions directs that each sociotechnical barrier should be addressed by a holistic and comprehensive market intervention/policy to accelerate the diffusion of a technology. The current EV market would be classified as a “sociotechnical niche”; that is, a new technology in its initial stage of transition to becoming the dominant actor in the market [12]. In order to achieve the accelerated adoption of EVs required to meet GHG emissions reduction goals, stakeholder expectations must be aligned and the interconnected nexus of sociotechnical barriers inhibiting EV diffusion must be addressed in a comprehensive manner [13][14]. While these interconnected barriers form a web, the primary barriers inhibiting EV diffusion are price, range, charging infrastructure, and consumer awareness and acceptance [13][15][16]. To ensure that the EV market achieves the accelerated growth required to meet the GHG emissions reduction goals, it is necessary to set complementary and clear policy signals that allow the market to overcome all of the individual sociotechnical barriers. In the Caret[®]-EV model, the policy signals come in the form of incentives that are combined to target the barriers that must be overcome [17].

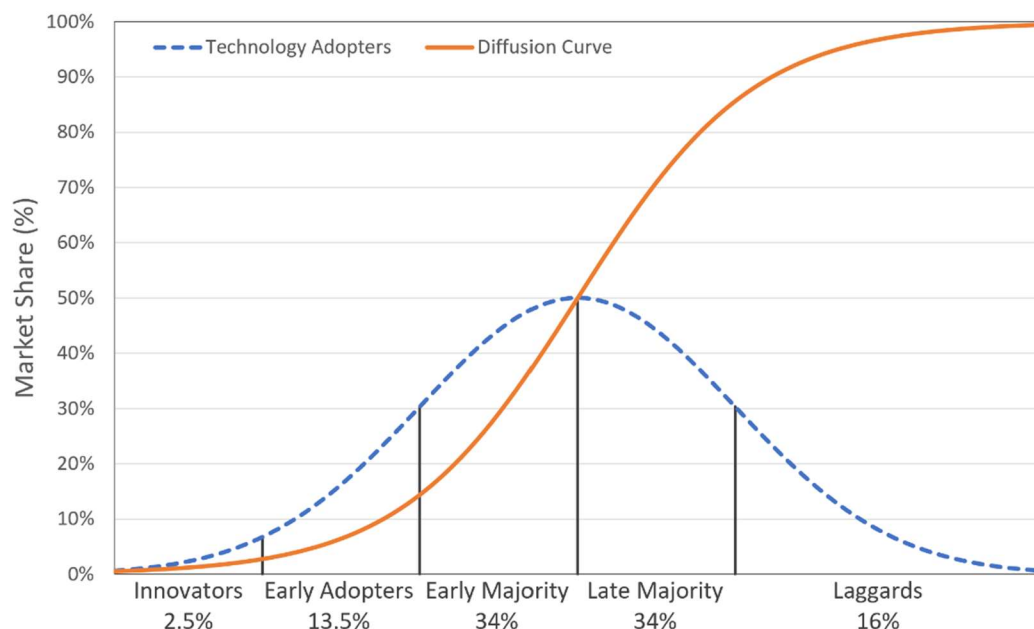
Diffusion of Innovations

The empirical concept of diffusion of innovations provides a framework for describing the characteristics of the adoption and spread of new technology [7][8][9][10][11] (also see Figure 1). The normal diffusion of a new technology is rooted in personality traits and other factors (such as level of knowledge or exposure to the new technology) that make each individual more or less likely to adopt it. It is driven by communication within social networks that acts to encourage adoption by more individuals over time. The overall distribution of these individual traits in a population is determinant of the rate of adoption in that population.

The rate at which a new technology moves up the sigmoidal (S-shaped) market share curve (i.e., the adoption rate) can be accelerated by encouraging (e.g., via incentives) the adoption of the technology among successive consumer groups (see Figure 1). Prioritizing resource expenditures to encourage adoption early in the diffusion process (on the lower, more linear branch of the S-curve) has the largest effect on accelerating the overall adoption rate by causing the growth in market share to reach the steep (exponential) central part of the S-curve faster. The most effective incentive policy acts to accelerate the EV adoption rate as rapidly as possible and as early as possible, to reach the steep part of the S-curve as soon as possible.

FIGURE 1

Diffusion of Innovations



Summary of results: As successive groups of consumers adopt a new technology (dashed blue “bell-shaped” curve), its market share (solid orange “S-shaped” curve) grows and eventually reaches the saturation level. Categories of consumer groups are indicated (vertical lines) and labeled according to their willingness to adopt a new technology (high to low from left to right) and percentage of the total population represented by each group.

Source: Center for Sustainable Energy®, 2023; figure design after Rogers (1962)

Some individuals in the final consumer group (the “laggards”) might be especially reluctant to adopt the new technology on the same time scale as others; an “extra push” (e.g., legislative action such as a zero-emission vehicle mandate) might be required to convert them. The upper portion of the S-curve gradually approaches 100% but will only reach it when the last laggard has adopted – this is why setting incentive policy goals based on reaching 100% market share can be unrealistic, especially when compared to more easily achievable goals such as 90% market share.

There are two primary considerations that Caret[®]-EV takes into account in the relationship between policy levers and the development of the EV market.

1. All barriers to EV adoption are sociotechnical in nature (see above).
2. Price is the principal barrier to EV adoption, and the main policy influence that the government can address.

An accurate and reliable forecast of the optimal diffusion of EVs in the light-duty vehicle market requires a methodology that accounts for all of the sociotechnical barriers with a balanced policy that combines incentives directed at each barrier.

Supporting Data and Relationships

Light-Duty Vehicle Classification

The definition of light-duty vehicles used in Caret[®]-EV is based on definitions in FRED economic data² and 49 CFR523.2³, and corresponds to the definition used in IRA. To qualify as light-duty, a vehicle must meet all of the following criteria:

- Before model year 2003, gross vehicle weight rating (GVWR) \leq 10,000 lbs. [FRED]
- Model year 2003 and after, GVWR \leq 14,000 lbs. [FRED]
- Not an “incomplete” vehicle [CFR]
- Seating capacity \leq 12 people [CFR]
- Designed for \leq 9 persons seated rearward of the driver [CFR]
- Open cargo area $<$ 72 inches interior length [CFR]

Initial Fleet Characteristics

One of the important inputs to Caret[®]-EV is a census of the current vehicle fleet in a state (or the U.S. as a whole) called the initial model year distribution (IMYD). For a given year, the IMYD lists the number of plug-in electric vehicles (PEVs)⁴ and internal combustion engine vehicles (ICEVs) in the state for each extant vehicle model year; hence, it describes the distribution of vehicle ages in the fleet. The IMYD provides a starting point for projections of the numbers of PEVs and ICEVs going forward, as well as contributing to calculation of the retirement (i.e., removal from the operational fleet) of vehicles in each future year (which depends on the ages of the vehicles).

CSE used vehicle registration and transaction data from the Vermont DMV (supplied by VTrans) and IHS Markit, respectively, to assemble the IMYD for the state. The transaction data were complete through

² See <https://fred.stlouisfed.org/series/DAUTOSA> and <https://fred.stlouisfed.org/series/FLTRUCKSNSA>.

³ See <https://www.govinfo.gov/content/pkg/CFR-2011-title49-vol6/xml/CFR-2011-title49-vol6-sec523-2.xml>.

⁴ The number of plug-in electric vehicles (PEVs) is equal to the sum of battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs). The Caret[®]-EV model includes a phaseout of PHEV availability by 2026, corresponding to current national purchasing and manufacturing trends.

calendar year 2022 and the registration data were complete through calendar year 2021. Caret®-EV then projects the fleet composition forward in time based on the modeled sales for EVs and ICEVs, and using proprietary data-backed relationships established by CSE describing vehicle resale and retirement.

Greenhouse Gas Emissions Levels

The amount of GHG emissions from the light-duty transportation sector for any given year is calculated by Caret®-EV as the sum of emissions derived from the combustion of gasoline in ICEVs⁵ and emissions derived from electricity generation to charge EVs,⁶ following the calculation of the total fuel consumption for each vehicle type.⁷ These two components are summed over the Caret®-EV projections of the light-duty vehicle fleet and added together each year to calculate total annual emissions. By default, the electricity carbon intensity is assumed to start in 2021 at either the national average or the 2021 value in a given state [22], and then decline at a rate of 7% per year thereafter (producing a 30-year decrease of approximately 90%). For Vermont, the starting electricity generation GHG emissions value for 2021 is 0.011 lbs. of CO₂ per kWh.

Scrap-and-Replace (Replace Your Ride)

Caret®-EV uses a multi-step approach to model scrap-and-replace programs like Vermont's Replace Your Ride. First, Caret®-EV calculates the proportion of potential new and used EV buyers who qualify either through the MAGI qualification or the 80% median income qualification in Vermont. Caret®-EV then estimates the proportion of the income-eligible population that has an ICEV that is eligible for the program. That population is filtered again to those who are in the process of selling their ICEV (and are in the market to get a new vehicle) and who have a vehicle with a residual value⁸ less than the scrap-and-replace incentive (otherwise, the model assumes they would sell their ICEV on the used vehicle market). Given the calculations above, the proportion of those who qualify, are in the market to get rid of their ICEV, and have a vehicle with residual value less than the Vermont Replace Your Ride rebate amount is comparatively small. Note that Caret®-EV only models Replace Your Ride in terms of new or used EV adoption and does not account for mode-switching to e-bikes or public transportation.

Zero-Emission Vehicle Mandate and the Advanced Clean Cars II Policy

A ZEV mandate is a legislated requirement that a manufacturer selling vehicles within a given territory must sell enough ZEVs (primarily EVs) to reach, at minimum, a given percentage of overall sales. For

⁵ The carbon intensity of gasoline is 19.37 lbs. of CO₂ per gallon [18].

⁶ Averaged across the U.S., this is 0.855 lbs. of CO₂ per kWh [19] but actual values vary regionally.

⁷ Fuel consumption is calculated by first determining the total energy consumed per vehicle type (EV and ICEV) under assumptions of average vehicle miles traveled (VMT) [20], VMT growth rate [21], ICEV fuel efficiency over time (based on a CSE analysis of the trend over the past 20 years), and an assumed average efficiency of 4 miles per kWh for EVs. These energy consumptions per vehicle type are then multiplied by the total light-duty vehicle fleet sizes (number of vehicles by type) projected by Caret®-EV.

⁸ Residual value is the value of the vehicle given its current age and is calculated in Caret®-EV from distributions of vehicle models, MSRP, and depreciation rates.

example, a 10% ZEV mandate would require all manufacturers to sell ZEVs such that they represent at least 10% of their annual sales by the specified date of enforcement. If a manufacturer was below this threshold, then they would have to either buy ZEV credits from manufacturers above the threshold or pay a non-compliance fee per vehicle below the goal. However, the impact of a ZEV mandate on EV adoption is not always simple to model, given that the reaction to a mandate of any given vehicle manufacturer can be extremely complex and depends on a variety of factors not generally shared outside of that manufacturer [23]. While other models may assume perfect compliance at no additional cost, regardless of realism, Caret®-EV incorporates three steps to model a ZEV mandate:

1. Convert the final ZEV mandate goal to yearly milestones.
2. Determine increases in EV adoption due to:
 - a. Increased manufacturer investment to reduce future EV prices.
 - b. Impact of a non-compliance fee on monthly adoption.
3. Determine the “tipping point” for manufacturers to switch to an “EVs only” strategy.

If the current level of EV diffusion due to existing incentive policies results in EV market share less than the expected market share required to stay on a diffusion pathway that reaches the ZEV mandate goal, there are two primary impacts to EV adoption. First, manufacturers will increase investments to reduce future EV prices and, thus, reduced future compliance costs. Second, manufacturers will reduce the price of EVs by the compliance cost, as they would be neutral between decreasing revenues by the amount or having to pay the non-compliance fee.⁹ This is accomplished in Caret®-EV by modifying the existing learning curve that tracks reductions in EV manufacturing costs to incorporate the manufacturers’ response to the sales pressure applied by the ZEV mandate.

In the case of Vermont, a ZEV mandate approximating the conditions of ACC2¹⁰ was included in the model projections. This ZEV mandate includes the foundational goal of ACC2 (achieving 100% EV market share by 2035 after being implemented in 2026) and evaluates annual EV sales against the yearly milestones defined for ACC2 (see Figure 2) to determine the extent of the \$20,000 per vehicle non-compliance fee. However, it does not capture the full complexity of the interstate market nature of ACC2 – that will be addressed in a future Caret®-EV update.

Participation Rates

By default, Caret®-EV assumes that all eligible consumers (i.e., those who make a qualified vehicle purchase and are income-qualified, and for Replace Your Ride own an eligible scrappable vehicle) will participate in the rebate program. In reality, the number of participants will tend to be smaller due to unpredictable factors (e.g., applicants who do not submit the required paperwork completely or on time, or who do not know about the rebate program or if they are eligible for it, etc.). Thus, a

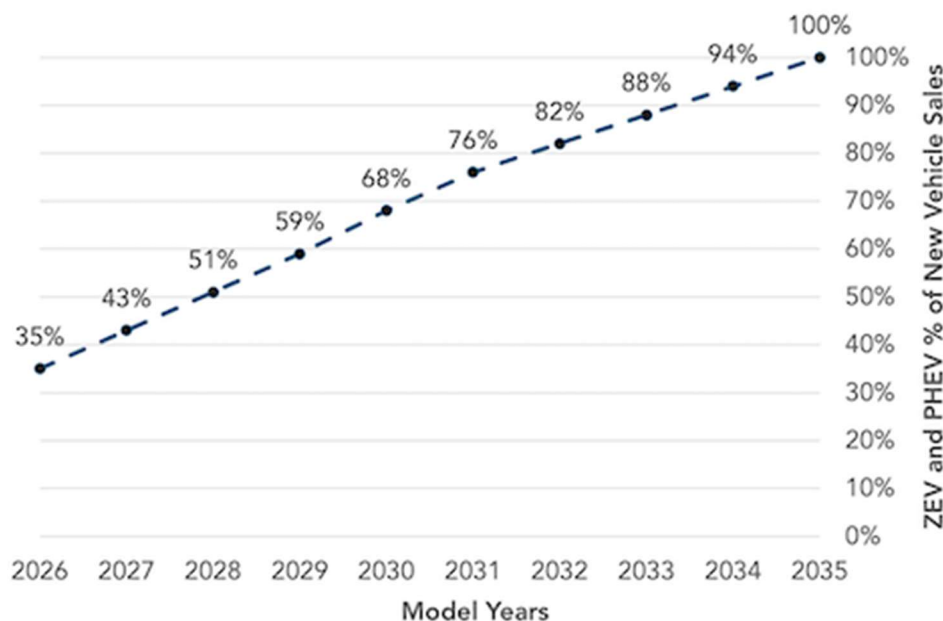
⁹ This assumes that options to purchase discounted ZEV credits from other manufacturers have been exhausted.

¹⁰ See <https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-ii>.

participation rate curve can be applied to the model to account for program non-participation to reflect this real-world behavior.

FIGURE 2

Advanced Clean Cars II Annual Sales Market Share Milestones



Summary of results: Annual ZEV and PHEV percentage of new vehicles sales (i.e., sales market share) milestone goals for Advanced Clean Cars II. Sales figures under these milestones result in a \$20,000 per vehicle non-compliance fee to be levied against the corresponding vehicle manufacturer(s).

Source: California Air Resources Board, 2022

CSE used Vermont rebate program data with corresponding IHS Markit vehicle transaction data to estimate annual participation rates at the end of 2022 of 40% for the New PEV rebate and 23% for the MileageSmart rebate programs.¹¹ CSE used these values as the starting points for sigmoidal participation rate curves (mirroring the expected shape of the EV adoption diffusion curve). For the New PEV rebate, CSE assume a participation rate of approximately 100% is reached by 2035. In the case of the MileageSmart rebate, CSE assumed a final participation rate of 80%, achieved in 2040.¹² The resultant participation rate curves that were applied to the Caret®-EV projections for Vermont are shown in

¹¹ A participation rate was not calculated for Replace Your Ride due to both the small number of program participants in 2022 (10) and the fact that Caret®-EV already calculates an expected participation rate based on a data-backed analysis of the vehicle fleet age and residual value distributions. The probability that a consumer will participate in a scrap-and-replace program is calibrated using participation rates as a function of rebate amount for several past regional trial programs in the United States.

¹² The final participation rate was estimated based on an anticipated lag between the maturation of the new EV market and the used EV market (with the former supplying stock for the latter), as well as personal preferences that might cause purchasers to eschew a rebate in favor of purchasing privately rather than from a dealer (as required to obtain a MileageSmart rebate).

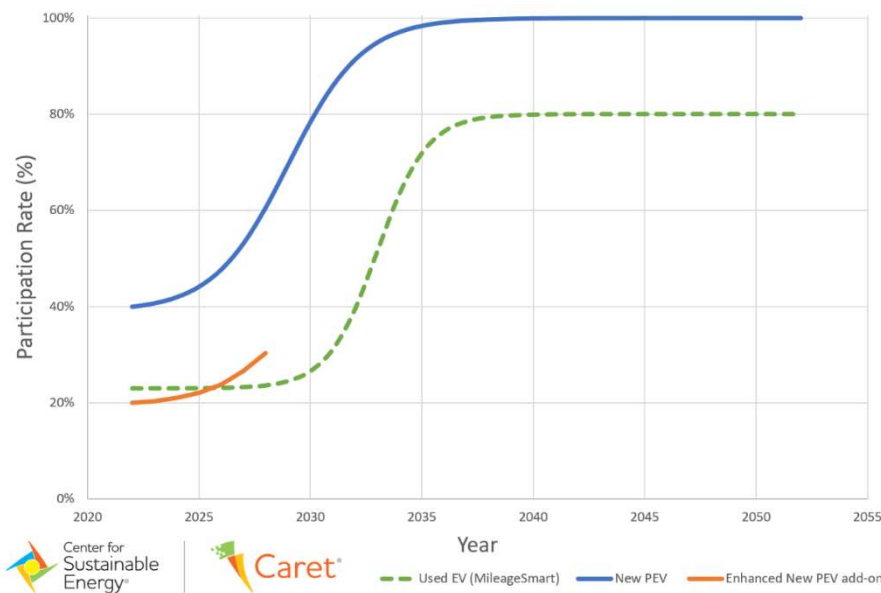
Figure 3. In practice, only the participation rates through 2028 (end of the Vermont rebate programs in the model scenarios) are relevant to the model projections.

The New PEV participation rate curve was confirmed to produce the estimated number of rebates for 2023 (approximately 600) based on the rebate statistics¹³ for both the first 3 months of 2023 as well as the period August 2022 – March 2023. Similarly, the MileageSmart participation rate curve was confirmed to produce the estimated number of rebates for 2023 (approximately 250) based on the corresponding total rebates from 2022. The participation rate for the income-qualified Enhanced Rebate add-on to the Standard New PEV rebate was assumed to follow the shape of the New PEV rebate, but was reduced by 50% (e.g., 20% participation in 2022) to produce projections that match the observed ratio of the Enhanced Rebate to all New PEV rebates in January – March 2023 (approximately 0.4).

The same participation rate curves were used for all three scenarios modelled here; note, however, that the changing parameters of the rebate programs between scenarios could induce changes in participation (e.g., the more generous low income-eligible rebates of Scenarios A and B might be expected to increased participation among that population group, resulting in even higher numbers of Enhanced New PEV and MileageSmart rebates).

FIGURE 3

Estimated Participation Rate Curves



Summary of results: Estimated projections of participation rates in Vermont’s New PEV (upper solid blue curve), Enhanced New PEV add-on (lower orange curve segment), and MileageSmart rebate programs (green dashed curve). See text for details.

Source: Center for Sustainable Energy®, 2023

¹³ From the Drive Electric Vermont dashboard at <https://www.driveelectricvt.com/reports-resources/state-incentive-electric-vehicle-sales-dashboards>.

Description of the Caret[®]-EV Model of IRA

New Vehicles in IRA

In order to accurately predict the outcome of a state PEV rebate program, it is necessary to include the impact within the state of the existing federal rebate program described in IRC 30D¹⁴ and the modifications to it provided by the Inflation Reduction Act of 2022 (IRA).¹⁵ There are three core components of the clean vehicle tax credit provided by the IRA for new vehicle purchases: the North America Assembly requirement, the Critical Minerals tax credit (\$3,750) and the Battery Components tax credit (\$3,750).¹⁶ In order to qualify for either of the tax credits, the vehicle must first comply with the North America Assembly requirement, meaning that the final assembly of the vehicle must occur within North America. Next, to receive the Critical Minerals tax credit, the eligible vehicle's battery must contain a minimum percentage by value of critical minerals extracted or processed in the United States (or a free trade agreement country) or recycled in North America. Likewise, the Battery Components tax credit depends on whether the eligible vehicle's battery meets a specified threshold of components manufactured or assembled in North America based on their value. See Table 1 for the respective requirements as outlined in the IRA.

In order to determine the impact of IRA in a state, the essential question is, "What proportion of new EV sales in the state will qualify for the assembly requirement and the respective tax credit minimum requirements?" First, CSE calculated the current proportion of vehicle sales for the remainder of 2022 that would qualify under both the pre-existing OEM production cap of IRC 30D and the new North America Assembly requirement of IRA¹⁷ (which was enacted as soon as the bill was signed into law by President Biden on 16 Aug 2022). As a result, only approximately 4% of EV sales were eligible for the remainder of 2022.

Starting in 2023, however, those OEM production caps were lifted, so CSE reanalyzed the proportion of vehicle sales under only the IRA North America Assembly requirement, resulting in 20% of EV sales being eligible. To project forward, CSE used recent announcements of accelerated domestic production plans from Kia, Hyundai, and other OEMs (e.g., [25][26]) to estimate the eligible EV sales in 2024 (27%) based on their current contributions to total EV sales. Finally, given that the current proportion of total vehicles (i.e., ICEV+EV) assembled in North America and sold in the U.S. is 90%,¹⁸ CSE manually regressed

¹⁴ See <https://www.irs.gov/businesses/plug-in-electric-vehicle-credit-irc-30-and-irc-30d>.

¹⁵ See <https://www.congress.gov/bill/117th-congress/house-bill/5376/text>.

¹⁶ Vehicle MSRP caps and purchaser income caps also affect eligibility to receive any IRA rebate.

¹⁷ This was accomplished by comparing IHS Markit transaction data from 2021 with the list of EVs provided by the U.S. Department of Energy Alternative Fuels Data Center (<https://afdc.energy.gov/laws/electric>) that meet the North America Assembly requirement of IRA and either had or had not already exceeded the OEM production cap of IRC 30D.

¹⁸ Currently, vehicles that are manufactured in North America and sold in the U.S. account for approximately 65% (U.S.) + 16% (Mexico) + 9% (Canada) = 90% of the U.S. market. See, respectively, [27][28][29].

these data points to project a quasi-sigmoidal curve of increasing EV eligibility over time that passes through 50% in 2025 and tops out at 90% in 2028 (see Figure 4).

TABLE 1

Minimum Requirements for IRA Tax Credits

Percentage of Total Value of Qualified Components

Year	Critical Minerals Requirement	Battery Components Requirement
2023	40% (Excluded Entities allowed)	50% (Excluded Entities allowed)
2024	50% (Excluded Entities allowed)	60%
2025	60%	60%
2026	70%	70%
2027	80%	80%
2028	80%	90%
2029	80%	100%
2030	80%	100%
2031	80%	100%
2032	80%	100%

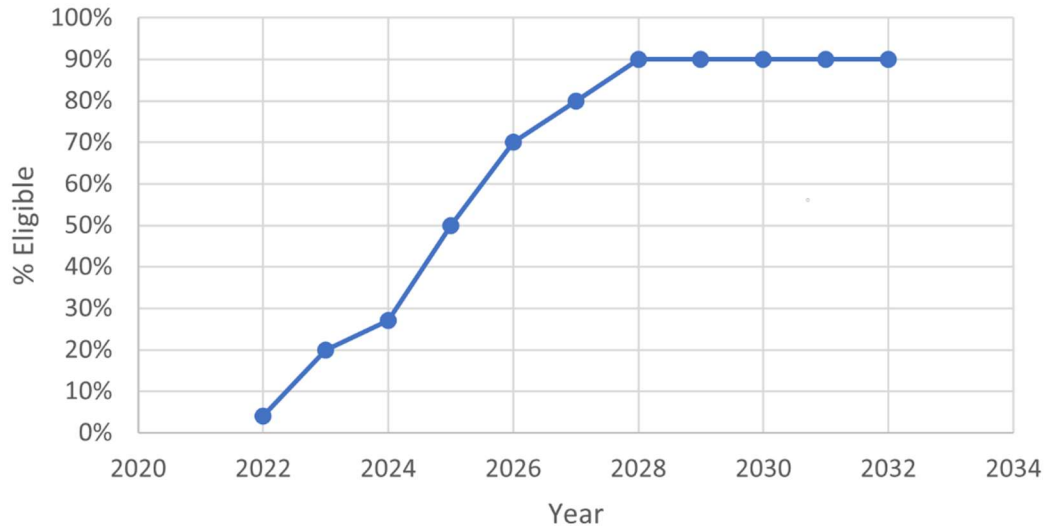
Summary of results: Percentage value of mineral and battery components required for IRA tax credits.

Source: Inflation Reduction Act of 2022

The proportion of EVs that would qualify for the Critical Minerals requirement is less clear due to the fact that there is no publicly available data indicating whether critical minerals in EV batteries were extracted or processed domestically or abroad [30]. CSE estimated the initial rate of critical mineral eligibility (10% for 2023) based on various published estimates of current mineral extraction and processing sites; for example, that as much as 85% of all rare earth mineral processing and a majority of critical mineral extraction currently takes place in China (e.g., [31][32][33]). This rate was kept constant for 2024 since increases in domestic mineral extraction and processing are likely to be at least offset by the activation of the “Excluded Entities” provision of the IRA in 2024, which disqualifies any clean vehicle whose battery contains critical minerals that were extracted, processed, or recycled in China (as well as some other locations that do not contribute significantly to the supply chain). From there, CSE assumed that there would be a sigmoidal qualification rate, mirroring a typical diffusion curve, that reaches 100% by 2030 (see Figure 5).

FIGURE 4

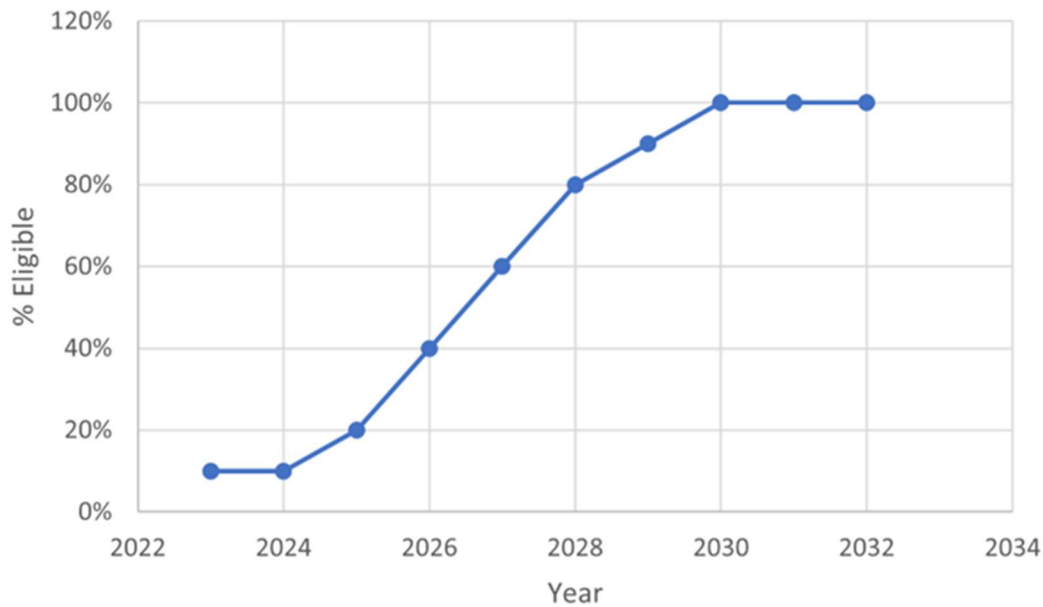
Estimated North America Assembly Eligible Vehicle Sales



Summary of results: Percentage of vehicles expected to be eligible under the IRA North America Assembly requirement.
Source: Center for Sustainable Energy®, 2022

FIGURE 5

Estimated Critical Minerals Eligible Vehicle Sales



Summary of results: Percentage of vehicles projected to be eligible under the IRA North America Assembly requirement.
Source: Center for Sustainable Energy®, 2022

Finally, to estimate the eligibility compliance with the IRA Battery Components requirement, CSE calculated the current breakdown of EV battery components by value (e.g., cathodes, anodes, battery cells, housing, etc.) as well as the current fraction of U.S. demand that could be met by current U.S. production for each component [34][35][36][37][38]. This yielded the current proportion of battery components by value that are manufactured or assembled in the U.S., which resulted in an estimate of 51% on average. Considering that the minimum percentage requirement from the IRA in 2023 is 50%, one interpretation is that, on average, approximately one-half of the EVs would qualify, and the other half would not. Moreover, while increases in domestic battery component compliance are projected, reaching 100% by 2032, the IRA minimum threshold requirements also increase at approximately the same rate, meaning the projected average of domestic battery component value and the requirement remain comparable through 2032. Consequently, CSE assumes that 50% of the EVs are expected to qualify throughout the lifetime of the tax credit.

The Treasury Department guidance from late-December 2022¹⁹ that delayed enforcement of the critical minerals and battery component requirements until April 2023 (as well as the explanation of the incremental cost of commercial vehicles) is incorporated into the Caret®-EV model framework. Additional guidance provided by the Treasury Department in the future will be incorporated as it arises, and impacts will be seen in future Caret®-EV projections as sales data become available.

Used Vehicles in IRA

The IRA Used EV incentive is 30% of the transaction price, up to a maximum of \$4,000. In addition, there are several requirements and criteria that apply to the IRA Used EV program. This includes a maximum vehicle price of \$25,000, a MAGI-based income cap that differs from the income cap for the IRA New EV incentive (\$75,000 if filing single; \$112,500 if filing head of household; \$150,000 if filing joint), and a minimum vehicle age of 2 years. In addition, the used EV must be purchased from a qualified seller (typically a dealer) and cannot have been used to receive the incentive previously. To model this in Caret®-EV, these requirements were applied to historic used EV sales to determine the weighted average expected incentive value. Next, this data set of historic used EV sales was filtered to the sales that met the criteria of minimum vehicle age, maximum vehicle price, and income-qualified buyers. Then these numbers were scaled down based on the proportion of sales that came from qualified sellers and had not been resold before.

Commercial Vehicles in IRA

The IRA commercial EV incentive (codified in IRC 45W²⁰) is calculated as the lesser of a percentage of the MSRP (30% for BEVs, 15% for PHEVs) and the “Incremental Purchase Cost”, up to a maximum of \$7,500. The “Incremental Purchase Cost” is a methodology developed by the Department of Energy to quantify

¹⁹ See <https://home.treasury.gov/news/press-releases/jy1179> and <https://www.irs.gov/newsroom/topic-c-frequently-asked-questions-about-when-the-new-requirements-apply-to-the-new-clean-vehicle-credit>.

²⁰ See <https://www.irs.gov/credits-deductions/commercial-clean-vehicle-credit>.

up front cost parity between ICEVs and PEVs.²¹ The incremental cost is calculated as the sum of two cost factors: (1) the dollar difference between an EV powertrain and an equivalent conventional powertrain, and (2) the battery total energy (kWh) multiplied by the battery price (\$/kWh). CSE projected the incremental cost through the last year of the IRA to incorporate the expected declining costs of powertrain and battery production. Based on these criteria, an average expected incentive was calculated. This calculation was done for specific makes and models of EVs identified as commercial vehicles by DOE. The vehicles in this list were then extracted from historic IHS Markit transaction data to create a corresponding sales distribution. The average aggregated incentive based on this distribution was then used to determine the total number of commercial EVs incentivized and the corresponding cost of the incentive.

Caret®-EV also models the impact of the IRA “leasing loophole” announced in late-December 2022, which defined light-duty passenger vehicles purchased to lease to consumers as qualified commercial clean vehicles subject to IRC 45W instead of IRC 30D, thereby making them exempt from the North America assembly, critical minerals, and battery components eligibility requirements [24].

Description of Modeled Scenarios

CSE used Caret®-EV to project model outcomes for the proposed Vermont PEV rebate program scenarios described in Table 2.

TABLE 2

Model Scenario Descriptions

Property	Baseline Scenario	Scenario A	Scenario B	
General Description	Current program, scheduled to end on 30 June 2023	Modified program, scheduled to start on 1 July 2023	Proposed two-phase program based on Scenario A with changes after 2025	
Model Date Range^a	1 Jan 2023 – 31 Dec 2028	1 Jul 2023 – 31 Dec 2028	1 Jul 2023 – 31 Dec 2025	1 Jan 2026 – 31 Dec 2028
New PEV Amount (BEV/PHEV)	\$2500/\$1500	\$3000/\$1500	\$3000/\$1500	\$3000/\$1500
New PEV Income Caps (S/HH/J)^b	\$100k/\$100k/\$125k	\$100k/\$125k/\$150k	\$100k/\$125k/\$150k	\$60k/\$75k/\$90k

²¹ See <https://www.energy.gov/sites/default/files/2022-12/2022.12.23%202022%20Incremental%20Purchase%20Cost%20Methodology%20and%20Results%20for%20Clean%20Vehicles.pdf>.

Property	Baseline Scenario	Scenario A	Scenario B	
New PEV MSRP Caps (BEV/PHEV)	\$45k/\$40k	\$50k/\$50k	\$50k/\$50k	\$50k/\$50k
Enhanced New PEV Amount (BEV/PHEV)	\$1500/\$1500	\$2000/\$1500	\$2000/\$1500	\$2000/\$1500
Enhanced New PEV Income Caps (S/HH/J)^b	\$50k/\$50k/\$75k	\$60k/\$75k/\$90k	\$60k/\$75k/\$90k	\$60k/\$75k/\$90k
Enhanced New PEV MSRP Caps (BEV/PHEV)	\$45k/\$40k (same as New PEV MSRP Caps)	\$50k/\$50k (same as New PEV MSRP Caps)	\$50k/\$50k (same as New PEV MSRP Caps)	\$50k/\$50k (same as New PEV MSRP Caps)
MileageSmart Amount	25% of sale price up to \$5000	25% of sale price up to \$5000	25% of sale price up to \$5000	25% of sale price up to \$5000
MileageSmart Income Caps	At or below 80% of State Median Income	At or below 80% of State Median Income	At or below 80% of State Median Income	At or below 80% of State Median Income
MileageSmart MSRP Caps (BEV/PHEV)	None (but rebate amount is based on MSRP - see above)	None (but rebate amount is based on MSRP - see above)	None (but rebate amount is based on MSRP - see above)	None (but rebate amount is based on MSRP - see above)
Replace Your Ride (RZR) Amount	\$3000	\$5000	\$5000	\$5000
RZR Income Caps (S/HH/J)^b	<ul style="list-style-type: none"> If new PEV is purchased: \$50k/\$50k/\$75k (same as Enhanced New PEV Income Caps) If used PEV is purchased: at or below 80% of State Median Income (same as MileageSmart Income Caps) 	<ul style="list-style-type: none"> If new PEV is purchased: \$60k/\$75k/\$90k (same as Enhanced New PEV Income Caps) If used PEV is purchased: at or below 80% of State Median Income (same as MileageSmart Income Caps) 	<ul style="list-style-type: none"> If new PEV is purchased: \$60k/\$75k/\$90k (same as Enhanced New PEV Income Caps) If used PEV is purchased: at or below 80% of State Median Income (same as MileageSmart Income Caps) 	<ul style="list-style-type: none"> If new PEV is purchased: \$60k/\$75k/\$90k (same as Enhanced New PEV Income Caps) If used PEV is purchased: at or below 80% of State Median Income (same as MileageSmart Income Caps)
RZR MSRP Caps (BEV/PHEV)	<ul style="list-style-type: none"> If new PEV is purchased: \$45k/\$40k (same as New PEV MSRP Caps) 	<ul style="list-style-type: none"> If new PEV is purchased: \$50k/\$50k (same as New PEV MSRP Caps) 	<ul style="list-style-type: none"> If new PEV is purchased: \$50k/\$50k (same as New PEV MSRP Caps) 	<ul style="list-style-type: none"> If new PEV is purchased: \$50k/\$50k (same as New PEV MSRP Caps)

Property	Baseline Scenario	Scenario A	Scenario B	
	<ul style="list-style-type: none"> If used PEV is purchased: none (same as MileageSmart MSRP Caps) 	<ul style="list-style-type: none"> If used PEV is purchased: none (same as MileageSmart MSRP Caps) 	<ul style="list-style-type: none"> If used PEV is purchased: none (same as MileageSmart MSRP Caps) 	<ul style="list-style-type: none"> If used PEV is purchased: none (same as MileageSmart MSRP Caps)
Include VT Utility Incentives?^c	Yes	Yes	Yes	Yes
Include IRA Rebates?	Yes	Yes	Yes	Yes
Include Preliminary ZEV Mandate Treatment of Advanced Clean Cars II?	Yes	Yes	Yes	Yes
Notes	<p>These conditions apply to all scenarios:</p> <ul style="list-style-type: none"> An initial tranche of \$15.3M (i.e., \$18M less 15% administrative costs) was available to fund the rebate programs starting on 1 Jan 2023. In the FY prior to the calendar year and month in which the original \$15.3M will run out, an additional \$15.3M will be requested and made available for use when the original tranche runs out. Thus, the total available budget is \$30.6M. 			

^a Scenarios will end before the end of the model date range if funding runs out. In the case of the Baseline Scenario, the model projections are a “what if?” scenario in which the current rebate programs continue unchanged past the end of June 2023.

^b S/HH/J refers to tax filing status: single, head-of-household, or joint/married.

^c The utility incentive is a weighted average of PEV rebates offered to customers of Vermont State Employees Credit Union and various electric utilities in Vermont (listed at <https://www.driveelectricvt.com/incentives>), accounting for service area customer bases and likely uptake of the incentive by customers. In total, it amounts to an average of approximately \$1200 for a new EV and \$440 for a used EV.

Summary of results: Descriptions of the Vermont PEV rebate program scenarios modeled with Caret[®]-EV.

Source: Center for Sustainable Energy[®], 2023

Modeling Analysis Results

Summary results from the Caret[®]-EV projections for new PEV sales and associated fleet characteristics are provided in Tables 3-7 and Figures 6-12. Several results of note are discussed below.

Replace Your Ride Participation

In three months of 2022 (Oct-Dec), ten ICEVs were scrapped in Vermont’s Replace Your Ride program. This implies an order of magnitude larger participation rate than the contemporaneous number predicted by Caret[®]-EV for the Baseline Scenario (see Table 4). This could be due to differences in the probability of scrapping that is used in Caret[®]-EV (which is an average derived from data from a number

of similar past programs in various states) and the specific (currently unknown) value localized to Vermont and the Replace Your Ride program (e.g., an effective marketing campaign raising public awareness in Vermont could contribute to - or even account for - the difference in consumer utilization of the program). In any case, even if the Caret®-EV projections were inflated by a factor of ten, the total cumulative cost of Replace Your Ride over the program lifetime would be less than 1% of the total sum cost of the entire suite of Vermont's PEV rebate programs (New PEV, MileageSmart, and Replace Your Ride).

End-of-Funding Dates

Table 7 contains estimates of the dates when the available funding for Vermont's rebate programs will run out. The initial tranche of \$15.3M is expected to run out during the months of August 2026 for the Baseline Scenario, March 2026 for Scenario A, and April 2026 for Scenario B. Assuming the second tranche of \$15.3M is immediately available, then these funds will be exhausted during the months of February 2028 for the Baseline Scenario, August 2027 for Scenario A, and November 2027 for Scenario B.

The final cumulative totals listed in Table 7 exceed the available total of \$30.6M because they indicate the amount needed to completely fund the indicated end-of-funding months. For example, in the case of the Baseline Scenario, the available funding is exhausted approximately 19 days into February 2028. Funding the remainder of this month would cost approximately \$400,000, bringing the cumulative program total to the \$31.00M listed in Table 7. Similar situations hold for the other scenarios.

For Scenario A, the available funding is exhausted approximately 19 days into August 2027. Funding the remainder of this month would cost approximately \$480,000, bringing the cumulative program total to the \$31.08M listed in Table 7.

For Scenario B, the available funding is exhausted approximately 10 days into November 2027. Funding the remainder of this month would cost approximately \$700,000, bringing the cumulative program total to the \$31.30M listed in Table 7.

In order to avoid ending the rebate programs mid-month, CSE recommends planning to close the programs at the end of the month previous to the indicated end-of-funding months (i.e., July 2027 instead of August 2027 for Scenario A or October 2027 instead of November 2027 for Scenario B).

TABLE 3

Vehicle Fleet Projections

Year	New PEV Sales Market Share ^a			PEV Fleet Share ^b			Total Registered PEVs ^c			GHG Emissions Level (MMT CO ₂ e)		
	Base-line	A	B	Base-line	A	B	Base-line	A	B	Base-line	A	B
2023	7.9%	7.9%	7.9%	1.3%	1.3%	1.3%	12,163	12,175	12,175	2.64	2.64	2.64
2024	9.0%	9.1%	9.1%	1.8%	1.8%	1.8%	15,892	15,934	15,934	2.61	2.61	2.61
2025	10.7%	10.8%	10.8%	2.3%	2.3%	2.3%	20,372	20,469	20,469	2.59	2.59	2.59
2026	15.7%	16.0%	16.0%	3.0%	3.0%	3.0%	26,982	27,194	27,160	2.56	2.56	2.56
2027	24.0%	24.1%	24.1%	3.9%	3.9%	3.9%	37,016	37,276	37,237	2.52	2.52	2.52
2028	35.9%	35.8%	35.8%	5.3%	5.3%	5.3%	52,142	52,367	52,321	2.46	2.46	2.46
2029	51.1%	51.0%	51.0%	7.4%	7.4%	7.4%	73,817	73,993	73,939	2.38	2.38	2.38
2030	67.6%	67.5%	67.5%	10.4%	10.4%	10.4%	102,514	102,658	102,596	2.27	2.27	2.27
2035	97.8%	97.9%	97.9%	34.7%	34.7%	34.7%	294,426	294,615	294,552	1.49	1.49	1.49
2050	99.9%	99.9%	99.9%	85.3%	85.3%	85.3%	658,876	659,032	658,945	0.21	0.20	0.20

^a This is the fraction of all light-duty sales in the state represented by PEVs. In the context of the Caret®-EV model, “PEVs” represents the sum of battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs). The Caret®-EV model includes a phaseout of PHEV availability by 2026, corresponding to current national purchasing and manufacturing trends.

^b This is the fraction of the operational (“on the road”) light-duty fleet in the state that is represented by PEVs.

^c This is the total number of light-duty PEVs “on the road”, accounting for pre-existing PEVs, purchased and resold PEVs, and retired (removed from service) PEVs.

Summary of results: Characteristics of the light-duty vehicle fleet in Vermont as projected by Caret®-EV for the proposed rebate programs.

Source: Center for Sustainable Energy®, 2023

TABLE 4

Annual Number of Vehicles Incentivized

Year	New PEV ^a									Used EV			Scrapped ICEV		
	VT Additionality ^b			VT Program ^c			Total Sold ^d			Base-line	A	B	Base-line	A	B
	Base-line	A	B	Base-line	A	B	Base-line	A	B						
2023	27	38	38	510	563	563	3,321	3,333	3,333	246	246	246	1	5	5
2024	68	96	96	615	681	681	3,885	3,915	3,915	342	343	343	1	5	5
2025	133	187	187	781	869	869	4,688	4,744	4,744	444	446	446	1	10	10
2026	1,409	1,520	1,487	1,242	1,388	933	6,899	7,013	6,980	570	573	573	1	28	28
2027	3,725	3,769	3,764	2,092	1,471	1,272	10,427	10,474	10,469	741	508	632	3	47	57
2028	7,138	7,100	7,093	527	--	--	15,656	15,622	15,614	158	--	--	2	--	--
2029	11,829	11,787	11,779	--	--	--	22,369	22,332	22,324	--	--	--	--	--	--
2030	16,675	16,637	16,629	--	--	--	29,665	29,633	29,625	--	--	--	--	--	--
2035	21,530	21,546	21,550	--	--	--	43,526	43,572	43,535	--	--	--	--	--	--
2050	4,887	4,886	4,886	--	--	--	43,747	43,748	43,747	--	--	--	--	--	--

^a In the context of the Caret®-EV model, "PEVs" represents the sum of battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs). The Caret®-EV model includes a phaseout of PHEV availability by 2026, corresponding to current national purchasing and manufacturing trends.

^b This is the annual number of new EVs whose purchase was motivated by the general improvement to the EV ecosystem and diffusion pathway caused by the existence of state rebates. Note that sales of new EVs that would not have happened without the VT rebate program continue even after the end of the program due to its early impact on transitioning the EV market in VT onto an accelerated diffusion path.

^c This is the annual number of new EVs directly incentivized by VT, irrespective of receiving an IRA rebate.

^d This is the annual number of new EVs purchased in VT, irrespective of receiving a VT or IRA rebate.

Summary of results: Caret®-EV projections of annual numbers of vehicles incentivized by each of the rebate categories in the proposed program.

Source: Center for Sustainable Energy®, 2023

TABLE 5

Cumulative Number of Vehicles Incentivized from 2023

Year	New PEV ^a									Used EV			Scrapped ICEV		
	VT Additionality ^b			VT Program ^c			Total Sold ^d								
	Base-line	A	B	Base-line	A	B	Base-line	A	B	Base-line	A	B	Base-line	A	B
2023	27	38	38	510	563	563	3,321	3,333	3,333	246	246	246	1	5	5
2024	94	134	134	1,125	1,244	1,244	7,206	7,248	7,248	589	589	589	2	10	10
2025	227	320	320	1,906	2,113	2,113	11,894	11,991	11,991	1,033	1,035	1,035	3	19	19
2026	1,636	1,841	1,807	3,148	3,501	3,046	18,793	19,005	18,971	1,603	1,608	1,608	4	47	47
2027	5,361	5,610	5,571	5,240	4,972	4,318	29,219	29,479	29,440	2,344	2,116	2,240	7	93	104
2028	12,498	12,709	12,663	5,766	4,972	4,318	44,875	45,100	45,054	2,502	2,116	2,240	9	93	104
2029	24,327	24,497	24,442	5,766	4,972	4,318	67,244	67,432	67,378	2,502	2,116	2,240	9	93	104
2030	41,002	41,134	41,072	5,766	4,972	4,318	96,909	97,065	97,003	2,502	2,116	2,240	9	93	104
2035	146,896	147,046	146,990	5,766	4,972	4,318	301,457	301,685	301,588	2,502	2,116	2,240	9	93	104
2050	317,237	317,483	317,338	5,766	4,972	4,318	959,612	960,002	959,816	2,502	2,116	2,240	9	93	104

^a In the context of the Caret®-EV model, "PEVs" represents the sum of battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs). The Caret®-EV model includes a phaseout of PHEV availability by 2026, corresponding to current national purchasing and manufacturing trends.

^b This is the cumulative number of new EVs whose purchase was motivated by the general improvement to the EV ecosystem and diffusion pathway caused by the existence of state rebates. Note that sales of new EVs that would not have happened without the VT rebate program continue even after the end of the program due to its early impact on transitioning the EV market in VT onto an accelerated diffusion path.

^c This is the cumulative number of new EVs directly incentivized by VT, irrespective of receiving an IRA rebate.

^d This is the cumulative number of new EVs purchased in VT, irrespective of receiving a VT or IRA rebate.

Summary of results: Caret®-EV projections of cumulative numbers of vehicles incentivized by each of the rebate categories in the proposed program starting from 2023.

Source: Center for Sustainable Energy®, 2023

TABLE 6

Annual Program Costs (in \$M)

Year	New PEV			MileageSmart			Replace Your Ride			Total		
	Baseline	A	B	Baseline	A	B	Baseline	A	B	Baseline	A	B
2023	1.36	1.88	1.88	1.34	1.34	1.34	0.003	0.025	0.025	2.70	3.25	3.25
2024	1.73	2.43	2.43	1.86	1.87	1.87	0.003	0.023	0.023	3.59	4.32	4.32
2025	2.31	3.29	3.29	2.42	2.43	2.43	0.003	0.048	0.048	4.73	5.77	5.77
2026	3.85	5.57	4.20	3.10	3.12	3.12	0.003	0.138	0.138	6.96	8.83	7.46
2027	6.49	5.91	5.73	4.03	2.76	3.44	0.009	0.233	0.285	10.53	8.91	9.46
2028	1.63	--	--	0.86	--	--	0.006	--	--	2.50	--	--

Summary of results: Caret®-EV projections of annual numbers of vehicles incentivized by each of the rebate categories in the proposed program.

Source: Center for Sustainable Energy®, 2023

TABLE 7

Cumulative Program Costs (in \$M)

Year	New PEV			MileageSmart			Replace Your Ride			Total (End-of-Funding Month) ^a		
	Baseline	A	B	Baseline	A	B	Baseline	A	B	Baseline	A	B
2023	1.36	1.88	1.88	1.34	1.34	1.34	0.003	0.025	0.025	2.70	3.25	3.25
2024	3.08	4.32	4.32	3.20	3.21	3.21	0.006	0.048	0.048	6.29	7.57	7.57
2025	5.39	7.61	7.61	5.62	5.63	5.63	0.009	0.096	0.096	11.01	13.34	13.34
2026	9.24	13.18	11.81	8.72	8.75	8.75	0.012	0.234	0.234	17.97 (Aug 2026)	22.17 (Mar 2026)	20.80 (Apr 2026)
2027	15.73	19.08	17.54	12.76	11.52	12.20	0.021	0.467	0.519	28.50	31.08 (Aug 2027)	31.30 (Nov 2027)
2028	17.36	--	--	13.62	--	--	0.027	--	0.629	31.00 (Feb 2028)	--	--

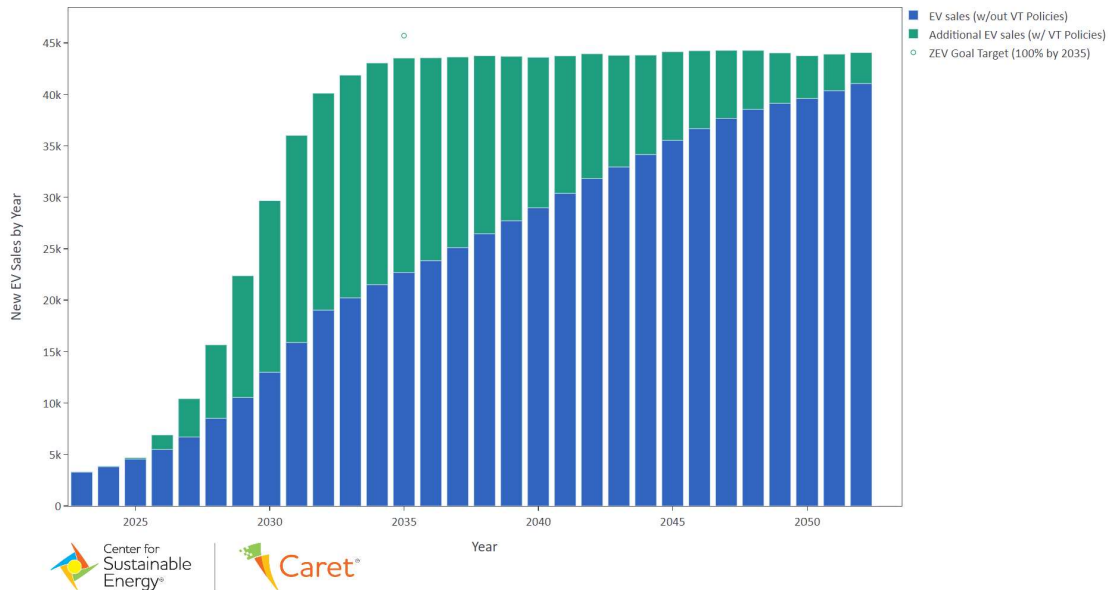
^a The associated cumulative costs include funding the entire end-of-funding month and may exceed the total budget of \$30.6M - see text for discussion.

Summary of results: Caret®-EV projections of annual numbers of vehicles incentivized by each of the rebate categories in the proposed program.

Source: Center for Sustainable Energy®, 2023

FIGURE 6

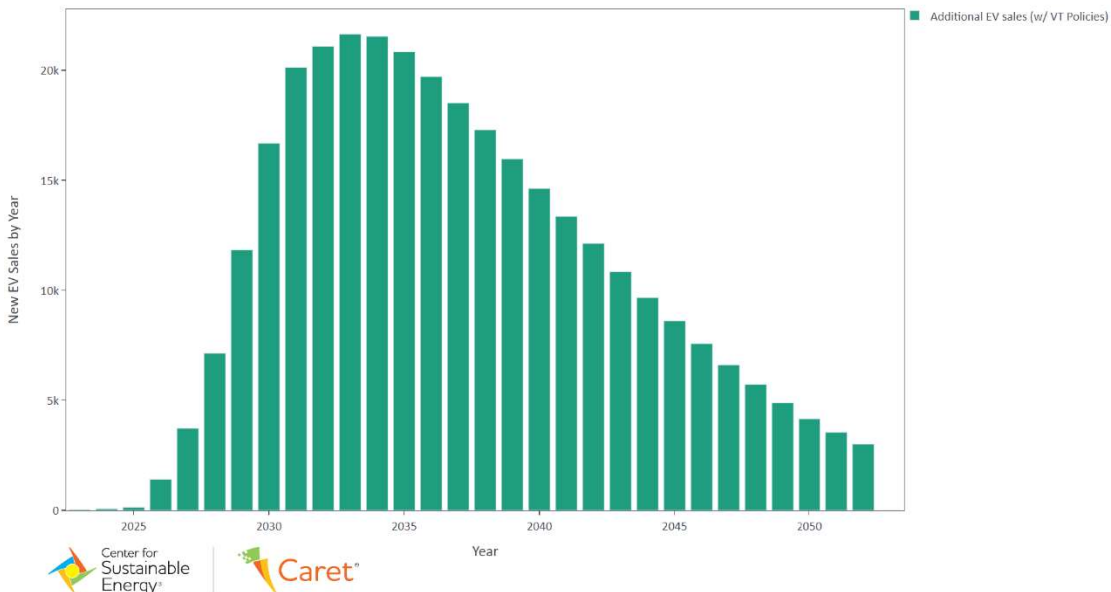
Baseline Scenario: Annual New PEV Sales from VT Rebate Program Including IRA



Summary of results: Vermont’s new EV sales by year resulting from current federal rebates and state rebates including the impact of ACC2. The lower blue section of each bar includes the federal IRA rebates, while the upper green section of each bar indicates the EV sales that were motivated by the general improvement to the EV ecosystem and diffusion pathway caused by the existence of the state rebates.
Source: Center for Sustainable Energy®, 2023

FIGURE 7

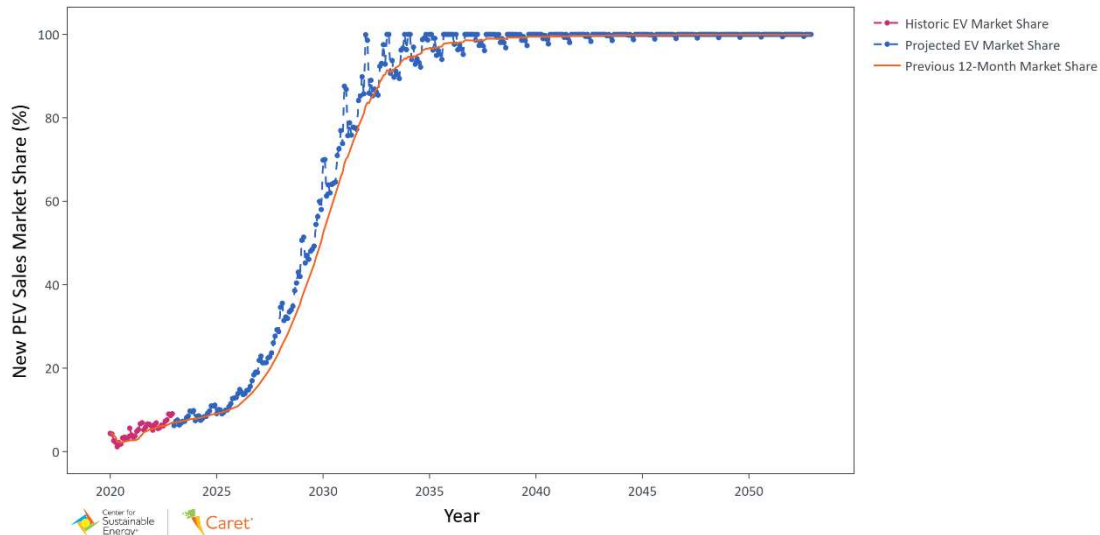
Baseline Scenario: Annual New PEV Sales from only VT Rebate Program



Summary of results: Vermont’s new EV sales by year that were motivated by the general improvement to the EV ecosystem and diffusion pathway caused by the existence of the state rebates, including the impact of ACC2.
Source: Center for Sustainable Energy®, 2023

FIGURE 8

Baseline Scenario: Monthly New PEV Sales Market Share

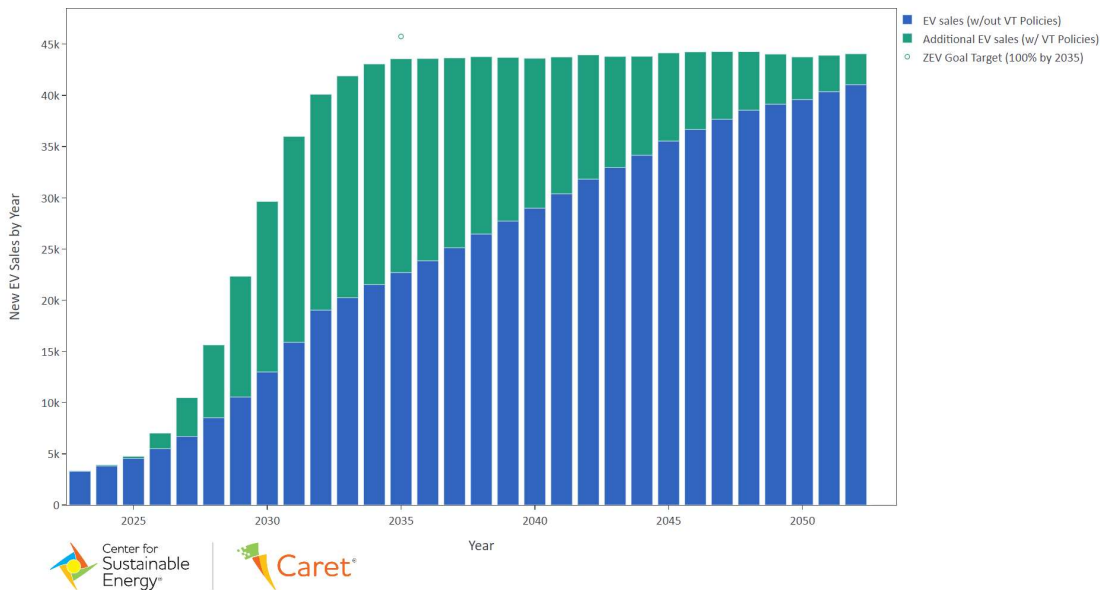


Summary of results: The historic and projected monthly new PEV sales market share in Vermont for the Caret®-EV model of the Baseline Scenario. The overall sigmoidal shape characteristic of diffusion of innovations is visible, as are smaller “wiggles” corresponding to the annual seasonality cycle of vehicle purchases. The market share projections for Scenarios A and B are almost indistinguishable from this one, so they are not presented.

Source: Center for Sustainable Energy®, 2023

FIGURE 9

Scenario A: Annual New PEV Sales from VT Rebate Program Including IRA

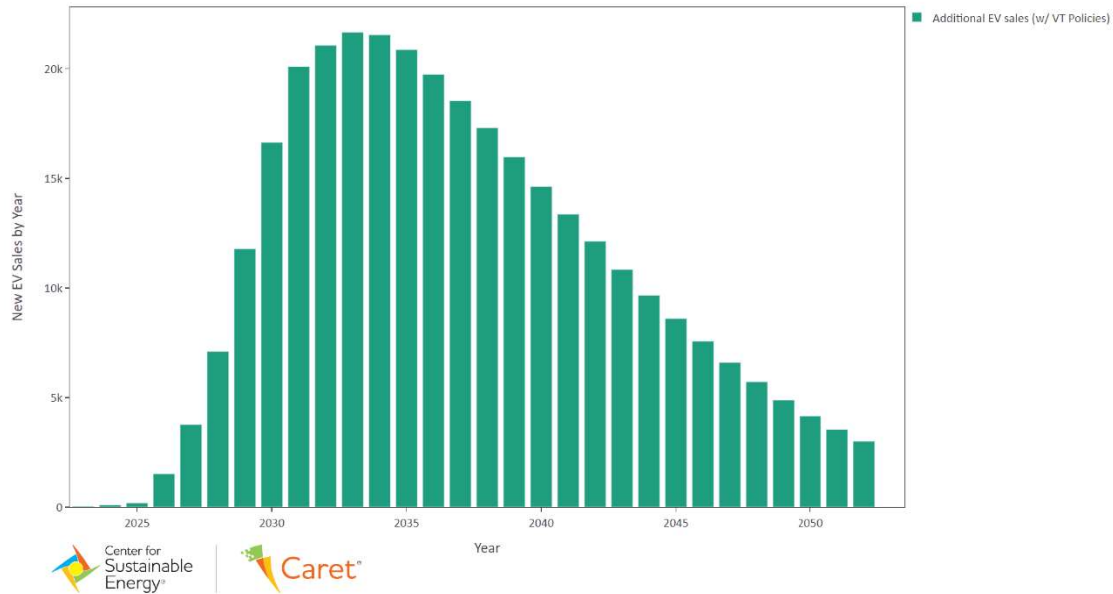


Summary of results: Vermont’s new EV sales by year resulting from current federal rebates and state rebates including the impact of ACC2. The lower blue section of each bar includes the federal IRA rebates, while the upper green section of each bar indicates the EV sales that were motivated by the general improvement to the EV ecosystem and diffusion pathway caused by the existence of the state rebates.

Source: Center for Sustainable Energy®, 2023

FIGURE 10

Scenario A: Annual New PEV Sales from only VT Rebate Program

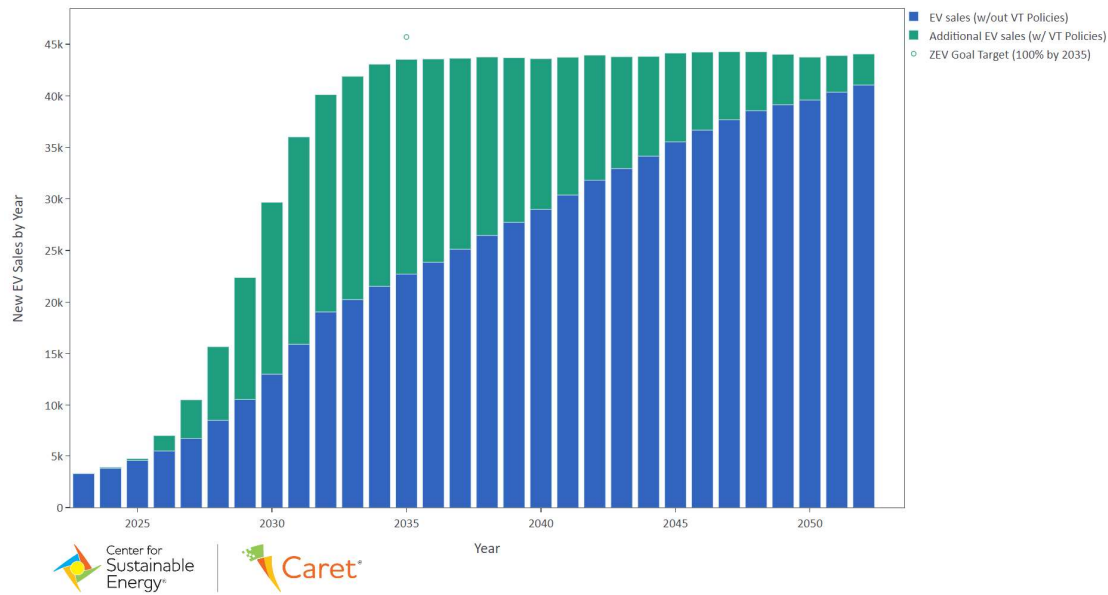


Summary of results: Vermont’s new EV sales by year that were motivated by the general improvement to the EV ecosystem and diffusion pathway caused by the existence of the state rebates, including the impact of ACC2.

Source: Center for Sustainable Energy®, 2023

FIGURE 11

Scenario B: Annual New PEV Sales from VT Rebate Program Including IRA

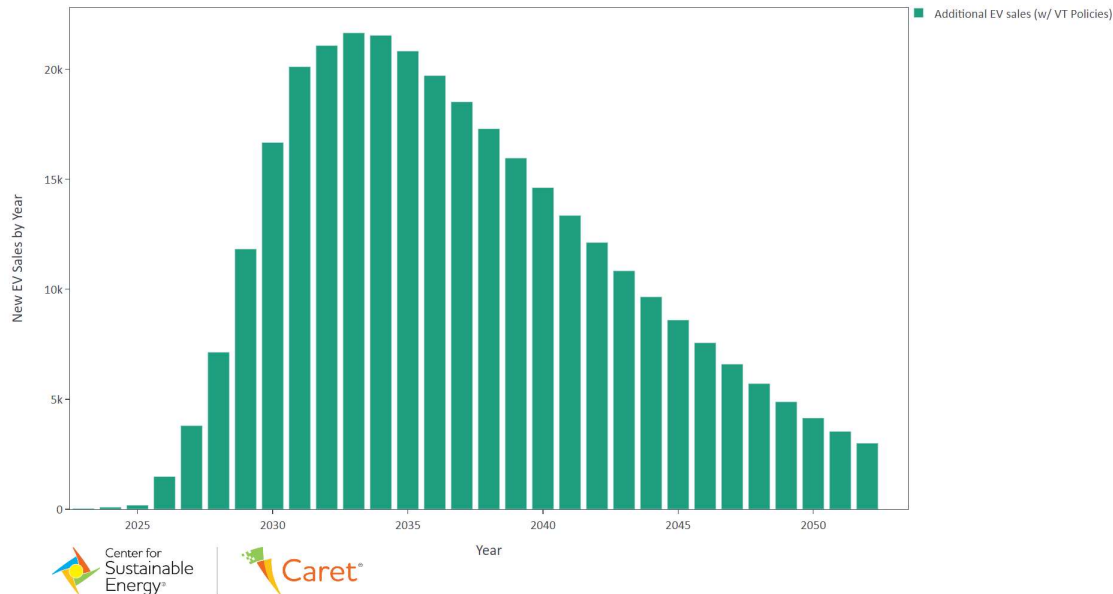


Summary of results: Vermont’s new EV sales by year resulting from current federal rebates and state rebates including the impact of ACC2. The lower blue section of each bar includes the federal IRA rebates, while the upper green section of each bar indicates the EV sales that were motivated by the general improvement to the EV ecosystem and diffusion pathway caused by the existence of the state rebates.

Source: Center for Sustainable Energy®, 2023

FIGURE 12

Scenario B: Annual New PEV Sales from only VT Rebate Program



Summary of results: Vermont’s new EV sales by year that were motivated by the general improvement to the EV ecosystem and diffusion pathway caused by the existence of the state rebates, including the impact of ACC2.

Source: Center for Sustainable Energy®, 2023

Vermont PEV Rebate Program Goals

The goals of Vermont’s PEV rebate program are ultimately defined in terms of reductions in GHG emissions in the state. The primary goals are as follows:

- **State of Vermont National Electric Vehicle Infrastructure (NEVI) Plan:**²² Increase total EV registrations across all vehicle classes to 27,000 by 2025 and 126,000 by 2030.
- **Advanced Clean Cars II:** Increase annual new EV market share to 100% by 2035.
- **Initial Vermont Climate Action Plan (IVCAP):**²³ The gross annual GHG emissions reductions required by 2025 are 1.26 MMT CO₂e below the most recent (2018) levels; 3.46 MMT CO₂e of reductions are required by 2030.²⁴ The transportation sector accounted for 40% of Vermont’s total annual GHG emissions of 8.64 MMT CO₂e in 2018,²⁵ of which 73% originates from light-duty vehicles.²⁶ Thus, the proportional annual GHG emissions level in 2018 from light-duty

²² See https://vtrans.vermont.gov/sites/aot/files/VERMONT_2022%20NEVI%20State%20Plan_FINAL.pdf.

²³ See <https://climatechange.vermont.gov/readtheplan> (IVCAP).

²⁴ IVCAP p.49.

²⁵ IVCAP p.73.

²⁶ See Energy Action Network Annual Progress Report (https://www.eanvt.org/wp-content/uploads/2021/06/EAN-APR2020-21_finalJune2.pdf).

transportation was 2.52 MMT CO₂e, and the corresponding reduction goals for light-duty transportation are -0.37 MMT CO₂e (to 2.15 MMT CO₂e) in 2025 and -1.01 MMT CO₂e (to 1.51 MMT CO₂e) in 2030.

- **Vermont Global Warming Solutions Act (Act 153):**²⁷ Achieve net zero emissions by 2050 across all sectors.

Table 8 provides a comparison of these goals with the results obtained from the Caret®-EV projections.

All three scenarios fall short of reaching the 2025 and 2030 registered EVs goals. However, the 2025 goal (27,000 registered EVs) is reached by the end of 2026 in all three scenarios and the 2030 goal (126,000 registered EVs) is reached by the end of 2031 in all three scenarios.

Similarly, none of the three scenarios reach the 2025 and 2030 GHG emissions reduction goals. In this case, the 2025 goal (<2.15 MMT CO₂e) is reached by the end of 2031 in all three scenarios and the 2030 goal (<1.51 MMT CO₂e) is reached by the end of 2035 in all three scenarios.

In summary, while the 2025 and 2030 target goals are not met by the modeled scenarios, all of the scenarios put Vermont on an EV adoption trajectory that meets the registered EVs goals 1 year after the target year and the GHG emissions reduction goals 5-6 years after the target year. The goals comparison also highlights that there are not significant differences in outcomes of the three scenarios, suggesting that the scenario that provides benefits to Vermont other than the target goals shown here (e.g., providing more equitable access to EVs) could be used as the determinant factor in selecting future rebate program changes.

TABLE 8

Goal Comparisons

Year	VT Program Goals Comparison ^a		
	Goal Level(s)	Attained Level(s)	Comparison to Goal(s)
2025	<ul style="list-style-type: none"> • Total EVs = 27,000 • GHG Emissions Level <2.15 MMT CO₂e 	<u>Baseline Scenario</u> <ul style="list-style-type: none"> • 20,372 EVs • 2.56 MMT CO₂e 	<u>Baseline Scenario</u> <ul style="list-style-type: none"> • 25% from reaching goal (need to add at least 6,628 EVs) • 19% from reaching goal (need to reduce emissions by at least 0.41 MMT CO₂e)
		<u>Scenario A</u> <ul style="list-style-type: none"> • 20,469 EVs • 2.56 MMT CO₂e 	<u>Scenario A</u> <ul style="list-style-type: none"> • 24% from reaching goal (need to add at least 6,531 EVs) • 19% from reaching goal (need to reduce emissions by at least 0.41 MMT CO₂e)
		<u>Scenario B</u> <ul style="list-style-type: none"> • 20,469 EVs • 2.56 MMT CO₂e 	<u>Scenario B</u> <ul style="list-style-type: none"> • 24% from reaching goal (need to add at least 6,531 EVs) • 19% from reaching goal (need to reduce emissions by at least 0.41 MMT CO₂e)

²⁷ See <https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/ACT%20153%20As%20Enacted.pdf>.

Year	VT Program Goals Comparison ^a		
	Goal Level(s)	Attained Level(s)	Comparison to Goal(s)
2030	<ul style="list-style-type: none"> Total EVs = 126,000 GHG Emissions Level <1.51 MMT CO₂e 	<u>Baseline Scenario</u> <ul style="list-style-type: none"> 102,514 EVs 2.27 MMT CO₂e 	<u>Baseline Scenario</u> <ul style="list-style-type: none"> 19% from reaching goal (need to add at least 23,486 EVs) 50% from reaching goal (need to reduce emissions by at least 0.76 MMT CO₂e)
		<u>Scenario A</u> <ul style="list-style-type: none"> 102,658 EVs 2.27 MMT CO₂e 	<u>Scenario A</u> <ul style="list-style-type: none"> 19% from reaching goal (need to add at least 23,342 EVs) 50% from reaching goal (need to reduce emissions by at least 0.76 MMT CO₂e)
		<u>Scenario B</u> <ul style="list-style-type: none"> 102,596 EVs 2.27 MMT CO₂e 	<u>Scenario B</u> <ul style="list-style-type: none"> 19% from reaching goal (need to add at least 23,404 EVs) 50% from reaching goal (need to reduce emissions by at least 0.76 MMT CO₂e)
2035	<ul style="list-style-type: none"> New PEV Market Share = 100% 	<u>Baseline Scenario</u> <ul style="list-style-type: none"> 98% 	<u>Baseline Scenario</u> <ul style="list-style-type: none"> 2% from reaching goal^b
		<u>Scenario A</u> <ul style="list-style-type: none"> 98% 	<u>Scenario A</u> <ul style="list-style-type: none"> 2% from reaching goal^b
		<u>Scenario B</u> <ul style="list-style-type: none"> 98% 	<u>Scenario B</u> <ul style="list-style-type: none"> 2% from reaching goal^b
2050	<ul style="list-style-type: none"> Net Zero GHG Emissions Across All Sectors 	<u>Baseline Scenario</u> <ul style="list-style-type: none"> 0.21 MMT CO₂e 	<u>Baseline Scenario</u> <ul style="list-style-type: none"> Unknown^c
		<u>Scenario A</u> <ul style="list-style-type: none"> 0.20 MMT CO₂e 	<u>Scenario A</u> <ul style="list-style-type: none"> Unknown^c
		<u>Scenario B</u> <ul style="list-style-type: none"> 0.20 MMT CO₂e 	<u>Scenario B</u> <ul style="list-style-type: none"> Unknown^c

^a See description of goals in the text.

^b Because it will not remain profitable to continue designing and building ICEVs for a dwindling market, it is likely that vehicle manufacturers will commit to an EV-only strategy some time before the new EV market share actually reaches 100%. Thus, achieving a new EV market share of >90-95% is tantamount to 100%, since the vehicle manufacturers will take this as a signal to cease manufacturing ICEVs.

^c “The Global Warming Solutions Act includes a requirement that Vermont achieve net zero emissions by 2050 but does not outline which sectors should be included and how to quantify fluxes” (IVCAP, p.67). Hence, it is unclear how much of the reduction to Net Zero will be required from light-duty transportation alone.

Summary of results: Comparison of Caret®-EV projections with Vermont’s climate action goals.

Source: Center for Sustainable Energy®, 2023

Recommendations for Vermont’s PEV Rebate Programs

As informed by this analysis, there are several recommendations on what segments of the EV market for Vermont’s rebate programs to focus on moving forward. Naturally, one may wonder what the correct incentive level is for each of these rebates but based on the status of the EV market and technology transitions science, it would be better to focus on what populations to incentivize instead.

To be clearer, the appropriate incentive level depends on the specific goal(s) and available timeframe of the policymaker (otherwise, the correct incentive is always “as much money as you can give” in order to maximize EV adoption in as short of a timeframe as possible). In the context of the results shown above, diffusion of EVs is primarily influenced by the federal IRA program in the earlier years, and the regulatory enforcement of ACC2 starting in 2026. Assuming that the EV diffusion levels presented in the tables above are satisfactory to Vermont (despite falling somewhat short of the original targets – see Table 8 and associated text), changing the state’s PEV rebate amounts would not directly achieve significant changes to the overall EV adoption outcomes. Instead, it may behoove the state to rely on IRA and ACC2 to do the heavy lifting of galvanizing the EV market to the next diffusion adoption stage and instead focus on other aspects of the market transformation that are important to the state.

For example, it would be more effective to shift the available funding towards low-income and other populations to ensure that the transition to EVs is equitable. There are three primary ways to do this through incentivization via rebate programs. First and foremost of these would be to induce additional low-income individuals to purchase EVs by altering the incentive eligibility, as shown in both Scenarios A and B. In fact, Vermont may want to consider both of the approaches demonstrated in these two scenarios. That is, Vermont could limit their rebates to low-income only (as in the latter portion of Scenario B) and at the same time, expand what is considered low-income (as shown in Scenario A). Limiting the incentive to low-income individuals may also make better use of Vermont’s available funding for PEV rebates. Additionally, Vermont could further restrict the income eligibility down the road as EV adoption continues to increase (for example, once the new PEV sales market share reaches approximately 16%, which is generally considered to signal the transition to mainstream adoption of a new technology – see Figure 1). This strategy would further EV adoption, ensure an equitable transition, and likely make the best use of Vermont’s available funding. The 16% market share threshold is reached by the end of 2026 in all three scenarios modeled here, so Scenario B, which transitions to a strictly low-income eligibility program in 2026 would be most consistent with this strategy.

In addition to a low-income new PEV rebate, there are two additional incentive types that Vermont could leverage to achieve its equity goals: a used PEV rebate and a scrap-and-replace program. While Vermont already has these programs (MileageSmart and Replace Your Ride, respectively), and they do help achieve equity, CSE recommends focusing on the new PEV market first. While the low-income new PEV rebate would contribute directly to increase EV diffusion by converting the population typically

considered “laggards” to early adopters, the used PEV rebate would only indirectly benefit EV diffusion. Finally, a scrap-and-replace program is better suited to later stages of diffusion, when ICEVs are less valued and the new PEV market is already mature. Otherwise, the scrap-and-replace rebate will have to greatly exceed vehicle residual values in order to promote significant consumer uptake, which makes the program expensive and inefficient.

In summation, with IRA and ACC2 in place, CSE recommends that Vermont should shift the focus of the state PEV rebate programs to low-income individuals to ensure an equitable transition. This recommendation is consistent with Scenario B modeled in this report. By focusing on changing the income eligibility for the New PEV rebate, Vermont can get the best of both worlds: leveraging the federal rebate and multi-state regulatory programs (e.g., ACC2) by continuing to incentivize the new EV market, while also focusing on individuals who need the incentive the most. Furthermore, by initially expanding, then restricting the income eligibility, Vermont can control the tradeoff between helping those who need the incentive the most and maximizing EV adoption. Finally, CSE recommends ending the Replace Your Ride program until the new EV market has reached a higher level of maturity in Vermont.

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State of Vermont
Electrify Your Fleet Program

PROGRAM GUIDELINES

November 7, 2023



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1 Program Overview

Fossil-fueled transportation in Vermont significantly impacts the State's economy and environment. The State of Vermont's Comprehensive Energy Plan includes several long-term goals to electrify the transportation sector to reduce emissions and costs. In addition, the Vermont Global Warming Solutions Act established actionable requirements for reducing greenhouse gas emissions in the State by specific deadlines with policies and programs for the transportation sector.

This document contains program guidelines for the implementation of the State of Vermont's Electrify Your Fleet (EYF) incentive program, or "Electrify Your Fleet," including information on eligibility and processing options to be used by applicants and anyone interested in additional details on how the program works.

The State of Vermont established the Electrify Your Fleet Program to accelerate the adoption of electric vehicles over internal combustion engine (ICE) vehicles and help Vermont municipalities and business entities enjoy the benefits of cleaner transportation options. Combined with potential federal and electric utility incentives, eligible fleet owners have an opportunity to save thousands of dollars on clean transportation alternatives.

The Vermont Agency of Transportation will provide incentives in the form of rebates to eligible fleet owners who demonstrate that the incentives will reduce the greenhouse gas emissions of their fleet operations. The total incentive pool of \$500,000 is available to Vermont fleet owners on a statewide, first-come, first-served basis. Forty percent (40%) or \$200,000 of the available funds will be available on a first come, first served basis to applicants who are from, or who primarily serve, historically underserved communities (such as Black, Indigenous and people of color or BIPOC individuals; women; veterans; those requiring language access assistance; and communities in disadvantaged census tracts as identified on the [Climate and Economic Justice Screening Tool](#)).

The rebate amount for this program is up to \$2,500, at no more than 25% of the purchase price, for each ICE vehicle replaced or avoided. Fleet owners are eligible for up to 20 incentives over the life of the program. Nonprofit mobility services organizations incorporated in the State of Vermont for the purpose of providing Vermonters with transportation alternatives to personal vehicle ownership shall be entitled to up to 5 enhanced incentive amounts of \$5,000 as well as up to 15 incentives at the standard \$2,500 amount.

2 Eligibility

To participate in the Electrify Your Fleet program, applicants must demonstrate how the purchase will reduce vehicle fleet greenhouse gas emissions in Vermont. Funding may be used to replace vehicles other than a plug-in electric vehicle (PEV) cycled out of a motor vehicle fleet or to avoid the purchase of vehicles other than a PEV for a motor vehicle fleet. The program's eligibility requirements are detailed below.

2.1 Applicant Eligibility

Vermont businesses, nonprofit organizations, and municipalities are eligible to apply for the Electrify Your Fleet Program. A vehicle shall be construed as a "fleet vehicle" if it is being used by the owner/operator for an established commercial or municipal purpose, and the owner of the vehicle is a municipality, business, or tax-exempt organization incorporated in the State of Vermont and registered with the office of the Secretary of State.

2.1.1 Vermont Municipalities

All Vermont municipalities and municipal organizations (including school districts, regional planning commissions, emergency response, etc.) that maintain a fleet of motor vehicles that are registered in Vermont are eligible for up to 20 incentives at \$2,500 through the Electrify Your Fleet program.

2.1.2 Business Entities

All non-profit institutions and for-profit business entities registered in Vermont that maintain a fleet of motor vehicles that are registered in Vermont are eligible for up to 20 incentives at \$2,500 through the Electrify Your Fleet program.

2.1.3 Nonprofit Mobility Services Organizations

Nonprofit mobility services organizations incorporated in the State of Vermont for the purpose of providing Vermonters with transportation alternatives to personal vehicle ownership are eligible for up to 5 increased incentives at \$5,000 and up to 15 standard incentives at \$2,500 through the Electrify Your Fleet program.

2.2 Incentives per Applicant Limit

No single applicant shall be eligible for more than 20 incentives over the existence of the Electrify Your Fleet program.

2.3 Incentive Requirements

To be eligible for the full incentive amount, grantees must demonstrate that the new vehicle funded with the incentive has adequately replaced the functions of the retired vehicle or what would have been purchased otherwise. Grantees must maintain ownership of the vehicles purchased with the incentive for a minimum period of twenty-four (24) months or, if leasing vehicles, the minimum term of the lease agreement for vehicles incentivized under this program is twenty-four (24) months.

As it is the intent of the Electrify Your Fleet Program to encourage an affordable, used PEV market for individual consumers and households to benefit from transportation electrification, Grantees shall make all reasonable efforts to resell fleet vehicles incentivized through this agreement to car dealerships participating in the [MileageSmart Program](#), Vermont's income-eligible incentive program for used high efficiency vehicles. Grantee shall notify the State in the event of an early lease termination or resale.

2.3.1 Standard \$2,500 Incentive Amount

The standard \$2,500 incentive may be used for up to 25% of the price to purchase or lease any of the following, with demonstration that the new vehicle funded has adequately replaced the functions of the retired vehicle or the vehicle that would have been purchased otherwise:

- A. New Battery All-Electric Vehicles (BEV/AEV) with a base Manufacturer's Suggested Retail Price (MSRP) of \$60,000.00 or less;
- B. New Plug-in Hybrid Electric Vehicles (PHEV) with an electric range of 20 miles or greater per complete charge as rated by the Environmental Protection Agency when the vehicle was new and a base MSRP of \$60,000.00 or less;
- C. New electric bicycles and electric cargo bicycles with a base MSRP of \$6,000.00 or less with a minimum one-year warranty and manufactured by a participating company in the voluntary e-bike battery recycling program, Call2Recycle: www.hungryforbatteries.org;
- D. New adaptive electric cycles with any base MSRP;
- E. New electric motorcycles with a base MSRP of \$30,000.00 or less; or
- F. New electric snowmobiles with a base MSRP of \$20,000.00 or less.

As noted above, eligibility for the EYF incentive program is determined by the *base* manufacturer's suggested retail price (MSRP). If a vehicle has a base trim level at or below the price cap then any version of that model is eligible for the State incentive program, even if the selling price is above the cap based on trim levels and/or option packages.

2.3.2 Enhanced \$5,000 Incentive Amount

Nonprofit mobility service organizations may use the enhanced \$5,000 incentive to purchase or lease a new battery all-electric vehicle (BEV/AEV) with a base Manufacturer's Suggested Retail Price (MSRP) of \$55,000.00 or less.

2.4 Research Participation and Data Sharing

The State of Vermont may request participation from incentive recipients in ongoing research efforts that support the State's Comprehensive Energy Plan and Climate Action Plan requirements or continuing Program improvements. The State and/or its designee(s) may administer fleet owner surveys to collect data and other information pertaining to their Electrify Your Fleet Program experience.

3 Application and Award Process

Electrify Your Fleet Program incentives will be processed by the Vermont Agency of Transportation. Funds are reserved at the time of application submission, and incentives are provided on a first come, first served basis. Forty percent (40%) or \$200,000 of the available funds will be available on a first come, first served basis to applicants who are from, or who primarily serve, historically underserved communities (such as Black, Indigenous and people of color or BIPOC individuals; women; veterans; those requiring language access assistance; and communities in disadvantaged census tracts as identified on the [Climate and Economic Justice Screening Tool](#)). Additional details on the application and award process are included in the sections below.

3.1 Electrify Your Fleet Application Process

To apply for Electrify Your Fleet Program incentives, fleet owners must fill out the online application form. Applications will be reviewed by a committee comprised of Agency staff. Applicants will then be contacted via screening call to confirm applicant eligibility and provide supporting documentation, including an EYF Impact Methodology that explains how the fleet owner will calculate the reduction in vehicle miles traveled (VMT) or greenhouse gas emission

reductions due to the EYF purchase(s). Applicants must have their methodology approved by Agency staff prior to being issued an award.

3.2 Required Documentation

To be approved, applicants must submit the following documentation:

- An **EYF Electrification Plan** that specifies which internal combustion engine vehicles will be replaced and which vehicles will be purchased with the EYF incentive funds.
- An **EYF Charging Plan** that specifies how electric fleet purchases will be charged.
- An **EYF Impact Methodology** that explains how the fleet owner will calculate the reduction in vehicle miles traveled (VMT) or greenhouse gas emission reductions due to the EYF purchase(s).

Information required of grant awardees by the State of Vermont

- Business applicants must be registered and in good standing with the Vermont Secretary of State. Check status at <https://bizfilings.vermont.gov/online/Certificate>
- An updated IRS form W9 (must be signed in ink, digital signatures are not accepted) <https://www.irs.gov/forms-pubs/about-form-w-9>
- (Where applicable) Unique Entity Identifier (UEI) number. Registration for a UEI is available for free at sam.gov but may require up to a few weeks to receive.

3.3 Award Process

The Agency will award grant agreements on a first-come, first-serve basis to applicants who meet the eligibility requirements and submit a complete application.

Purchases made before application is approved and grant agreement is counter signed will not be eligible for reimbursement. Once the grant agreement is counter signed, the grantee may purchase the approved vehicle(s).

In order to ensure that program funding is directed to projects which can achieve the most expedient climate impacts, grantees shall order approved vehicle(s) within 30 days of an

executed grant agreement with the Agency and shall enter into a lease or purchase agreement for said vehicle(s) within 90 days of an order. Exceptions (e.g., due to supply chain delays) may be granted after submitting a written request to the Agency for permission to extend the allowable timeframe.

3.4 Incentive Payments

Incentives will be paid in the form of reimbursements in the amount approved during the application process. Upon purchase of the approved vehicle(s), grantees will submit their request for rebate using a template provided by the Agency along with proof of purchase and vehicle details.

3.5 State Purchase and Use Tax

Electric vehicle purchases or leases remain subject to the State of Vermont’s new vehicle purchase and use tax. The State incentive is issued as a post-sale rebate, and so does not reduce the overall purchase price used as the basis for the purchase and use tax.

The Electrify Your Fleet Program does not issue 1099s for incentives. It is the sole responsibility of the incentive recipients to seek professional advice and determine any tax consequences of participation in the Program.

3.6 Program Funding and Sunset Process

Program funding relies on legislative appropriations. The Electrify Your Fleet website will report on the program funds when the funding pool is drawn down to \$120,000. Future Program funding beyond these funds is uncertain, however, interested parties will be encouraged to submit an application to register their interest in the program and be considered for future funding opportunities if reauthorized by the legislature.

4 Audit Process

To prevent fraud, the Agency will audit a subset of applications for accuracy. The Agency may choose to audit suspicious applications or a random subset or both.

Failure to provide requested documents and to provide reasonable cooperation in the event of an audit will result in revocation of the incentive and an obligation to repay the State the full amount of the incentive plus interest at the statutory rate from the date the incentive was awarded.

5 Customer Support

For more information about the Electrify Your Fleet Program or questions about your application please contact the Agency of Transportation Environmental Policy & Sustainability unit by emailing AOT.climate@vermont.gov.

The [Electrify Your Fleet website](#) will promote the Program, including links to the application portal and other resources.

5.1 Translation and Interpretation Services

If you are a **non-English speaker** and need translation assistance, please contact Agency staff by emailing AOT.climate@vermont.gov to be connected with free State-contracted translation and interpretation services. Be prepared to leave your name, phone number, and email address so we can contact you with a translator on the line.

Program Guidelines Translation: [Arabic \(العربية\)](#) | [Bosnian \(Bosanski\)](#) | [Burmese \(မြန်မာစာ\)](#)
| [Chinese \(中文\)](#)
| [Dari \(دری\)](#) | [French \(Français\)](#) | [Kirundi](#) | [Nepali \(नेपाली\)](#) | [Pashto \(پښتو\)](#) | [Somali \(Soomaali\)](#) |
[Spanish \(Español\)](#) | [Swahili \(Kiswahili\)](#) | [Ukrainian](#) | [Vietnamese \(Tiếng Việt\)](#)



To receive this information in an alternative format or for other accessibility requests, please contact: Ari Lattanzi, ari.lattanzi@vermont.gov, 802-371-7366

6 Program Reporting

All successful Electrify Your Fleet applicants will be required to submit a report thirteen (13) months after receipt of the incentive payment to show how the incentive reduced greenhouse gas emissions for the fleet. The exact reporting requirements may vary based on the type of fleet and specific EYF fleet electrification strategy and impact methodology. Applicants must have their greenhouse gas emission methodology approved by Agency staff prior to approval for an EYF incentive.

Required reporting metrics may include any of the following:

- Make, Model, Year, VIN and odometer reading of retired/replaced fleet vehicles
- Make, Model, Year, VIN and odometer reading of EYF fleet vehicles
- Percent of electric vehicle miles traveled for EYF PHEVs
- Vehicle miles traveled (VMT) of EYF eBike or eMotorcycle
- Hours or miles of operation for snowmobiles and snowmobiles pre- and post- EYF
- Comparative fuel usage metrics from before and after EYF
- EYF survey response
- Number of days electric vehicle was in service
- Effective average range of electric vehicle
- Electric vehicle reliability in terms of fleet operations (i.e., were vehicles available when needed)
- Reduction in air pollutants (greenhouse gas reduction)
- How vehicles replaced were cycled out of the motor vehicle fleet

7 Additional Fleet Electrification Resources

To ensure that all applicants fully understand their charging needs and other credits and resources available to help meet those needs, the Agency of Transportation strongly encourages all applicants of the Electrify Your Fleet Program to consider the additional resources listed below that are available to support fleet electrification initiatives in Vermont.

7.1 Vermont Community Electric Vehicle Chargers Incentive Program

Made possible by the Vermont Department of Housing and Community Development, this program provides incentives for installing EV charging that will increase Vermonters' access to charging at workplaces, multiunit homes, and community attractions. For more information visit vermontevchargers.com.

7.2 Drive Electric Vermont Business EV Resources

AOT partner Drive Electric Vermont (DEV) offers answers to questions commonly asked about commercial EV charging incentives, fleet electrification, and business assistance. DEV also provides commercial EV industry information. Find this information and schedule a consultation with EV fleet and charging consultations by visiting the Drive Electric Vermont website.

7.3 EV Fleet and Charging Consultations

AOT partner VEIC offers free 30-minute consultations for Vermont-based entities to discuss fleet electrification and facility charging infrastructure. Interested parties should complete a [brief intake](#)

[survey](#) and schedule a call time to get started.

7.4 Electric Utility Business Support

Many Vermont electric utilities offer incentives for EVs, EV chargers, and e-bikes. Contact your utility's business support team to learn more about any resources and offers available for fleet electrification. [Find your power company.](#)

7.5 eBike Consultations

AOT partners VBike Solutions and Go!Vermont offer free electric bike consultations for Vermont households and businesses to help choose the e-bike, e-cargo bike and/or e-assist system that best fits your needs based on type of terrain and distance you intend to ride, what you want to do with your bike, cargo hauling needs and many other considerations. To get started, interested parties should contact [VBike Solutions](#) to schedule a consultation.

7.6 Commercial Clean Vehicle Tax Credit

The Federal Commercial Clean Vehicle Tax Credit is currently under development by the Internal Revenue Service (IRS). The credit will be equal to the lesser of 30% of the purchase price, or the incremental cost of the vehicle. The credit amount will not exceed \$7,500 in the case of a vehicle which has a gross vehicle weight rating of less than 14,000 pounds, or \$40,000 in the case of a vehicle more than 14,000 pounds. Tax exempt entities can receive direct (aka "elective") payments. The IRS is still developing the rules for this program and will soon have a pre-registration process. More information is available on the [IRS website](#).

7.7 Alternative Fuel Infrastructure Tax Credit

The Inflation Reduction Act (IRA) authorized a tax credit to support the installation of electric vehicle supply equipment (EVSE) or EV charging infrastructure up to 30% of the cost, not to exceed \$100,000. Permitting and inspection fees are not included in covered expenses and equipment must be installed in locations that meet certain census tract requirements. Fueling station owners who install qualified equipment at multiple sites are allowed to use the credit towards each location. More information is available on the [U.S. Department of Energy website](#).

Electrify Your Fleet Overview

The intent of the Electrify Your Fleet (EYF) incentive program is to encourage organizations operating motor vehicle fleets to transition to plug-in electric vehicles. Municipal organizations, non-profits and businesses are eligible for up to 20 standard incentives in the amount of \$2,500 each towards the purchase or lease of qualifying plug-in electric vehicles (which include all-electric and plug-in hybrid vehicles as well as electric bikes, electric motorcycles and electric snowmobiles). Non-profit mobility service organizations are eligible for up to 5 enhanced incentives in the amount of \$5,000 towards the purchase of a qualifying all-electric vehicle, as well as up to 15 of the standard incentives. In order to launch the program simply and quickly, the Agency of Transportation Environmental Policy and Sustainability (EPS) unit is managing the incentive program in-house. The EYF program was authorized by the Vermont Legislature in June 2023 and began accepting applications in November 2023.

Electrify Your Fleet Process

Applicants complete a simple form on SurveyMonkey.com to provide an overview of their fleet and intended use of the EYF incentives. The EPS team then follows up by email to address any missing details and schedule a brief interview. The purpose of the interview is to ensure applicants understand the relevant program guidelines and process. Once the application is approved, details are sent to the Grant Administration unit and a grant agreement is executed. Applicants may purchase their vehicles once their application is approved, but must wait for the fully executed grant agreement before submitting their documentation and request for reimbursement. Twelve months after the purchase of their vehicle, EYF recipients will be sent a template to report their annual miles, fuel use and other metrics that enable greenhouse reduction calculations.

Electrify Your Fleet Data

Since November 2023, 24 organizations have initiated EYF applications. Three grant agreements have been executed and four are in progress thus far, representing \$83,000 in incentive funding towards the purchase or lease of 25 plug-in electric vehicles, which are anticipated to reduce greenhouse gas emissions by an estimated 73,500 kg CO2 each year, with a cost efficacy of an average of \$1.26 per kg (or \$1,259.87 per MT) of CO2 reduction in the first year.

	Sum of Award Amount	Sum of AEV Lease	Sum of AEV Purchase	Sum of eBike Purchase
Grant Agreement in Progress	\$57,500.00	2	16	
Nonprofit shared mobility service	\$30,000.00		7	
Police Department	\$5,000.00	2		
University	\$17,500.00		7	
Utility	\$5,000.00		2	
Grant Executed	\$25,500.00		5	2
Nonprofit	\$5,500.00		1	2
Nonprofit shared mobility service	\$20,000.00		4	
Grand Total	\$83,000.00	2	21	2

Of the 24 applications, two have been withdrawn. Two organizations who applied are ineligible given the current program guidelines. One applicant requested EYF funding to replace a battery in an all-electric vehicle and replace a battery in a food truck. Another applicant requested EYF funding to purchase an all-electric all-terrain vehicle. Seven organizations have not completed their initial application and six applicants must provide additional information.

Grant Status by Organization Type	Grant Executed	Grant Agreement in Progress	Waiting on Applicant	Incomplete	Ineligible	Withdrawn	Grand Total
Nonprofit Shared Mobility Service	1	1					2
Nonprofit	2		1		1		4
Municipality			1	1			2
Police Department		1	1	2			4
Utility		1	1				2
University		1					1
Business			1			2	3
Farm			1	1			2
Food Truck					1		1
Hospital				1			1
Ski Resort				2			2
Grand Total	3	4	6	7	2	2	24

*does not include two incidents of duplicate applications

Applicants must demonstrate that their purchase with EYF funding will reduce greenhouse gas emissions. There are three options within the Electrify Your Fleet Program:

1. Replace an existing internal combustion engine (ICE) vehicle in the organization fleet
2. Reduce annual mileage on an existing internal combustion engine (ICE) vehicle in the organization fleet
3. Avoid the purchase of a new internal combustion engine vehicle

EYF Incentive Use by Rationale	AEV Purchase	AEV Lease	eBike Purchase	eMotorcycle Purchase
Replacing an internal combustion engine vehicle	14	2		
Reducing miles traveled on internal combustion engine vehicles			2	1
Avoiding the purchase of a new ICE vehicle	9		2	

*This table includes details from applications which have not yet been executed as grant agreements.

The vehicle make and model details for the 25 incentives in executed or pending grant agreements are included below. The greenhouse gas emissions reduction from vehicle replacements is estimated based on the EPA fueleconomy.gov tailpipe emissions data in grams of CO2/mile multiplied by the applicant reported annual mileage compared to the 0 grams CO2/mile emissions of the EYF AEV replacement. For instances where the purchase of an ICE vehicle will be avoided, applicants were asked to identify the comparable ICE they would have purchased without the assistance of the EYF incentive and an estimated annual mileage. For cases of mileage reduction, applicants were asked to estimate how many annual miles on their existing ICE vehicle would be reduced by the use of their ebikes and multiplied that by the grams CO2/mile of the reduced mileage vehicle. This analysis assumes that the EYF replacement vehicles will all be charged with renewable or zero emission electricity. Based on these calculations, we estimate a reduction of 73,500 kg CO2 per year. The 12-month reporting requirement will yield the actual annual mileage of the replacement vehicles and the miles offset by the electric bikes for the official greenhouse gas reduction total.

Organizational Type	Intent	Replaced / Reduced Mileage / Purchased Avoided Vehicle			EYF Replacement Vehicle		
		Make	Model	Year	Make	Model	Year
NMSO	ICE Purchase Avoided	Hyundai	Kona	2022	Chevy	Bolt	2019
NMSO	ICE Purchase Avoided	Hyundai	Kona	2022	Chevy	Bolt EUV	2023
NMSO	Replace Vehicle	Subaru	Impreza	2019	Chevy	Bolt EUV	2023
NMSO	Replace Vehicle	Toyota	Prius C	2016	Chevy	Bolt EUV	2023
NMSO	ICE Purchase Avoided	Toyota	RAV4	2024	Hyundai	Ioniq 5 SEL AWD	2024
NMSO	ICE Purchase Avoided	Toyota	RAV4	2024	Hyundai	Ioniq 5 SEL AWD	2024
NMSO	ICE Purchase Avoided	Toyota	RAV4	2024	Hyundai	Ioniq 5 SEL AWD	2024
NMSO	ICE Purchase Avoided	Toyota	RAV4	2024	Hyundai	Ioniq 5 SEL AWD	2024
NMSO	ICE Purchase Avoided	Toyota	RAV4	2024	Hyundai	Ioniq 5 SEL AWD	2024
NMSO	ICE Purchase Avoided	Toyota	RAV4	2024	Hyundai	Ioniq 5 SEL AWD	2024
NMSO	ICE Purchase Avoided	Toyota	RAV4	2024	Hyundai	Ioniq 5 SEL AWD	2024
Nonprofit	eBike to Reduce Mileage	Chevrolet	Colorado	2023	Cannondale	Adventure Neo Allroad EQ Electric Bike	2023
Nonprofit	eBike to Reduce Mileage	Chevy	Colorado	2023	Cannondale	Adventure Neo Allroad EQ Electric Bike	2023
Nonprofit	Replace Vehicle	Subaru	Outback	2018	Tesla	Model 3 Long Range AWD	2023
Police Dept	Replace Vehicle	Ford	Taurus	2014	Ford	Mach-E	2024
Police Dept	Replace Vehicle	Dodge	Charger	2013	Ford	Mach-E	2024
University	Replace Vehicle	Ford	E350 Ambulance Truck	2000	Ford	E-Transit Cargo Van	2023
University	Replace Vehicle	Chevrolet	Express 2500 Cargo Van	2012	Ford	E-Transit Cargo Van T-350 130" Med Rf 9500 GVWR RWD	2023
University	Replace Vehicle	Chevrolet	Express 2500 Cargo Van	2013	Ford	E-Transit Cargo Van T-350 130" Med Rf 9500 GVWR RWD	2023
University	Replace Vehicle	Chevrolet	Express 2500 Cargo Van	2013	Ford	E-Transit Cargo Van T-350 130" Med Rf 9500 GVWR RWD	2023
University	Replace Vehicle	Chevrolet	Express 1500 Passenger Van	2011	Ford	E-Transit	2023
University	Replace Vehicle	Chevrolet	Express 1500	2011	Ford	E-Transit	2023

			Passenger Van				
University	Replace Vehicle	Ford	Transit Connect Van	2013	Ford	E-Transit Cargo Van T-350 130" Med Rf 9500 GVWR RWD	2023
Utility	Replace Vehicle	Ford	F-150	2013	Ford	F-150 Lightning	2023
Utility	Replace Vehicle	Ford	F-150	2014	Ford	F-150 Lightning	2023

Program Administration

Up to 15% of the \$500,000 (\$75,000) of the Electrify Your Fleet funding allocation may be used for administrative expenses. From November through January, staff time for program administration has totaled \$5,334.81. This does not include staff time for program development before November, which predated the Electrify Your Fleet expense account. This amount also does not include the cost to translate the program documents. Recent payroll costs now average less than \$1000 per month.

Administration		
Administration Budget	Total Admin \$ expended	Total Admin \$ remaining
\$ 75,000.00	\$ 5,334.81	\$ 69,665.19

Equity and Outreach

The Electrify Your Fleet program guidelines have been translated into 14 languages and interpretation services have been contracted so they are available as needed. In the spirit of the Justice40 initiative, we have reserved 40% of EYF funding (\$200,000) to applicants who are from, or who primarily serve, historically underserved communities (such as Black, Indigenous and people of color or BIPOC individuals; women; veterans; those requiring language access assistance; and communities in disadvantaged census tracts as identified through the Climate and Economic Justice Screening Tool).

Justice40			Other Available Funding		
Justice40 Reserved Total	Justice40 Obligated	Justice 40 \$ Remaining	Total Other Funding	Other Funding Obligated	Other Funding Remaining
\$200,000	\$52,500.00	\$147,500.00	\$225,000.00	\$30,500.00	\$194,500.00

Upon program launch, the program details were emailed to 170 recipients including business associations, organizations representing disadvantaged communities, municipal organizations, and utilities. The Agency issued a press release and posted on social media.

Both CarShare Vermont and Community Rides Vermont have already purchased vehicles with the EYF incentive, and Agency staff anticipates more rounds of publicity and outreach featuring their images and testimonials. It is envisioned that this outreach will be coordinated with highlighting of the recent IRS changes to make the Commercial Clean Vehicle tax credits available to tax-exempt organizations through a direct-pay option.