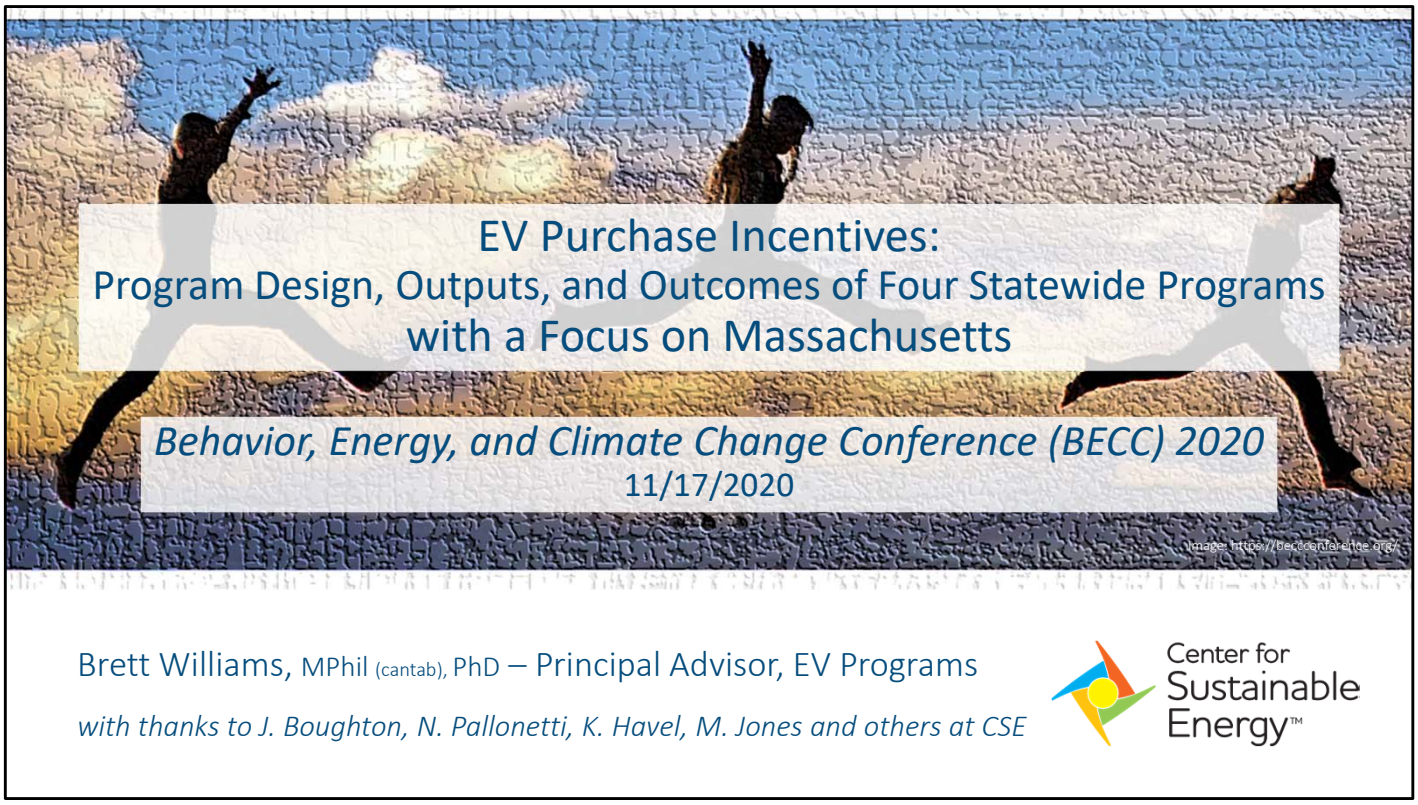


Brett Williams, MPhil (cantab), PhD – Principal Advisor, EV Programs

*with thanks to J. Boughton, N. Pallonetti, K. Havel, M. Jones and others at CSE*

Center for Sustainable Energy™

Reducing the price of electric vehicles (EVs) has been identified as one of the most effective ways to accelerate adoption, but **concerns surround the investment of public funds**:

- Do EV incentives benefit only luxury cars and wealthy, white consumers?
- Are EVs and incentives really having an impact?

**This presentation helps calibrate our understanding of EV-incentive impacts with data.** It draws on 75,000 survey responses from participants in four statewide EV rebate programs (California, Massachusetts, Connecticut, and New York) that have been weighted to represent over 319,000 rebated EV consumers.

It highlights, across states and over time:
1. Program eligibility criteria
2. Rebated vehicle & consumer characteristics
3. Metrics of behaviors influenced and market impact

--

Before diving in, **thanks are due** to the analysts at the Center for Sustainable Energy (CSE) that supported the creation of this presentation, some of which are listed on this slide.

## State EV Rebate Programs Administered by CSE (as of Jan. 2020)

| | CALIFORNIA CLEAN VEHICLE REBATE PROJECT | MOR-EV | CHEAPR | NEW YORK STATE | OREGON CLEAN VEHICLE REBATE PROGRAM | New Jersey's cleanenergy program |
|---|---|---|---|---|---|---|
| **Fuel-Cell EVs** | $4,500 | $2,500 | $5,000 | ≥ 120 e-miles*: $2,000<br>≥ 40 e-miles: $1,700<br>≥ 20 e-miles: $1,100<br>< 20 e-miles: $500 | ≥ 10 kWh: $2,500<br>< 10 kWh: $1,500 | $25 per electric mile*, up to a max. of $5,000 |
| **All-Battery EVs** | $2,000 | $2,500 | ≥ 200 e-miles*: $1,500<br>< 200 e-miles: $500 | | | |
| **Plug-in Hybrid EVs** | BEVx = $2,000<br>Others = $1,000 | BEVx = $2,500<br>Others = $1,500 | | | | |
| **Zero-Emission Motorcycles** | $750 | | | | $750 (and NEVs) | |
| **Program Design Elements** | • Base MSRP PEVs ≤ $60k<br>• ≥ 35 UDDS* electric miles<br>• Income cap<br>• +$2,500 for income-qualified households | • Purchase price ≤ $50k<br>• ≥ 25 U.S. EPA electric miles*<br>• No fleet rebates (forthcoming) | • Base MSRP: FCEVs ≤ $60k PEVs ≤ $42k<br>• Point-of-sale option<br>• $125/$75 dealer incentive | • Base MSRP >$60k = $500<br>• Point-of-sale | • Base MSRP <$50k<br>• Point-of-sale option<br>• +$2,500 for income-qualified households, used EVs also qualify | • Base MSRP <$55k<br>• Post-purchase, to be replaced with point-of-sale rebate in late 2020 |

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* Electric miles (e-miles) are U.S.-EPA-rated all-electric miles in all states except in CA

Thanks are also due to the state agencies, on behalf of whom CSE administers six statewide EV rebate programs

Those programs are, from left to right and oldest to newest, in CA, MA, CT, NY, OR, and NJ.

Here is just a **quick glimpse at the different flavors** of program design across states, which **each have their own sets of goals, opportunities, and constraints.**

Note that all programs now limit program eligibility based upon vehicle price; three determine rebate amounts according to EPA all-electric range, three are point-of-sale cash rebates, and one has a dealer sales incentive.

Quite a lot can be learned from data collected by these programs.

## Outline

I. Statewide EV Rebate Program Update
   - *Program Design:* Rebate Amounts and Eligibility
   - *Outputs*: Vehicles & Consumers Rebated
   - *Outcomes*: Behaviors Influenced
   - *Impacts*: Market Additions

II. Wrap Up, Additional Info

** EVs = light-duty plug-in hybrid, battery, and fuel-cell electric vehicles (PHEVs, BEVx vehicles, BEVs, and FCEVs)*

3

This presentation will focus on data from the first four states (CA, MA, CT, and NY):

Keeping in mind the variety of program design features, it will
* characterize who and what has been rebated,
* what behaviors have been influenced, and
* what impact rebates have had on the market.

# Statewide EV Rebate Program Update

Design, Outputs, Outcomes, and Impacts

# Design: Rebate Amounts and Eligibility

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## Program Design Over Time

MOR-EV
Massachusetts Offers Rebates for Electric Vehicles

| | as of Jun. 2014 | as of Feb. 2016 | as of Jan. 2019 | Oct.–Dec 2019 | as of Jan. 2020 |
|---|---|---|---|---|---|
| Fuel-Cell EVs* | $2,500 | $2,500 | $1,500 | Program suspended** | $2,500 |
| All-Battery EVs | $2,500 | $2500 | $1,500 | | $2,500 |
| Plug-in Hybrid EVs | > 10kWh = $2,500<br>< 10kWh = $1,500 | > 10kWh = $2,500<br>< 10kWh = $1,500 | BEVx = $1,500<br>Others ineligible | | BEVx = $2,500<br>Others = $1,500 |
| Zero-Emission Motorcycles | $750 | $750 | $450 | | |
| Additional features: | | ≥ $60k MSRP = $1,000 max | Purchase price ≤ $50k only | | ≥ 25 electric miles<br>Purchase price ≤ $50k |

* No rebates have been issued to date for FCEVs

** Retroactive Rebate applications accepted in 2020 for purchases/leases during the 2019 suspension period.

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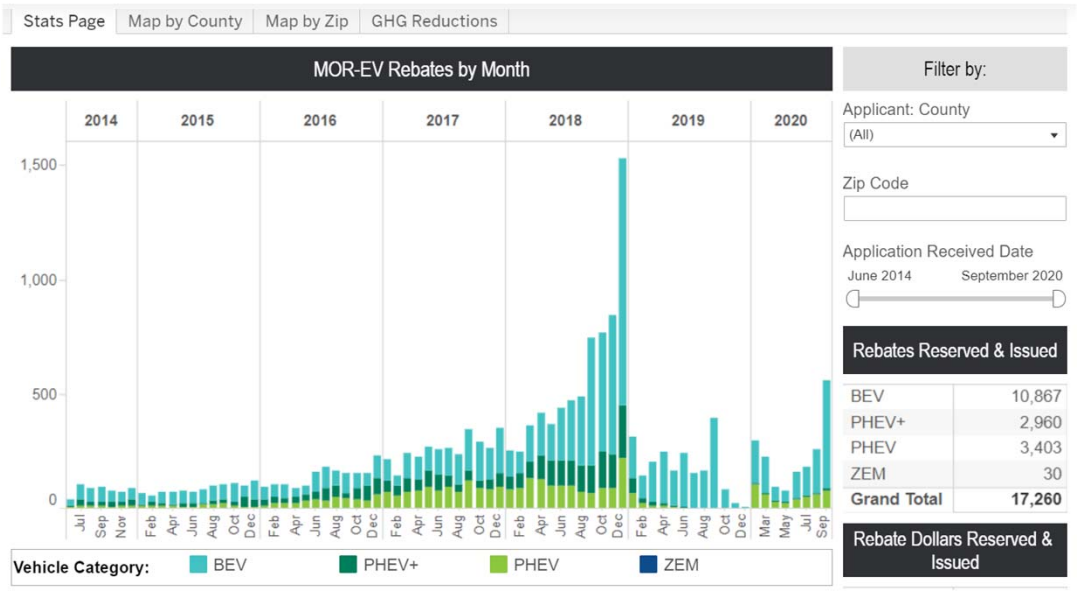
The program designs shown earlier describe eligibility criteria as of January 1st, 2020.

Using Massachusetts for illustration throughout this presentation, here is a reminder that **programs change over time**.

This happens both 1) "**by design**" as goals evolve, stakeholders engage, and data inform program improvements, **and** also 2) **due to** a variety of **implementation factors and funding disruptions**.

## Applications Over Time

MOR-EV
Massachusetts Offers Rebates for Electric Vehicles




*Oct. 2020 image from https://mor-ev.org/program-statistics*

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Keeping the last slide in mind, program **design and funding availability interact** in complex ways **with market conditions**—such as the dramatic increase in rebate demand due to the **disruptive** release of the **Tesla Model 3** starting in mid-2018.

These interactions change the face of the program and **cause currents in the data**, some of which will be discussed in subsequent slides.

# EV Rebate Designs

*(As of Sept. 2018; Reflective of Most of the Data Gathered)*

| | California Clean Vehicle Rebate Project | MOR-EV | CHEAPR | New York State |
|---|---|---|---|---|
| **Fuel-Cell EVs**  | $5,000 | $2,500 | $5,000 | e-miles<br>≥ 120 $2,000<br>≥ 40 $1,700<br>≥ 20 $1,100<br>< 20 $500 |
| **All-Battery EVs**  | $2,500 | $2,500 | e-miles<br>≥ 175 $3,000<br>≥ 100 $2,000<br>< 100 $500 | |
| **Plug-in Hybrid EVs**  | $2,500 (i3 REx)<br>$1,500 | ≥10 kWh $2,500<br><10 kWh $1,500 | ≥ 40 $2,000<br>< 40 $500 | |
| **Zero-Emission Motorcycles**  | $900 | $750 | | |
| | • e-miles ≥ 20 only<br>• Consumer income cap<br>• Increased Rebates for lower-income households | • Base MSRP ≥ $60k = $1,000 max.<br>• no fleet rebates | • Base MSRP ≤ $60k only<br>• dealer assignment<br>• $150 dealer incentive ($300 previous) | • Base MSRP > $60k = $500 max.<br>• point-of-sale via dealer |

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But, **to** help **simplify** things, this slide has been dug out of the archives as the single-best **snapshot of the program designs** that helped **shape the bulk of the results** presented here. You can come back to it if necessary.

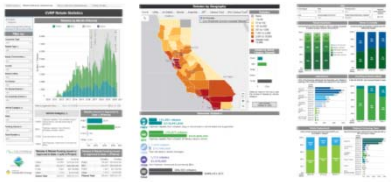
# Outputs: Vehicles Rebated



Now to the sort. What vehicles have been rebated?

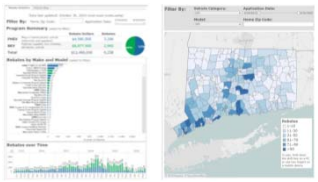
## Where Are EV Rebates Going?
## Public Dashboards and Data Facilitate Informed Action

Statewide EV Rebate Programs: CA, MA, CT, NY (OR and NJ dashboards forthcoming)

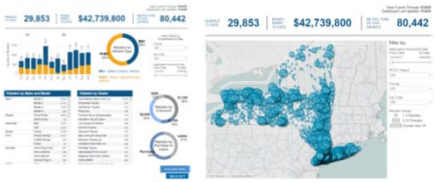


cleanvehiclerebate.org

mor-ev.org



ct.gov/deep




nyserda.ny.gov (dashboards done by NYSERDA)

- > 442,000 EVs and consumers have received > $979 M in rebates
- > 75,000 survey responses being analyzed so far, statistically represent > 319,000 consumers
- Reports, presentations, and analysis growing

*As of 11/4/2020*

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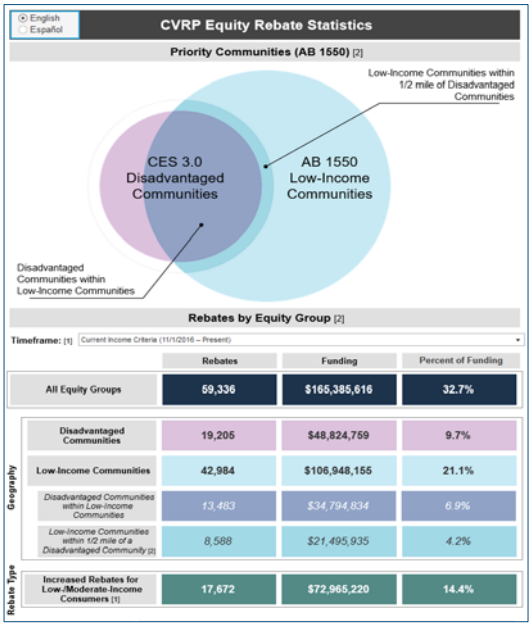
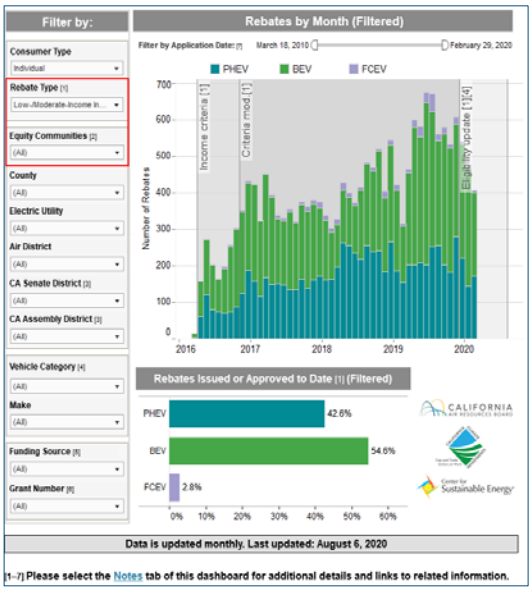
You can see data characterizing over 442,000 rebated vehicles for yourself **for free online** at the dashboards linked here.

They allow you **to slice and dice that data how you like to** answer your own questions and **support the market in your own specific ways**.

# Equity Statistics Dashboard

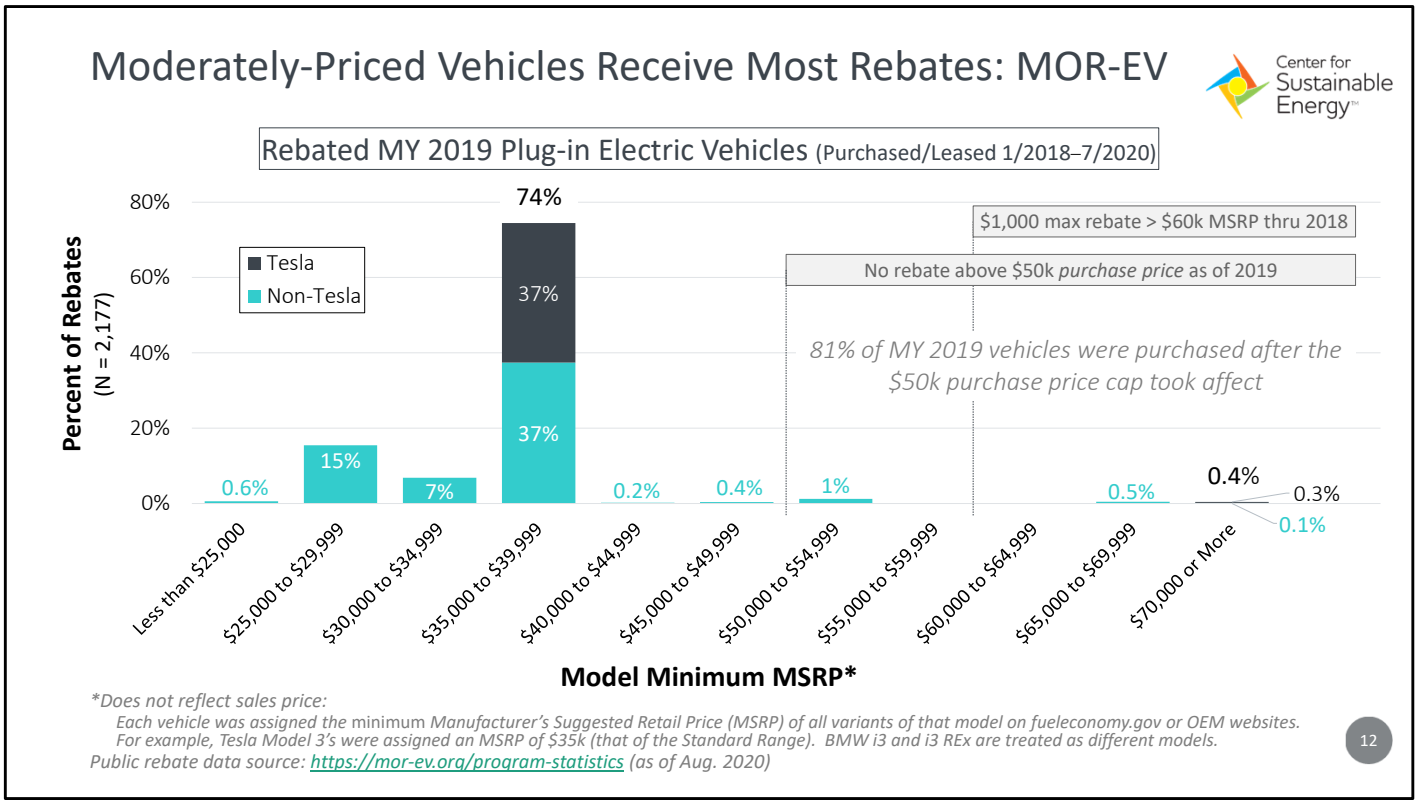



*8/6/20 images from https://cleanvehiclerebate.org/eng/rebate-statistics*

11

**One feature** to highlight on the CA rebate statistics dashboard is an "Equity Statistics" tab that **defines the state's priority populations** and **supplies** a variety of **equity metrics** and filterable results.




**Going beyond** what is available on the **dashboards**, here is **a look into** the manufacturers **suggested retail price** of vehicles being rebated.

By MY 2019, **three-quarters** of all vehicles rebated had model minimum MSRPs **between $35,000 and $40,000, before incentives**.

This was due to both the fall of the price of the Tesla Model 3 and, interestingly, the upwards shift in the largest portion of non-Tesla EVs from the $30,000–35,000 level (before incentives). An increase in the electric range of non-Tesla EVs in recent years may represent a similar trend of "convergence."

Note that, MOR-EV's $50,000 purchase-price cap took effect as of January 1st 2019, eliminating the expenditure of public funds on high-priced vehicles.


There are also some **misconceptions** about EV consumers **that** program survey **data can help re-calibrate**.

## Consumer Survey Data *(Shows Rebates to Individuals Only)*

| | CALIFORNIA CLEAN VEHICLE REBATE PROJECT | MOR-EV Massachusetts Offers Rebates for Electric Vehicles | CHEAPR | NEW YORK STATE | **Total** |
|---|---|---|---|---|---|
| **Vehicle Purchase/ Lease Dates** | Dec. 2010 – Dec. 2018 | Jun. 2014 – Apr. 2020 | May 2015 – Sep. 2018 | Mar. 2017 – Dec. 2019 | Dec. 2010 – Apr. 2020 |
| **Survey Responses (total n)*** | 62,092 | 6,616 | 1,565 | 5,170 | 75,443 |
| **Program Population (N)**** | 278,538 | 16,070 | 3,510 | 21,395 | 319,213 |

** Subsequently weighted to represent the program population along the dimensions of vehicle category, model, buy vs. lease, and county.*
*** Small numbers of rebated vehicles are not represented in the time frames due to application lags.*

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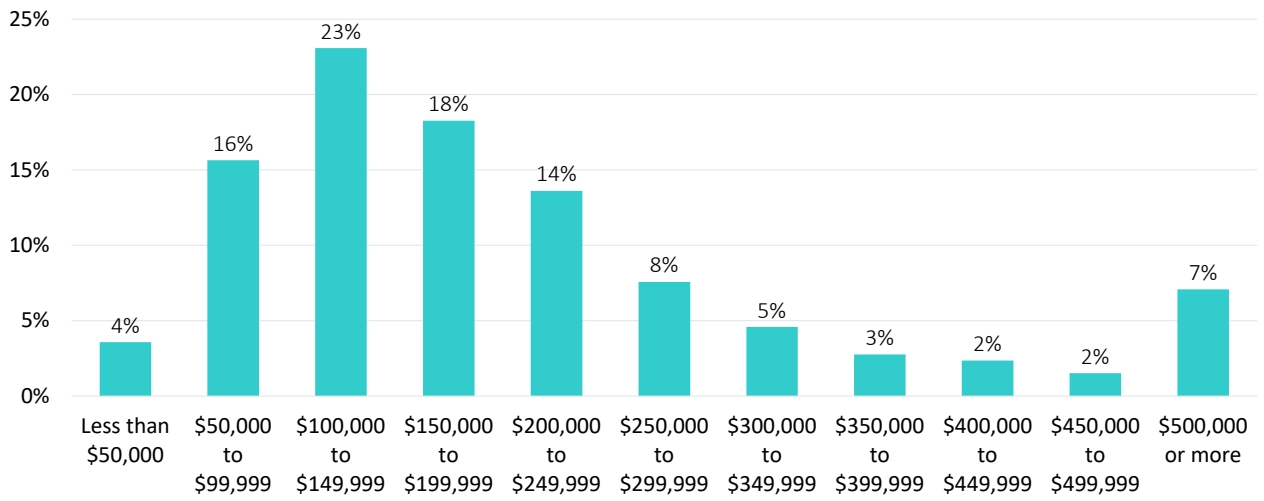
The following slides utilize survey responses **from over 75,000 rebated EV consumers**, which have been **weighted to statistically represent over 319,000 program participants** along the dimensions of vehicle model, technology type, buy vs. lease, and county.

## Distribution of Household Income: Life of Program

Purchases/Leases From June 2014 Through April 2020

MOR-EV
Massachusetts Offers Rebates for Electric Vehicles




*MOR-EV Consumer Survey through April 2020 purchase/lease dates (weighted n = 6,616)*
*Question responses filtered to exclude "Prefer not to answer" and missing data (weighted question n = 5,358)*

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Here we see the distribution of household income for all rebates given in Massachusetts for vehicles purchased/leased from program launch (June 2014) through April 2020 (latest available data).

It is likely that the high-income participants seen here were predominantly from the early years of the program, before a strict vehicle purchase-price cap was implemented. If higher-income households do continue to participate, they will be **supporting the volume production of more affordable EV models** and, subsequently, the **generation of affordable used EVs**.

More broadly, what do distributions like this one for income, or for other demographic characteristics, mean? Are they "good"? "Bad"? "High? "Low"?

To understand that, we need a baseline against which to compare these results.

## Setting an Appropriate Baseline: U.S. Car Buyers Are Different Than the Population

| |  **All** U.S. Population (Census 2018) | | **New-Vehicle Buyers** U.S. MYs 2016–17 (2017 NHTS) |
|---|---|---|---|
| Selected solely White/Caucasian | 61% | << | 74% |
| ≥ 50 Years Old | 35% | << | 51% |
| ≥ Bachelor's Degree | 23% | <<<< | 56% |
| Own Residence* | 63% | << | 75% |
| ≥ $75k HH Income* | 40% | <<< | 63% |
| Selected Male | 49% | ≈ | 51% |

- New-car buyers are different on almost every dimension.
- More frequently:
  - White
  - Older
  - Degree holders
  - Residence owners
  - Higher income

*"**Prefer not to answer**," "**I don't know**," **and similar** responses are **excluded** throughout. ***** Based upon **household level data**.*

Census 2018*: 2014–2018 American Community Survey, PUMS.* 2017 NHTS *is weighted to represent population, not new-vehicle subset. New-vehicle buyers identified based on within-100-mile match between odometer and miles driven while owned.*

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Let's tackle several consumer characteristics at once, including race/ethnicity, age, educational attainment, home ownership, income, and sex/gender.

To help us calibrate our understanding of EV-rebate-recipient demographics, **a baseline of comparison is needed**.

**Often,** as a matter of convenience, **Census statistics are used** for this purpose, but unfortunately, **this does not paint an accurate picture**.

This is because **new-car buyers are quite different** from the population as a whole **in almost all respects, sometimes dramatically**.

## U.S. Car Buyers Are Different Than the Population: Only Partially Explained by Age

| |  **All** U.S. Population (Census 2018) | **Driving Age** *16+ Years Old* U.S. Population (Census 2018) | **"Buying Age"** *21+ Years Old* U.S. Population (Census 2018) | **New-Vehicle Buyers** U.S. MYs 2016–17 (2017 NHTS) |
|---|---|---|---|---|
| Selected solely White/Caucasian | 61% | 64% | 65% < | 74% |
| ≥ 50 Years Old | 35% | 44% | 48% < | 51% |
| ≥ Bachelor's Degree | 23% | 28% | 30% <<< | 56% |
| Own Residence* | 63% | | << | 75% |
| ≥ $75k HH Income* | 40% | | <<< | 63% |
| Selected Male | 49% | 49% | 49% ≈ | 51% |

- *Some* of the difference explained by driving or buying age
- The rest may be due in part to *social inequities*

*"Prefer not to answer," "I don't know," and similar responses are excluded throughout. * Based upon household level data.*

Census 2018*: 2014–2018 American Community Survey, PUMS.* 2017 NHTS *is weighted to represent population, not new-vehicle subset. New-vehicle buyers identified based on within-100-mile match between odometer and miles driven while owned.*

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Even **accounting for** "driving age" or "new-car-buying **age**" only **partially explains these differences**.

**The rest** may be due to **social inequities** built up over decades. **To overcome these may take a** concerted and **comprehensive effort to transform our transportation systems**.

## Rebated EV Consumer Characteristics: Most Recent Calendar Year Available

| | All<br>U.S. Population<br>(Census 2018) | New-Vehicle Buyers<br>U.S. MYs 2016–17<br>(2017 NHTS) | CALIFORNIA CLEAN VEHICLE REBATE PROJECT<br>CY 2017<br>weighted n = 9,664 | MOR-EV Massachusetts Offers Rebates for Electric Vehicles<br>CY 2019<br>weighted n = 630 | CHEAPR<br>CY 2017<br>weighted n = 516 | NEW YORK STATE<br>CY 2018<br>weighted n = 2,092 |
|---|---|---|---|---|---|---|
| Selected solely White/Caucasian | 61% | 74% | 58% | 75% | 88% | 84% |
| ≥ 50 Years Old | 35% | 51% | 52% | 50% | 59% | 55% |
| ≥ Bachelor's Degree in HH | 23%* | 56%* | 82% | 93% | 85% | 78% |
| Own Residence | 63%** | 75%** | 79% | 91% | 89% | 87% |
| ≥ $75k HH Income | 40%** | 63%** | 79% | 92% | 81% | 67% |
| Selected Male | 49% | 51% | 72%*** | 79% | 71% | 70% |

*"Prefer not to answer," "I don't know," and similar responses are excluded throughout. * Census & NHTS data characterize individual educational attainment, whereas other data characterize highest household attainment. ** Based upon household level data. *** 100% includes non-binary options.*

Census 2018*: 2014–2018 American Community Survey, PUMS.* NHTS 2017 is *weighted to represent population, not new-vehicle subset. New-vehicle buyers identified based on within-100-mile match between odometer and miles driven while owned. Rebate data filtered by purchase/lease date.*

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**So, lets' grey out that inappropriate baseline** (in the first column) and examine EV consumers receiving new-car rebates **relative to new-car buyers.**

**The second column**, which is meant to represent an average U.S. new-vehicle buyer, **is a better starting point**. (Note that **educational attainment is measured differently** in the new-vehicle-buyer and rebate datasets, so that number is **greyed out as well to caution against direct comparisons**.)

Further, **each row is framed so** that over **half of all new-vehicle buyers fall into that category**. So each row can be considered **a "majority characteristic."**

For comparison, the most recent complete calendar year of data available is used to characterize each of the four statewide EV rebate programs in CA, MA, CT, and NY. There **are indeed some differences**, but **here those differences aren't exaggerated**—they are better calibrated.

But before discussing those differences, let's take the calibration one step further on the next slide—by using state- or region-specific characteristics for new-vehicle buyers, rather than U.S. averages.

This slide is included mainly for reference and multi-state context. For example, consider CA (a state that started directly limiting the income of eligible consumers with an income cap in 2016) in contrast to CT and NY (which both have point-of-sale rebate and MSRP-cap features but no income caps). Comparing the income statistic brings into question if the latter approach might be just as effective, if not more effective, than the former approach from an equity perspective. Additional discussion of this topic from an implementation perspective can be found here: https://energycenter.org/thought-leadership/research-and-reports/clean-transportation

## Rebated EV Consumer Characteristics: Most Recent Calendar Year

MOR-EV
Massachusetts Offers Rebates for Electric Vehicles

| | MA Population (Census 2018) | New England New-Vehicle Buyers MYs 2016–17 (2017 NHTS) | | MOR-EV Massachusetts Offers Rebates for Electric Vehicles CY 2019 purchases/leases weighted n = 630 |
|---|---|---|---|---|
| Selected solely White/Caucasian | 72% | 88% | >> | 75% |
| ≥ 50 years old | 36% | 49% | | 50% |
| ≥ Bachelor's degree in HH | 33%* | 61%* | | 93% |
| Own Residence | 62%** | 82%** | < | 91% |
| ≥ $75k HH Income | 51%** | 73%** | << | 92% |
| Selected Male | 49% | 49% | <<< | 79% |

*"Prefer not to answer," "I don't know," and similar responses are excluded throughout. * Census & NHTS data characterize individual educational attainment, whereas rebate data characterize highest household attainment. ** Based upon household-level data.*

Census 2018*: 2014–2018 American Community Survey, PUMS.* 2017 NHTS*: filtered for model years 2016, 2017 and states = CT, MA, ME, RI, VT, NH (weighted n = 330,437). NHTS is weighted to represent population, not new-vehicle subset. New-vehicle buyers identified based on within-100-mile match between odometer and miles driven while owned.*

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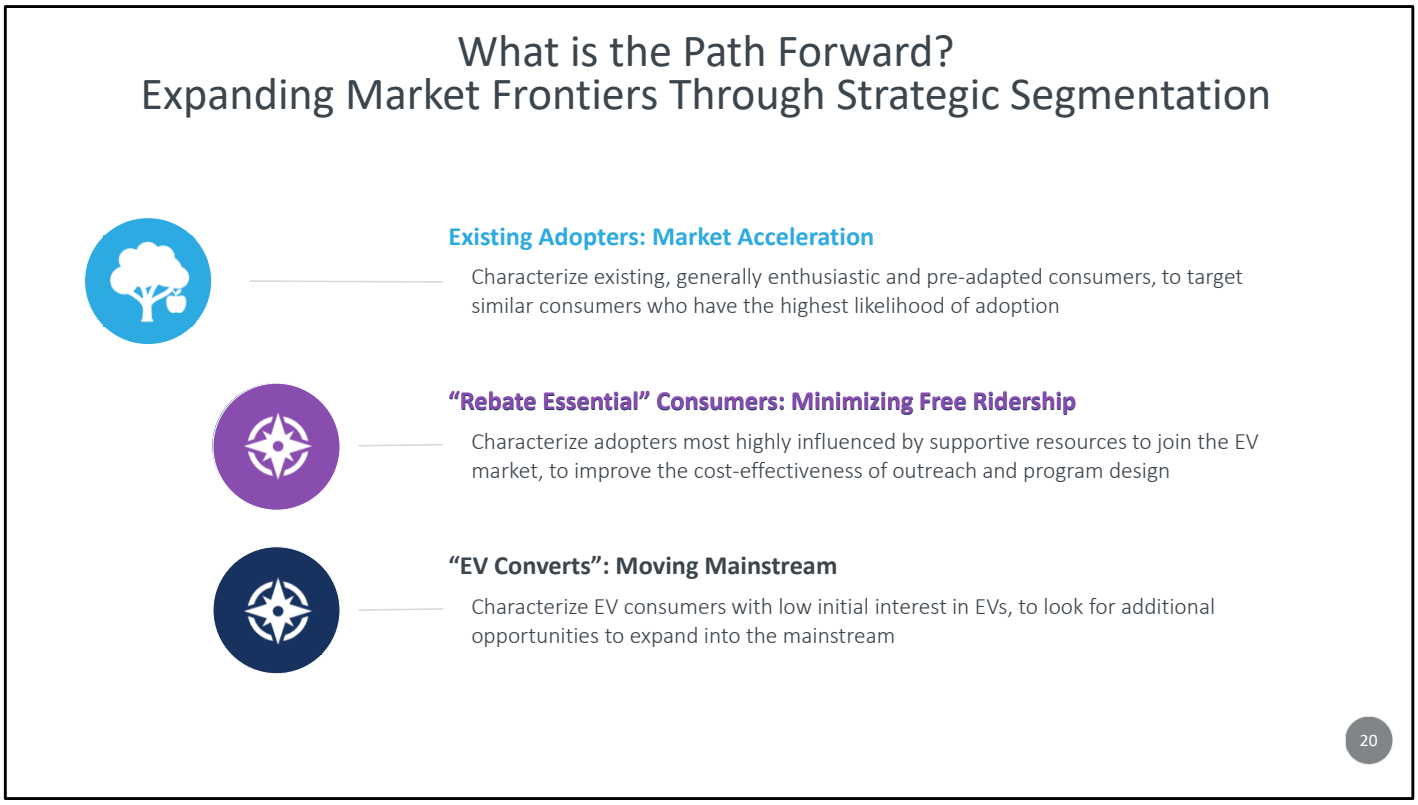
**When we use a new-car-buyer baseline even more specific to MA**, we see **some of the disparities** left when using a national baseline **diminish or** even **fade away**.

Indeed, Massachusetts **rebate recipients appear** to be **much *less* frequently white than New-England new-vehicle buyers** as a whole.

**Significant differences** do **remain for income** and should not be understated—over 92% of rebate recipients have household incomes greater than $75,000 per year. **But the difference** (**19 percentage points** compared to New-England car buyers) **is smaller than expected** if **comparing to** population data characterizing Massachusetts (**41 percentage points**) **or** the U.S. average (**52 percentage points**).

Finally, **the biggest remining difference across all these programs and all baselines is gender**.

Let's do something about that.




**What is the path forward?**

**So far, these data characterize** existing EV adopters as a whole, and create what you might consider **a "low-hanging fruit" profile**. **Targeting similar characteristics increases the** odds of finding consumers with a high **likelihood of adoption and** serves the goal of putting as many **EVs on the roads** as possible.

However, **we need to** not just **reinforce what is working**, **but also expand the frontiers of the market beyond pre-adapted, enthusiastic consumers**.

We've been working on **a couple of ways to do that:**

- **The first characterizes** the subset of existing **adopters who would not have acquired an EV without the rebate**, **or** what I call **Rebate Essentials**. This **focuses attention away from free riders and onto the most cost-effective targets for public subsidy, true market additions**.
- **The second characterizes** the subset of **adopters who had low initial interest in EVs**, but went on to adopt, or what I call **EV Converts**. This **helps us move further into the mainstream**.

See https://energycenter.org/thought-leadership/research-and-reports/clean-transportation

# Paths Forward: CA

| | Low-Hanging Fruit<br>*Nov. 2016* – Dec. 2018<br>weighted n = 23,478 | Rebate Essentials | EV Converts | CA New-Vehicle Buyers,<br>MYs '16–'17<br>(2017 NHTS) | Priority Populations |
|---|---|---|---|---|---|
| Selected solely White/Caucasian | 54% ↑ | ↑ | ↑ | 51% | For example, CalEnviroScreen Disadvantaged Communities or AB 1550 Priority Communities |
| ≥ 50 Years Old | 52% ↑ | ↓ | ↓ | 46% | |
| ≥ Bachelor's Degree in HH | 83% ↑↑ | ↑↑ | ↑ | 58%* | |
| ≥ $150k HH Income | 42% ↑ | ↑ | ≈ | 32% | |
| Selected Male | 73%* ↑↑↑ | ↑↑↑ | ↑↑ | 50% | |

*"Prefer not to answer," "I don't know," and similar responses are excluded throughout.*
*NHTS weighted to represent population, not new-vehicle subset. New-vehicle buyers identified based on within-100-mile match between odometer and miles driven while owned.*
** 100% includes non-binary options.*

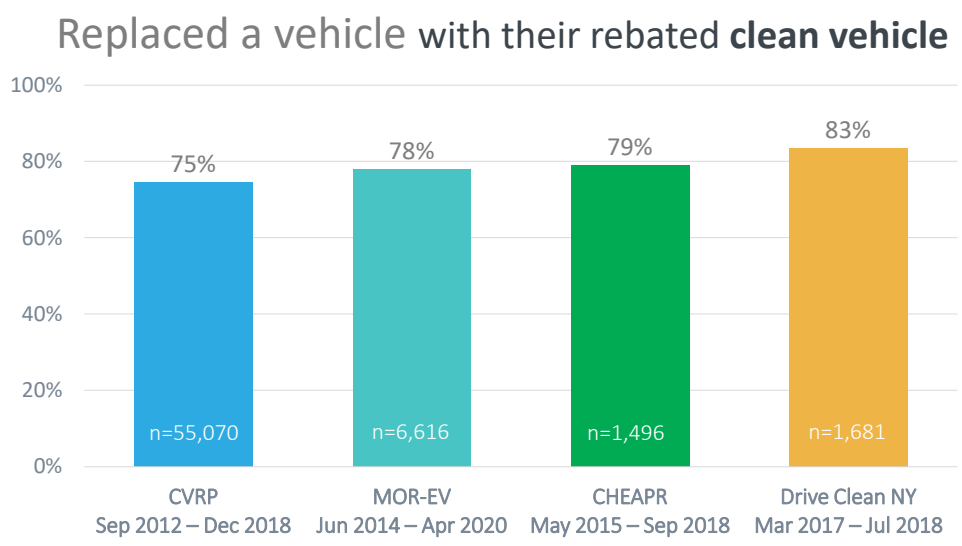
21

Demographically, preliminary analysis of California data shows that strategic segments like Rebate Essentials and EV Converts whittle away at the differences between early adopters and mainstream car buyers and point the way toward mainstream car markets.

But **we can't stop there**, **we must assure that priority populations facing structural social inequities benefit as well.**


So now lets **move beyond characterizing rebated vehicles and consumers to understanding the behaviors influenced** and, in due course, program impacts

# Do EVs Get Used?



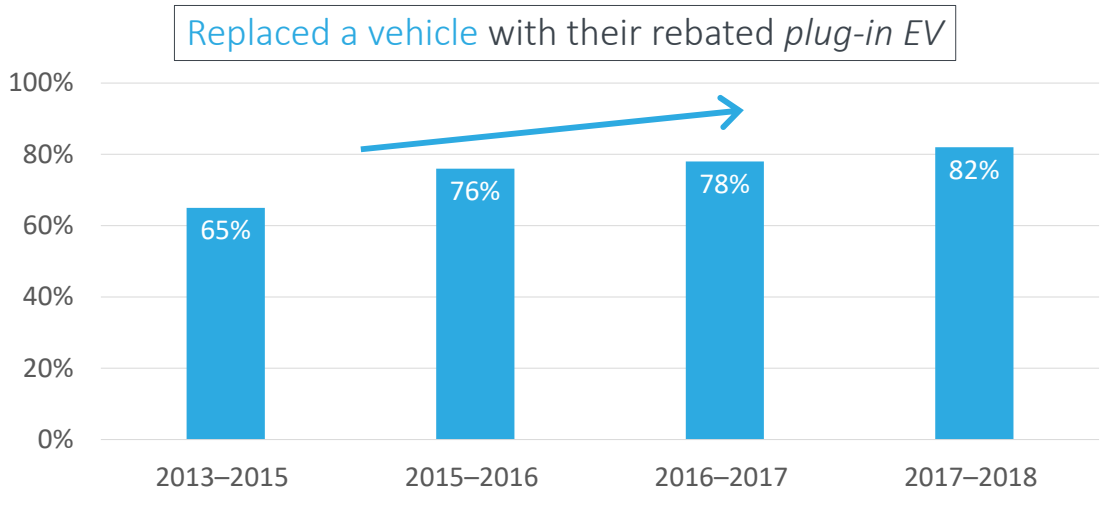

*Overall datasets: 72,081 total survey respondents weighted to represent 306,769 rebate recipients*

23

**EVs are not just extra toys that don't get used.**

**Across all states, EVs are replacing older, more polluting vehicles at high rates**, typically about 80% in recent years

## Vehicle Replacement is Increasing




CVRP Consumer Survey: 2013–2015 edition: weighted, question n=19,247;
2015–2016 edition: weighted, question n= 11,583;
2016–2017 edition: weighted, question n= 9,006;
2017–2018 edition: weighted, question n= 20,847

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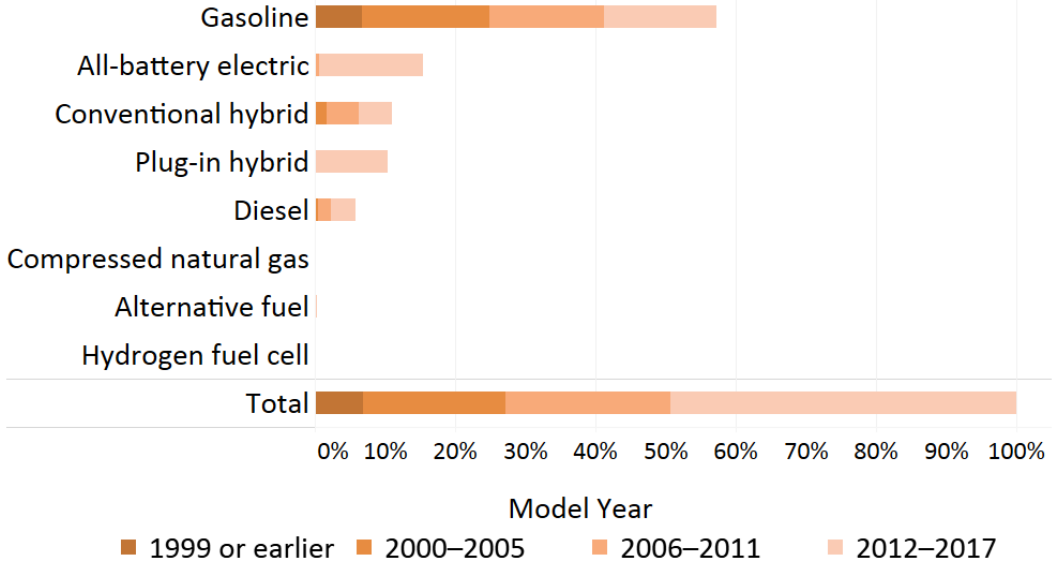
And this **trend is increasing over time**, as EVs make inroads into the mainstream.

# Impacts: Emission

## What Vehicles Types Have Rebates Helped Replace?

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*CVRP Consumer Survey. **2016–2017** edition, **trimmed to start November 2016**, PEV respondents only, weighted, n=4,695*

And **the vehicles being replaced are older and more polluting**.

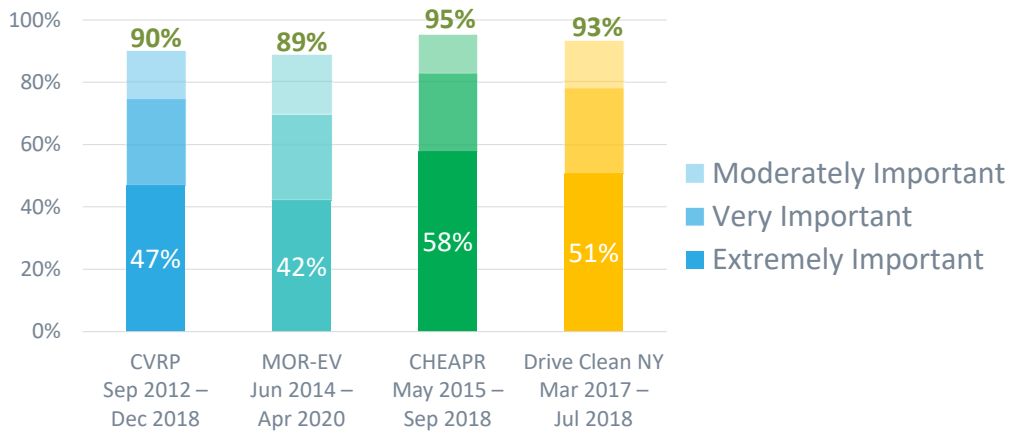
Even in a recent data, **most of the replaced vehicles are still gasoline vehicles. Half are more than five years old, shown in the darker shading, and** consistently over time, **one-quarter** of the vehicles being replaced **are more than 11 years old**.

Calculations **using case-specific program data** indicate the **GHGs being saved may amount to over 30 tons/vehicle at well under $100/t.**


Finally, what is the **impact on the market?**

## Rebate Influence: Importance

How important was the state rebate in making it possible for you to acquire your clean vehicle?




*Overall datasets: 72,081 total survey respondents weighted to represent 306,769 rebate recipients*

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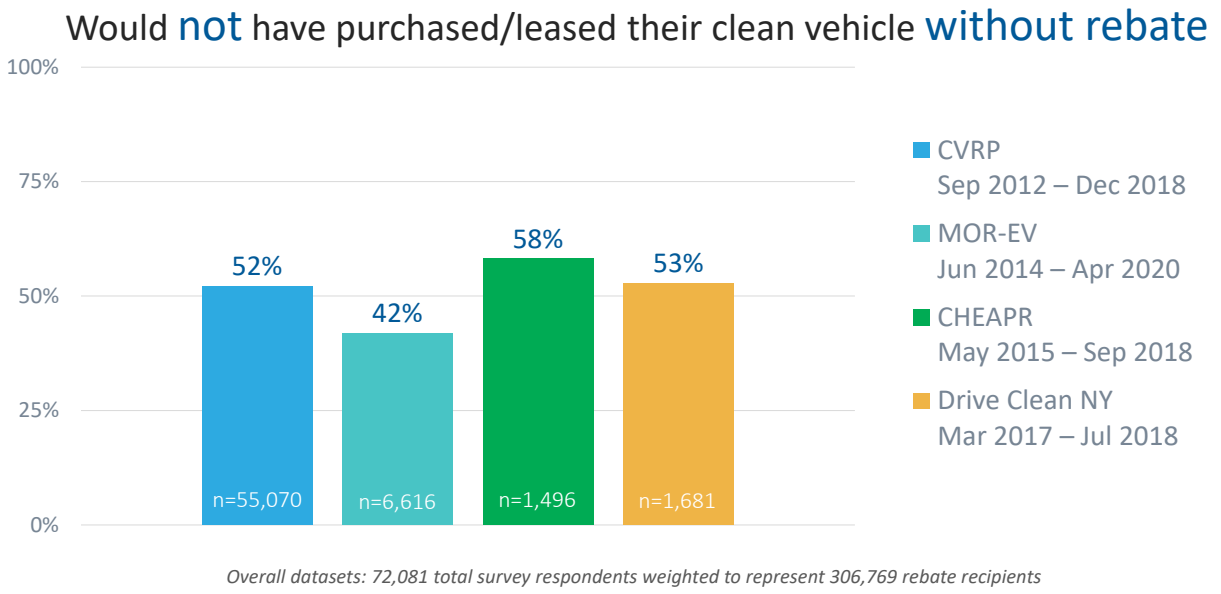
**Across all states, rebates are** rated **moderately to extremely important** about **90% of the time,** not just in general, but **specifically in terms of making it possible** for consumers **to acquire an EV.**

# Rebate Influence: Essentiality




*Overall datasets: 72,081 total survey respondents weighted to represent 306,769 rebate recipients*

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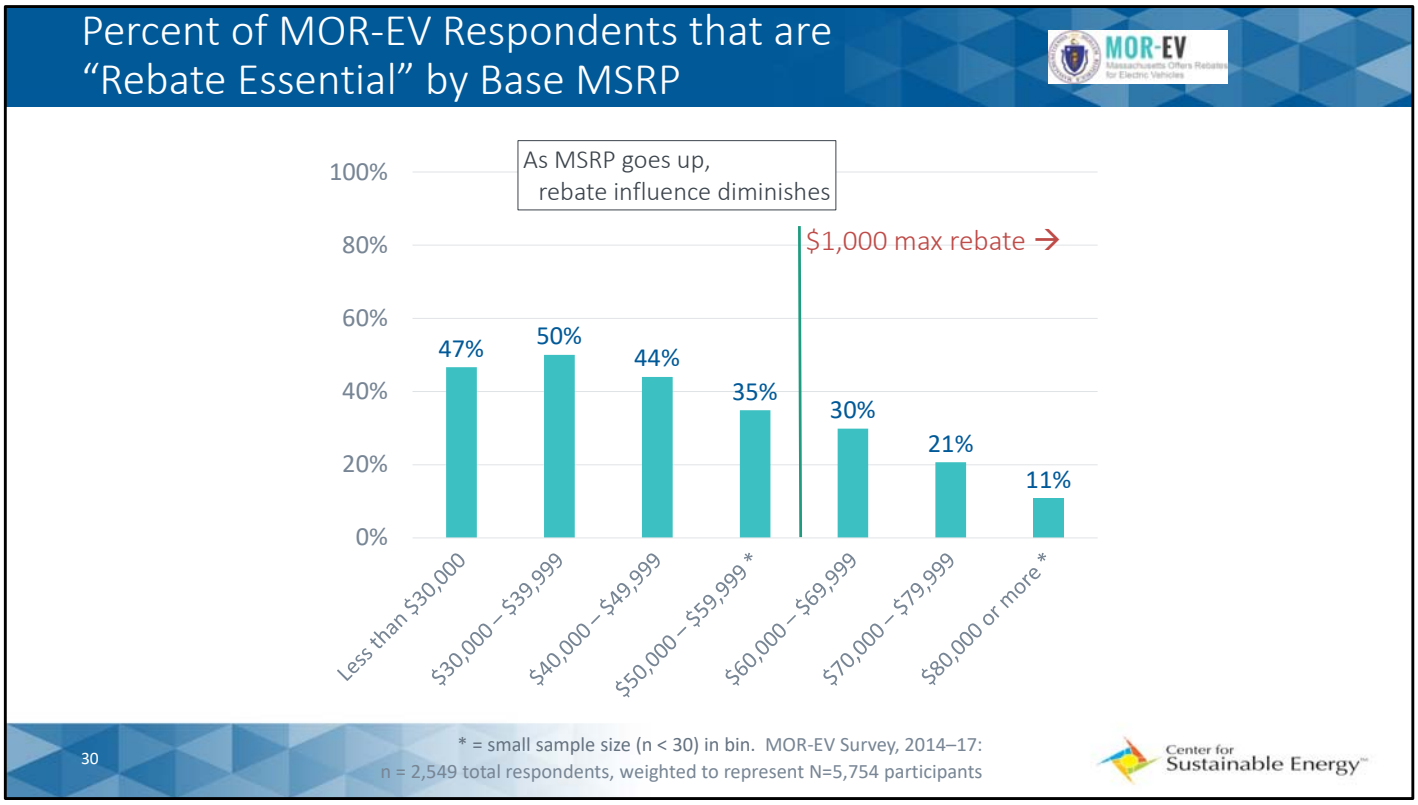
Moving beyond "importance" is **a measure that is more conservative, straightforward, and counterfactual** (and less subject to interpretation or survey bias)**: "*Rebate Essentiality.*"**

About **half of all** 300k **program participants** claim they simply **would not have acquired their EV without the state rebate**.




***Rebate Essentiality*** is not just a good indicator of impact, it **also** reveals and confirms interesting trends.

For example, **rebate influence decreases as vehicle price goes up**.

Programs can **reduce free ridership** and improve equity **with a simple MSRP cap** on vehicles **rather than a complicated-to-implement income cap** on consumers.

This allows states to simply take luxury vehicles off the eligibility list for public support. Importantly, it also **avoids:** the **intrusiveness** of collecting tax forms from consumers, **fraud**, **loopholes, and other implementation challenges** of income caps.

# Rebate Importance by Vehicle Price


MOR-EV Survey, 2014–17: n = 2,549 total respondents weighted to represent N = 5,754 participants
Excludes one response missing price data.

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Put another way, the proportion of participants rating the rebate extremely important to enabling their purchase or lease of vehicles with MSRPs below $60,000 was double that for vehicles with MSRPs greater than $60,000.

# Wrap Up

## Select Findings: Program Impacts

**Vehicles Rebated**

- Predominantly moderate-MSRP models
- 4/5$^{ths}$ of rebated EVs replace older, more polluting vehicles

**Rebated Consumer Characteristics**

- Some characteristics are aligning with, or trending toward, new-vehicle buyers
- Some differences remain, particularly gender and, to a lesser extent, income
- Important to calibrate against appropriate comparisons

**Rebate Influence** on purchase/lease:

- moderately to extremely important to 9/10$^{ths}$
- essential to 1/2
    - Focusing on "*Rebate Essentials"* can reduce free-ridership, be a cost-effective, strategic step on the path toward mainstream markets and beyond to priority populations
- Indicators of **impact** tend to be ***increasing***

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Here is a summary of what we've talked about.

**To repurpose the words of Abraham Lincoln**, "**If we could first know *where* we are, and *whither* we are tending, we could then better judge *what* to do, and *how* to do it."**

So, with this presentation, **I hope I have helped update and calibrate our thinking**,
**and given a sense of what is being done**, **its impact**, and **what we should do**
**Let us press on towards widespread adoption, more mainstream markets, and beyond to increased access and equitable solutions.**

I look forward to the conversation. Please join me:

Snapshot Session, 3:15–3:30pm, Tuesday, 8 December 2020
(setting the stage for the "Electric Vehicles for All" Session 5A at 3:30pm)
beccconference.org

# (Additional) Topics for Discussion

- Tales in EV Sales, in Massachusetts and elsewhere
- Who is buying EVs and receiving rebates?
  - EV consumer demographics / incentive beneficiaries (a.k.a. “Are they just rich white guys?”)
- What are the paths forward?
  - EV incentive design and outreach strategy for: Volume benefits vs. Cost effectiveness vs. Equity
- Outcomes: what behaviors are rebates influencing?
  - A.k.a. “Are EVs just toys that don’t get used and don’t do any good?”
- Impacts: for the market and emissions
  - A.k.a. “Do they do any good?”
- What about the federal tax credit?
- Implementation perspectives and program design considerations
  - Income caps vs. MSRP caps
  - Pillars of program administration
- Dealer sales incentives
- Comprehensive and effective EV policy frameworks
  - Vehicle supply, awareness, purchase/lease incentives, dealer sales incentive, fuel carbon intensity, vehicle use, used EVs
- Musings for Massachusetts: program-design recommendations

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Some topics (both covered by the slides and others), to help seed the conversation.

# Additional Resources

## Introducing… Caret™

Caret™ is a dynamic platform for designing and optimizing EV incentive programs that empowers decision-makers to make data-driven choices.

It helps policymakers determine which mix of incentives will encourage EV adoption and reduce GHG emissions at the lowest cost and in the shortest time.

With Caret™ you can:

- Take EV incentive ideas for a virtual test drive
- See in real time the costs and impacts of various decisions
- Continuously optimize incentives to meet your goals

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# Center for Sustainable Energy

The Center for Sustainable Energy (CSE) is an independent nonprofit with a single mission: **Decarbonize**.

Financially independent from donors, members or shareholders, CSE has built a reputation as a trusted neutral party in clean energy and transportation program design.

CSE has decade-long experience designing and administering over $1 billion of EV and EV charging infrastructure incentive programs. In its program work, CSE has interacted with nearly 30% of new-EV buyers in the U.S.

- Learn more about Caret™ at EnergyCenter.org/software/caret.
- Learn more at EnergyCenter.org.

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For more information:

https://energycenter.org/thought-leadership/research-and-reports

https://cleanvehiclerebate.org/eng/program-reports

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