What Vehicles Are Electric Vehicles Replacing and Why?

BECC Conference, “Charging Into the Future” Session, 19 November 2019, Sacramento CA

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Brett Williams, PhD – Principal Advisor, EV Programs — CSE

with thanks to Keir Havel and others at CSE

Version: January 2020
CSE Areas of Expertise

**Clean Transportation**
Adoption of electric vehicles and deployment of charging infrastructure

**Built Environment**
Advancing energy efficiency and renewable resources

**Technology Convergence**
Interconnecting systems to achieve decarbonization
### State EV Cash Rebate Programs Administered by CSE
(as of 30 Sep. 2019)

<table>
<thead>
<tr>
<th>Fuel-Cell EVs</th>
<th>All-Battery EVs</th>
<th>Plug-in Hybrid EVs</th>
<th>Zero-Emission Motorcycles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$5,000</td>
<td>$2,500</td>
<td>$2,500 (i3 REx)</td>
<td>$900</td>
</tr>
<tr>
<td>$1,500</td>
<td>$1,500</td>
<td>BEVx only: $1,500</td>
<td>$450</td>
</tr>
<tr>
<td></td>
<td>$2,500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$1,500</td>
<td>$1,500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 20 UDDS e-miles</td>
<td>≥ 200 e-miles $2,000</td>
<td>≥ 45 e-miles $1,000</td>
<td>• Base MSRP &lt; $50k</td>
</tr>
<tr>
<td>Income cap</td>
<td>≥ 120 e-miles $1,500</td>
<td>&lt; 45 e-miles $500</td>
<td>• Point-of-sale option</td>
</tr>
<tr>
<td>Increased rebates for lower-income households (+$2,000)</td>
<td>≥ 20 e-miles $1,100</td>
<td>&lt; 10 kWh $1,500</td>
<td>• Increased rebates for lower-income households (+$2,500), used EVs also qualify</td>
</tr>
<tr>
<td>No fleet rebates</td>
<td>&lt; 120 e-miles $500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Program ended 9/30/19

- BEVs & PHEVs ≤ $50k base MSRP, FCEVs ≤ $60k
- Point-of-sale option
- $150 dealer incentive

- Base MSRP > $60k = $500
- Point-of-sale

- Oregon CVRP

≥ 120 e-miles $2,000
≥ 40 e-miles $1,700
≥ 20 e-miles $1,100
< 20 e-miles $500

≥ 10 kWh $2,500
< 10 kWh $1,500

≥ 45 e-miles $1,000
< 45 e-miles $500

$750 (and NEVs)
Outline: Vehicle Replacement Over Time

• **Context**

• **Are EVs* Replacing Older Vehicles?**

• **What Vehicles are Plug-in EVs** ** Replacing?**

• **What Motivated Vehicle Replacement?**

• **What Might Have Happened Without the Rebated Plug-in EV?**

• **Wrap Up**

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

** PEVs = PHEVs and BEVs
Outline: Vehicle Replacement Over Time

• **Context**
  – Research aims and data (for reference)

• **Are EVs* Replacing Older Vehicles?**
  – Replacement rates across states, by tech type

• **What Vehicles are Plug-in EVs** ** Replace?**
  – Replaced-vehicle model year, tech type

• **What Motivated Vehicle Replacement?**
  – Replacement decision factors, push vs. pull, and by tech type

• **What Might Have Happened Without the Rebated Plug-in EV?**
  – Counterfactual behaviors

• **Wrap Up**
  – Summary, additional resources, and supplementary details

---

* EVs = light-duty plug-in hybrid, battery, and fuel-cell electric vehicles (PHEVs, BEVs, and FCEVs)
** PEVs = PHEVs and BEVs
Replaced Vehicles
Context, Replacement Rates, Vehicle Details, Decision Factors, Incentive Counterfactuals
Context

Research Aims and Data
This study was conducted to inform the California Clean Vehicle Rebate Project (CVRP) and, in doing so, inform broader assessments.

- *It does not necessarily represent the views of the California Air Resources Board*
- *Nor does it represent a final determination for project-reporting purposes*

We thank CARB staff for the opportunity to contribute to, and foster, the conversation.
## 4-State Consumer Survey Data
(Shows Rebates to Individuals Only)

<table>
<thead>
<tr>
<th>Vehicle Purchase/Lease Dates</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 2015 – Sep. 2018</td>
<td></td>
</tr>
</tbody>
</table>

### Survey Responses (total n)*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>62,092</td>
<td>4,555</td>
<td>1,565</td>
<td>70,020</td>
</tr>
</tbody>
</table>

### Program Population (N)

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>278,538</td>
<td>10,920</td>
<td>3,510</td>
<td>301,619</td>
</tr>
</tbody>
</table>

*Weighted to represent the program population along the dimensions of vehicle category, vehicle model, buy vs. lease, and county (using raking method)
CA Consumer Survey Data
(Shows Rebates to Individuals Only)

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PHEVs, BEVs</td>
<td>PHEVs, BEVs</td>
<td>PHEVs, BEVs, FCEVs</td>
<td>PHEVs, BEVs, FCEVs</td>
<td>PHEVs and BEVs: Sep. ‘12 – Dec. ‘18 FCEVs: Dec. ‘10 – Dec. ‘18</td>
</tr>
<tr>
<td>Survey Responses (total n)*</td>
<td>19,460</td>
<td>11,611</td>
<td>9,367</td>
<td>21,654</td>
<td>62,092</td>
</tr>
<tr>
<td>Program Population (N)</td>
<td>91,081</td>
<td>45,698</td>
<td>48,588</td>
<td>93,171</td>
<td>278,538</td>
</tr>
</tbody>
</table>

* Weighted to represent the program population along the dimensions of vehicle category, vehicle model, buy vs. lease, and county (using raking method)
CA Consumer Survey Data: Plug-in EVs*
(Shows Rebates to Individuals Only)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Survey Responses</strong></td>
<td>19,460</td>
<td>11,611</td>
<td>8,957</td>
<td>20,864</td>
<td>60,892</td>
</tr>
<tr>
<td>(total n)**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Program Population</strong></td>
<td>91,081</td>
<td>45,698</td>
<td>46,839</td>
<td>89,944</td>
<td>273,562</td>
</tr>
<tr>
<td>(N)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* PHEVs and BEVs
** Weighted to represent the program population along the dimensions of vehicle category, vehicle model, buy vs. lease, and county (using raking method)
## EV Rebate Designs

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

<table>
<thead>
<tr>
<th>Category</th>
<th>Base MSRP ≤ $60k</th>
<th>Base MSRP &gt; $60k</th>
<th>e-miles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fuel-Cell EVs</strong></td>
<td>$5,000</td>
<td>$2,500</td>
<td>≥ 120</td>
</tr>
<tr>
<td><strong>All-Battery EVs</strong></td>
<td>$2,500</td>
<td>$2,500</td>
<td>≥ 40</td>
</tr>
<tr>
<td><strong>Plug-in Hybrid EVs</strong></td>
<td>$2,500 (i3 REx)</td>
<td>≥10 kWh</td>
<td>≥ 100</td>
</tr>
<tr>
<td></td>
<td>$1,500</td>
<td>&lt;10 kWh</td>
<td>&lt; 100</td>
</tr>
<tr>
<td><strong>Zero-Emission Motorcycles</strong></td>
<td>$900</td>
<td>$750</td>
<td>≥ 40</td>
</tr>
</tbody>
</table>

**Program ended 9/30/19**

- e-miles ≥ 20 only
- Consumer income cap
- increased rebates for lower-income households
- Base MSRP ≥ $60k = $1,000 max.
- no fleet rebates
- Base MSRP ≤ $60k only
- dealer assignment
- $150 dealer incentive ($300 previous)
- Base MSRP > $60k = $500 max.
- point-of-sale via dealer

- e-miles
- ≥ 120 $2,000
- ≥ 40 $1,700
- ≥ 20 $1,100
- < 20 $500
Are EVs Replacing Older Vehicles?

Replacement rates across states, by tech type
Do EVs Get Used?

Replaced a vehicle with their rebated clean vehicle

- CVRP (2013–2018): 75%
- MOR-EV (2014–2018): 77%
- CHEAPR (2015–2018): 79%
- Drive Clean NY (2017–2018): 83%

Overall datasets: 70,020 total survey respondents weighted to represent 301,619 rebate recipients
Vehicle Replacement is Increasing

Replaced a vehicle with their rebated plug-in EV

- 2013–2015: 65%
- 2015–2016: 76%
- 2016–2017: 78%
- 2017–2018: 82%

2015–2016 edition: weighted, question n= 11,583
2016–2017 edition: weighted, question n= 9,006
2017–2018 edition: weighted, question n= 20,847
Vehicle Replacement is *Increasing* Over Time, Contradicting a Common Paradigm About Phasing Out Incentives

<table>
<thead>
<tr>
<th>Year Range</th>
<th>Replaced a vehicle with their plug-in EV</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013–2015</td>
<td>65%</td>
</tr>
<tr>
<td>2015–2016</td>
<td>76%</td>
</tr>
<tr>
<td>2016–2017</td>
<td>78%</td>
</tr>
<tr>
<td>2017–2018</td>
<td>82%</td>
</tr>
</tbody>
</table>

2015–2016 edition: weighted, question n= 11,583
2016–2017 edition: weighted, question n= 9,006
2017–2018 edition: weighted, question n= 20,847
Vehicle Replacement Has Long Been High for PHEVs, Is Growing for BEVs

Replaced a vehicle with their rebated plug-in EV

2015–2016 edition: weighted, question n=11,583
2016–2017 edition: weighted, question n=9,006
2017–2018 edition: weighted, question n=20,847

BECC 2019
What Vehicles are EV Replacing?

Replaced vehicle details
### Replaced Vehicle Age

Age = Rebated EV model year − Replaced vehicle model year

<table>
<thead>
<tr>
<th>Survey Edition</th>
<th>0%</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013–2015</td>
<td>26%</td>
<td>17%</td>
<td>18%</td>
<td>21%</td>
<td>19%</td>
</tr>
<tr>
<td>2015–2016</td>
<td>25%</td>
<td>15%</td>
<td>13%</td>
<td>30%</td>
<td>18%</td>
</tr>
<tr>
<td>2016–2017</td>
<td>26%</td>
<td>12%</td>
<td>11%</td>
<td>37%</td>
<td>14%</td>
</tr>
<tr>
<td>2017–2018</td>
<td>27%</td>
<td>13%</td>
<td>14%</td>
<td>28%</td>
<td>18%</td>
</tr>
</tbody>
</table>

2015–2016 edition: weighted, question n= 8,627
2016–2017 edition: weighted, question n= 6,933
2017–2018 edition: weighted, question n= 14,696
What Vehicle **Types** Have Rebates Helped Replace?

<table>
<thead>
<tr>
<th></th>
<th>Gasoline</th>
<th>Electric (BEV/PHEV/FCEV)</th>
<th>Conventional hybrid</th>
<th>Diesel or other alternative fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013–2015</td>
<td>76%</td>
<td>9%</td>
<td>14%</td>
<td>1%</td>
</tr>
<tr>
<td>2015–2016</td>
<td>71%</td>
<td>17%</td>
<td>10%</td>
<td>2%</td>
</tr>
<tr>
<td>2016–2017</td>
<td>59%</td>
<td>26%</td>
<td>10%</td>
<td>5%</td>
</tr>
<tr>
<td>2017–2018</td>
<td>63%</td>
<td>24%</td>
<td>11%</td>
<td>2%</td>
</tr>
</tbody>
</table>

2015–2016 edition: weighted, question n= 8,594
2016–2017 edition: weighted, question n= 6,925
2017–2018 edition: weighted, question n= 17,021
What Vehicle Types Have Rebates Helped Replace?

<table>
<thead>
<tr>
<th></th>
<th>'13-'15</th>
<th>'15-'16</th>
<th>'16-'17</th>
<th>'17-'18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline or Diesel</td>
<td>77%</td>
<td>73%</td>
<td>64%</td>
<td>64%</td>
</tr>
<tr>
<td>Electric (BEV/PHEV/FCEV)</td>
<td>9%</td>
<td>17%</td>
<td>26%</td>
<td>24%</td>
</tr>
<tr>
<td>Conventional hybrid</td>
<td>14%</td>
<td>10%</td>
<td>10%</td>
<td>11%</td>
</tr>
<tr>
<td>Other alternative fuel</td>
<td>0%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

2015–2016 edition: weighted, question n= 8,594
2016–2017 edition: weighted, question n= 6,925
2017–2018 edition: weighted, question n= 17,021

BECC 2019
Model-Year Distribution of Vehicles Replaced by 2017–18 Edition Survey Respondents

Vehicle Type
- Other alternative fuel
- Conventional hybrid
- Electric (BEV/PHEV/FCEV)
- Gasoline or Diesel

Model-Year Distribution of Vehicles Replaced by 2017–18 Edition Survey Respondents

Vehicle Type
- Other alternative fuel
- Conventional hybrid
- Electric (BEV/PHEV/FCEV)
- Gasoline or Diesel

Repeat buyers?
Top Replaced-Vehicle Technology Types, by Rebated-Vehicle Technology Type

2015–2016 edition: weighted, question n= 8,398
2016–2017 edition: weighted, question n= 6,557
2017–2018 edition: weighted, question n= 16,673
What Motivated Vehicle Replacement?
Replacement decision factors, push vs. pull, and by tech type
Why Now? - Factors Influencing the Decision to Replace

Select all that apply:

- Current government/employer incentives were appealing (e.g. financial, carpool sticker, parking)
- Spending too much on fuel for previous vehicle
- Wanted a different vehicle
- Previous vehicle was too old/needed costly repairs
- Current price or interest/lease rates were appealing
- Previous lease expired/was about to expire
- New model caught my attention
- Other
- Previous vehicle no longer fit my (family’s) needs
- I get a new vehicle on a regular basis
- Previous vehicle was damaged/stolen
- Financial situation changed

2016–2017 edition: weighted, question n= 7,000
“Push” vs. “Pull” Factors Influencing the Decision to Replace

Select all that apply:

- Current government/employer incentives were appealing (e.g. financial, carpool sticker, parking)
- Spending too much on fuel for previous vehicle
- Wanted a different vehicle
- Previous vehicle was too old/needed costly repairs
- Current price or interest/lease rates were appealing
- Previous lease expired/was about to expire
- New model caught my attention
- Other
- Previous vehicle no longer fit my (family’s) needs
- I get a new vehicle on a regular basis
- Previous vehicle was damaged/stolen
- Financial situation changed

Percent of Respondents that Selected

![Bar chart showing the percent of respondents that selected each factor. The factors are ranked by their influence, with "Pushed" factors (6 factors ≈ 41% of selections) and "Pulled" factors (5 factors ≈ 50% of selections).](chart.png)

2016–2017 edition: weighted, question n= 7,000

BECC 2019
Financial Factors Influencing the Decision to Replace

Select all that apply:

- Current government/employer incentives were appealing (e.g. financial, carpool sticker, parking)
- I get a new vehicle on a regular basis
- Spending too much on fuel for previous vehicle
- Wanted a different vehicle
- Previous vehicle no longer fit my (family’s) needs
- Previous vehicle was damaged/stolen
- Previous lease expired/was about to expire
- New model caught my attention
- Current price or interest/lease rates were appealing
- Financial situation changed
- Other: New model caught my attention

Percent of Respondents that Selected

Lured
2 factors ≈ 30% of selections ↗

2016–2017 edition: weighted, question n= 7,000

BECC 2019
Financial lures are important to entice replacement with BEVs

Select all that apply:

- Current government/employer incentives were appealing (e.g., financial, carpool sticker, parking)
- Previous lease expired/was about to expire
- Spending too much on fuel for previous vehicle
- New model caught my attention
- Current price or interest/lease rates were appealing
- Previous vehicle was too old/needed costly repairs
- Other, please specify: _____
- Wanted a different vehicle
- Previous vehicle no longer fit my (family’s) needs
- Previous vehicle was damaged/stolen
- I get a new vehicle on a regular basis
- Financial situation changed

Percent of Respondents that Selected

CVRP Consumer Survey, 2016–2017 edition: weighted, question n=7,000
What Might Have Happened Without the Rebated EV?

Counterfactual behaviors
Counterfactual Alternative Behaviors

Kept Old

Bought/Leased

- used ICEV
- new ICEV
- used EV
- new other EV
- same new EV

Which of the following best describes your [model] purchase or lease?

- Kept Old
- Bought/Leased used ICEV
- Bought/Leased new ICEV
- Bought/Leased used EV
- Bought/Leased new other EV
- Bought/Leased same new EV
If the state vehicle rebate (CVRP) were not available for a [model] or any other plug-in electric vehicle (PEV), what do you think you would have done?

**Alternative Scenario Without CVRP**

- **Purchased/leased this exact vehicle anyway**: 37% (PHEV), 33% (BEV)
- **Purchased/leased a new non-PEV instead**: 11% (PHEV), 16% (BEV)
- **Not made any purchase/lease at all**: 16% (PHEV), 23% (BEV)
- **Purchased/leased a less expensive version of the same model**: 12% (PHEV), 15% (BEV)
- **Purchased/leased a different [new] PEV**: 10% (PHEV), 8% (BEV)
- **Purchased/leased a used PEV**: 6% (PHEV), 6% (BEV)
- **Purchased/leased a used non-PEV instead**: 4% (PHEV), 4% (BEV)

**Percent of Total**

BECC 2019

If the state vehicle rebate (CVRP) were not available for a [model] or any other plug-in electric vehicle (PEV), what do you think you would have done?

<table>
<thead>
<tr>
<th>Alternative Scenario Without CVRP</th>
<th>PHEV</th>
<th>BEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchased/leased this exact vehicle anyway</td>
<td>33%</td>
<td>37%</td>
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<td>15%</td>
</tr>
<tr>
<td>Purchased/leased a different [new] PEV</td>
<td>8%</td>
<td>10%</td>
</tr>
<tr>
<td>Purchased/leased a used PEV</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>Purchased/leased a used non-PEV instead</td>
<td>4%</td>
<td>4%</td>
</tr>
</tbody>
</table>

If the state vehicle rebate (CVRP) were not available for a [model] or any other plug-in electric vehicle (PEV), what do you think you would have done?

**Alternative Scenario Without CVRP**

- Purchased/leased this exact vehicle anyway: 33%
- Purchased/leased a new non-PEV instead: 16%
- Not made any purchase/lease at all: 16%
- Purchased/leased a less expensive version of the same model: 15%
- Purchased/leased a different [new] PEV: 12%
- Purchased/leased a used PEV: 8%
- Purchased/leased a used non-PEV instead: 6%
- Purchased/leased a new non-PEV instead: 4%

**Summary**

- Free riders: 33%
- Rebate influenced: 67%
  - Switched to EV: 37%
  - Entered market for an EV (>1/5): 37%
  - EV added: 23%
  - EV changed: 10%

In particular, rebates appear to **encourage new BEV purchases/leases**

### Alternative Scenario Without CVRP

<table>
<thead>
<tr>
<th>Scenario</th>
<th>PHEV</th>
<th>BEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchased/leased this exact vehicle anyway</td>
<td>37%</td>
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<tr>
<td>Purchased/leased a used non-PEV instead</td>
<td>4%</td>
<td>4%</td>
</tr>
</tbody>
</table>

*Entered new-car market due to rebate*

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BECC 2019

CVRP Consumer Survey, **2017–2018** edition: weighted, question n= 17,880
Wrap Up
Summary, additional resources & supplemental details
Select Findings: Vehicle Replacement

• ~4/5ths of rebated EVs *replaced* older, more polluting vehicles
• PHEVs produced strong replacement rates early, BEVs catching up
• These and other impacts tend to be *increasing* over time
• Replaced vehicles:
  – 1/4th are ≥12 years old, 1/2 are >5 years old
  – 2/3rds are gasoline, down from 3/4ths, but stabilized/rebounding
• In absence of the rebate, 2/3rds of consumers may have used a different vehicle than rebated, 1/3rd a non-EV, and 1/5th their old vehicle
• Related research: when compared to buying a new non-EV, rebated EVs may be saving >30 tons of GHG emissions per vehicle (12-year life) at costs <$100/ton
Next Steps

• Refine GHG calculations with case-specific data

• Differentiate free riders from influenced consumers
  – characteristics, vehicles, behaviors, and impacts

• Compare to characterization of Rebate Essential consumers (BECC 2016 and subsequent analysis)…
Additional Resources & Details
Evaluation: CVRP Analysis

Program reports, fact sheets, infographics & presentations
CSE Clean Transportation Resources

Reports, analysis, infographics, presentations,...
Where Are EV Rebates Going? 
Public Dashboards and Data Facilitate Informed Action

- > 350,000 EVs and consumers have received > $720 M in rebates
- > 70,000 survey responses being analyzed so far, statistically represent > 300,000 consumers
- Reports, presentations, and analysis growing
Equity Statistics Dashboard

8/5/19 images from https://cleanvehiclerebate.org/eng/rebate-statistics
## Rebated EV Consumer Characteristics: 2017

<table>
<thead>
<tr>
<th>“Buying Age”</th>
<th>New-Vehicle Buyers</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>21+ Years Old U.S. Population (Census 2017)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selected solely White/Caucasian</td>
<td>65%</td>
<td>74%</td>
<td>58%</td>
<td>85%</td>
<td>88%</td>
</tr>
<tr>
<td>≥ 50 Years Old</td>
<td>47%</td>
<td>51%</td>
<td>52%</td>
<td>61%</td>
<td>59%</td>
</tr>
<tr>
<td>≥ Bachelor’s Degree in HH</td>
<td>30%*</td>
<td>56%*</td>
<td>82%</td>
<td>90%</td>
<td>85%</td>
</tr>
<tr>
<td>Own Residence</td>
<td>64%</td>
<td>75%</td>
<td>79%</td>
<td>92%</td>
<td>89%</td>
</tr>
<tr>
<td>≥ $150k HH Income</td>
<td>12%</td>
<td>23%</td>
<td>40%</td>
<td>58%</td>
<td>41%</td>
</tr>
<tr>
<td>Selected Male</td>
<td>49%</td>
<td>51%</td>
<td>72%**</td>
<td>74%</td>
<td>71%</td>
</tr>
</tbody>
</table>

*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.

* Census & NHTS data characterize individual educational attainment, whereas other data characterize highest household attainment.

** 100% includes non-binary options.
Rebate Influence: Importance

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

![Bar chart showing rebate influence importance](chart)

Overall datasets: 70,020 total survey respondents weighted to represent 301,619 rebate recipients
Rebate Influence: Essentiality

Would **not** have purchased/leased their clean vehicle **without rebate**

Overall datasets: 70,020 total survey respondents weighted to represent 301,619 rebate recipients
Percent Rating the Federal Tax Credit “Extremely Important”
(“...in making it possible to acquire” plug-in EVs)

Overall datasets: 70,020 total survey respondents weighted to represent 301,619 rebate recipients
If the state vehicle rebate (CVRP) were not available for a [model] or any other plug-in electric vehicle (PEV), what do you think you would have done?

<table>
<thead>
<tr>
<th>Alternative Scenario Without CVRP</th>
<th>Survey Edition</th>
</tr>
</thead>
</table>
| Purchased/leased this exact vehicle anyway | 2015–2016: 33%  
2016–2017: 33%  
2017–2018: 34% |
| Not made any purchase/lease at all | 2015–2016: 14%  
2016–2017: 13%  
2017–2018: 12% |
| Purchased/leased a new non-PEV instead | 2015–2016: 14%  
2016–2017: 14%  
2017–2018: 14% |
| Purchased/leased a less expensive version of the same model | 2015–2016: 14%  
2016–2017: 11%  
2017–2018: 10% |
| Purchased/leased a different [new] PEV | 2015–2016: 8%  
2016–2017: 8%  
2017–2018: 8% |
| Purchased/leased a used PEV | 2015–2016: 5%  
2016–2017: 6%  
2017–2018: 6% |
| Purchased/leased a used non-PEV instead | 2015–2016: 5%  
2016–2017: 5%  
2017–2018: 4% |

2016–2017 edition: weighted, question n= 8,930  
2017–2018 edition: weighted, question n= 17,880
If the state vehicle rebate (CVRP) were not available for a [model] or any other plug-in electric vehicle (PEV), what do you think you would have done?

<table>
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<tr>
<th>Alternative Scenario Without CVRP</th>
<th>Survey Edition</th>
<th>Percent of Total</th>
</tr>
</thead>
</table>

Free riders 1/3
Rebate Influenced 2/3
EV added 2/5
EV changed 1/4

2016–2017 edition: weighted, question n= 8,930
2017–2018 edition: weighted, question n= 17,880

BECC 2019
If the state vehicle rebate (CVRP) were not available for a [model] or any other plug-in electric vehicle (PEV), what do you think you would have done?
This presentation supplements the following linked resources, which contain additional content:


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