Electric Vehicle Rebates in Disadvantaged Communities: Evaluating Progress with Appropriate Comparisons

Evaluation 2016 (AEA), 26 October 2016, Atlanta
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Thanks also to Clair Johnson, Colin Santulli, and others at CSE
CSE’s Plug-In & Fuel-Cell Electric Vehicle (EV) Activities

Incentives Design & Administration

Fleet Assistance & Clean Cities

Consumer & Dealer Outreach

PEV, Alt.-Fuel, & ZEV Planning & Implementation

Stakeholder Engagement

2nd Life Battery Research & Vehicle-Grid Integration
CSE has processed >163k rebates totaling ~$350M

California (CVRP), 2010–present
- Air Resources Board
- 2007 Legislation (AB118, then AB8) allowing vehicle registration fees
- Greenhouse Gas Reduction Fund

Massachusetts (MOR-EV), 2014–present
- Department of Energy Resources
- Regional Greenhouse Gas Initiative

Connecticut (CHEAPR), 2015–present
- Department of Energy & Environmental Protection
- Utility Settlement
- Vehicle rebate and dealer incentive (consumer can also assign vehicle rebate to dealer)
Where can I get the data?: CSE Transparency Tools

- Public, online, interactive dashboards facilitate informed action
  - Data characterizing >163,000 EVs and consumers
  - ~$350M in rebates processed
  - >19,000 survey responses statistically represent >90,000 consumers
Outline

• Clean Vehicle Rebate Project (CVRP)
  – Overview
  – Requirements to benefit disadvantaged communities (DACs)

• Program Participation: DACs vs. CA as a whole
  – How many vehicles? Where?

• Indicators of Progress in DACs
  – Context is important

• Underlying Market Differences
  – To further calibrate expectations

• Recent Legislative Action
Clean Vehicle Rebate Project
Program overview and Requirement to benefit DACs
Major CVRP-Eligible PHEVs, BEVs, ZEMs, and FCEVs (2016)

Plug-in hybrid EVs

All-battery EVs

Zero-emission motorcycles

Fuel-cell EVs
## Statewide Monetary Incentives

<table>
<thead>
<tr>
<th>Category</th>
<th>CVRP</th>
<th>Federal Tax Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen Fuel-Cell Electric Vehicles</td>
<td>$5,000</td>
<td>$8,000</td>
</tr>
<tr>
<td>Battery Electric Vehicles (&amp; i3 REx)</td>
<td>$2,500</td>
<td>$7,500</td>
</tr>
<tr>
<td>Plug-in Hybrid Electric Vehicles</td>
<td>$1,500</td>
<td>$2,500–$7,500</td>
</tr>
<tr>
<td>Neighborhood Electric Vehicles</td>
<td>$900</td>
<td></td>
</tr>
<tr>
<td>Zero-Emission Motorcycles</td>
<td>$900</td>
<td></td>
</tr>
</tbody>
</table>

Plug-in EVs or PEVs
Legislative Background

• AB 32: CA Global Warming Solutions Act (2006)
  – Requires California to reduce its greenhouse gas emissions to 1990 levels by 2020.
  – Allowed for the creation of a cap-and-trade program

• Cap-and-trade program begins (2012)
  – Proceeds from the auction of allowances are deposited into the Green House Gas Reduction Fund (GGRF)

• SB 535 (2012)
  – Requires CalEPA to identify DACs (variety of criteria)
  – GGRF requirements
    • ≥ 10% of funds to be spent on projects located within in DACs
    • ≥ 25% of funds should be spent to the benefit of DACs
Disadvantaged Communities: CalEnviroScreen 2.0 (CES)

- State’s OEHHA scores each Census tract by combining various indicators of:
  1. Exposure to pollution
  2. Socioeconomic vulnerability
- Top scoring tracts are designated “Disadvantaged Communities” (DACs)
Program Participation in DACs

How many vehicles? Where?
Cumulative California PEV Rebates

Approved rebate applications for BEVs and PHEVs purchased/leased thru 2015 as of 3 October 2016.

- Rest of State
- DACs

Yearly Breakdown:
- 2010: 8,511
- 2011: 130,992
- 2012: (data not shown)
- 2013: (data not shown)
- 2014: (data not shown)
- 2015: (data not shown)
New PEV Registrations by County (thru Dec 2015)

Overall Registrations by County

DAC Registrations by County

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How is the program doing in DACs?
Indicators of Progress in DACs

Context is Important
Approved BEVs and PHEVs purchased/leased through Dec 2015 as of 3 October 2016.
Are these appropriate indicators?
Relative to what?
Context Is Important (2015)

PEV Rebates as a Percent of:

- CA Population: 0.12%
- CA Driving Age Population (16+): 0.15%
- New LDV Sales: 2.3%

Context Is Important (2015)

New PEV Registrations: By County & Normalized to Comparable Sales (2015)

- **Total Registrations:**
  - 28,567
  - 49,151
  - 14,354

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DACs as a Percentage of Entire State (2015)

Rebates as a % of Comparable New Car Sales
(2015 calendar year)

Statewide DAC

includes vehicles purchased/registered in 2015. Uses content supplied by R.L. Polk & Co.; Copyright © R.L. Polk & Co., 2015. All rights reserved
 Rebates as a % of Comparable New Car Sales (2015 calendar year)

Statewide DAC

PEV Rebates per Comparable LDV Sale

DACs = 6.4% of CA

45,854

2,946

DACs = 34% of CA

4.1%

1.4%

Includes vehicles purchased/registered in 2015. Uses content supplied by R.L. Polk & Co.; Copyright © R.L. Polk & Co., 2015. All rights reserved
Underlying Differences

DAC PEV Consumers
Weighted EV Consumer Survey: Overall and DACs
(CVRP vehicles acquired Sep 2012 thru May 2015)

Overall:

Survey population
91,085 plug-in electric vehicles (PEVs) were adopted by individuals and rebated from September 1, 2012 to June 17, 2015*

39,325 Plug-in hybrid electric vehicles (PHEVs)

51,760 Battery electric vehicles (BEVs)

Survey sample
19,460 individuals responded to the survey**

Vehicles driven by respondents

- Nissan LEAF: 24%
- Chevrolet Volt: 20%
- Tesla Model S: 19%
- Toyota Prius Plug-in: 15%
- FIAT 500e: 13%
- Other: 9%

Weighted EV Consumer Survey: Overall and DACs
(CVRP vehicles acquired Sep 2012 thru May 2015)

Overall:

Survey population
91,085
plug-in electric vehicles (PEVs) were adopted by individuals and rebated from September 1, 2012 to June 17, 2015*

39,325
Plug-in hybrid electric vehicles (PHEVs)

51,760
Battery electric vehicles (BEVs)

Survey sample
19,460
individuals responded to the survey**

DACs:

Survey population
5,320
plug-in electric vehicles (PEVs) were adopted by individuals in DACs and rebated from September 1, 2012 to June 17, 2015*

2,608
Plug-in hybrid electric vehicles (PHEVs)

2,712
Battery electric vehicles (BEVs)

Survey sample
1,120
individuals responded to the survey*

Vehicles driven by respondents

Overall:

24%
Nissan LEAF

20%
Chevrolet Volt

19%
Tesla Model S

15%
Toyota Prius Plug-in

13%
FIAT 500e

9%
Other

DACs:

25%
Chevrolet Volt

21%
Toyota Prius Plug-in

17%
Nissan LEAF

16%
FIAT 500e

14%
Ford Fusion Energi

6%
Other

Housing: CVRP Overall and DACs

Overall:
- **81%** reside in a single-family detached home
- **9%** reside in a single-family attached home (townhome, duplex, triplex, etc.)
- **9%** reside in an apartment/condominium
- **1%** reside in other dwellings

DACs:
- **72%** reside in a single-family detached home
- **15%** reside in an apartment/condominium
- **12%** reside in a single-family attached home (townhome, duplex, triplex, etc.)
- **2%** reside in other dwellings

CVRP and New-vehicle “Intender”
Income Distributions: All vs. DACs

Weighted CVRP (2014) & weighted CHTS (2012) data
Importance of Rebate: Overall and DACs

Overall:

Importance of CVRP rebates

DACs:

Importance of CVRP rebates

Understanding Underlying Differences

DAC Plug-in Electric Vehicles by Product Type
Technology Share: Sales

CA

PHEV 50%  BEV 50%

DACs

PHEV 43%  BEV 57%
Overall market data includes vehicles registered thru Dec 2015 and uses content licensed from and copyrighted by R.L. Polk & Co. Approved rebates thru December 2015.
### Vehicle Replacement Rates

<table>
<thead>
<tr>
<th></th>
<th>PEV Replaced Previous Vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statewide</td>
</tr>
<tr>
<td>PHEVs</td>
<td>72%</td>
</tr>
<tr>
<td>non-Tesla BEVs</td>
<td>56%</td>
</tr>
</tbody>
</table>

Total Responses: 16,306
Overall Time Frame: 9/1/2012–5/31/2015
Recent Legislative Action
## Legislation: New CVRP Eligibility Requirements

<table>
<thead>
<tr>
<th>Consumer Income Cap*</th>
<th>Took effect March 2016</th>
<th>To take effect November 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single filers</td>
<td>$250,000</td>
<td>$150,000</td>
</tr>
<tr>
<td>Head-of-household filers</td>
<td>$340,000</td>
<td>$204,000</td>
</tr>
<tr>
<td>Joint filers</td>
<td>$500,000</td>
<td>$300,000</td>
</tr>
</tbody>
</table>

### Vehicle Requirement:

- Electric range: Must be ≥ 20 e-mi

### Increased Rebate for Low-to-Moderate Income Households**:

- $1,500
- $2,000

*Income cap is deferred for consumers of fuel-cell electric vehicles

** Defined as ≤ 300% of the Federal Poverty Level
Increased Rebate Amounts for Low-to-Moderate-Income (LMI) Consumers

On November 1, 2016:

• The increased rebate amount will become $2,000

• Prioritization of rebate payments to low income consumers

<table>
<thead>
<tr>
<th>Persons in household</th>
<th>Max Income*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$35,640</td>
</tr>
<tr>
<td>2</td>
<td>$48,060</td>
</tr>
<tr>
<td>3</td>
<td>$60,480</td>
</tr>
<tr>
<td>4</td>
<td>$72,900</td>
</tr>
<tr>
<td>5</td>
<td>$85,320</td>
</tr>
<tr>
<td>6</td>
<td>$97,740</td>
</tr>
<tr>
<td>7</td>
<td>$110,190</td>
</tr>
<tr>
<td>8</td>
<td>$122,670</td>
</tr>
</tbody>
</table>

* 300% of the Federal Poverty Level
### Statewide Monetary Incentives (as of 1 Nov.)

<table>
<thead>
<tr>
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<th>CVRP</th>
<th>CVRP-LMI (≤300% FPL)</th>
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<td>$5,000</td>
<td>$7,000</td>
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<td>$2,500</td>
<td>$4,500</td>
</tr>
<tr>
<td>Plug-in Hybrid Electric Vehicles</td>
<td>$1,500</td>
<td>$3,500</td>
</tr>
<tr>
<td>Neighborhood Electric Vehicles</td>
<td>$900</td>
<td>$900</td>
</tr>
<tr>
<td>Zero-Emission Motorcycles</td>
<td>$900</td>
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Rebate Recipients with Low-to-Moderate Income

<table>
<thead>
<tr>
<th></th>
<th>CVRP LMI (2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA Overall</td>
<td>4% - 10%</td>
</tr>
<tr>
<td>In DACs</td>
<td>10% - 25%</td>
</tr>
</tbody>
</table>

LMI households are even more constrained in other ways (e.g., less frequently are home owners)

Weighted CVRP (2014) & weighted CHTS (2012) data
Would NOT have purchased or leased vehicle without the state rebate (2014)

Outside DACs: 47%
In DACs: 51%
Non-LMI: 46–47%
LMI: 52–55%

Weighted CVRP (2014)
Rebate Influence

Importance of the rebate in making it possible to acquire a PEV.

- No answer
- Not at all important
- Slightly important
- Moderately important
- Very important
- Extremely important

- Total responses: 15,304
- 8,711 (57.3%) extremely important
- 5,382 (35.1%) very important
- 3,211 (21.1%) moderately important
- 1,101 (7.2%) slightly important
- 372 (2.4%) not at all important
- 16 (0.1%) no answer
Rebate Influence

Importance of the rebate in making it possible to acquire a PEV.

- All
  - No answer: 3,211
  - Not at all important: 5,382
  - Slightly important: 8,711
  - Moderately important: 7,965
  - Very important: 876
  - Extremely important: 746

- <$60k MSRP
  - No answer: 2,301
  - Not at all important: 4,506
  - Slightly important: 7,965
  - Moderately important: 876
  - Very important: 746
  - Extremely important: 746

- >$60k MSRP
  - No answer: 508
  - Not at all important: 910
  - Slightly important: 746
  - Moderately important: 746
  - Very important: 746
  - Extremely important: 746
Summary

- **5.9% of rebate funds have gone to DACs, but context is important:**
  - Some “small markets” (e.g., Fresno) show similar EV market shares as L.A.
  - DACs are $1/4$th of the population, but only $\sim 1/6$th of new-car market and $\sim 1/14$th of the ZEV market
  - Similarly, CVRP demographics differ less from new-car buyers than the population

- **When normalized for comparable new-car sales, the rebate share in DACs is $\sim 34\%$ that of the state overall, not 6%**

- **Expectations should be further calibrated in light of underlying “structural” differences that make EV adoption more challenging in DACs**
  - E.g., lower income, greater portion of MUDs and lower access to workplace charging
  - Underlying proclivity for PHEVs is counter to incentive structure favoring BEVs

- **The stated importance of the rebate is growing and is higher in DACs**

- **Measures to increase the proportion of low-to-moderate income program participants are underway, but add program complexity**

- **Expectations should be modest about how these LMI measures will affect DAC indicators, due to modest levels of LMI participants to date in DACs**
Data Sources

Program:
- CVRP EV Consumer Survey (n=19,460)
  - EV purchase/lease dates 9/2012–5/2015
  - Weights applied to make responses represent 91,085 program participants along the dimensions of vehicle model, county, and buy vs. lease
- Applications (n=110,734)

Market:
- EV Registration Data (Polk, N=150,287)
We work nationally in the clean energy industry and are always open to exploring partnership opportunities.

Thank You for Your Attention

What would you like to know more about? What decisions are you facing? brett.williams@energycenter.org