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

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Building Performance

Clean Transportation

Distributed Generation

Energy Efficiency

Energy Storage

Renewable Energy

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CSE's Plug-In & Fuel-Cell Electric Vehicle (EV) Activities

CLEAN VEHICLE REBATE PROJECT™

MOR-EV
Massachusetts Offers Rebates for Electric Vehicles

CHEAPR
Connecticut Hydrogen and Electric Automobile Purchase Rebate

Incentives Design & Administration

Consumer & Dealer Outreach

DDER
Massachusetts Department of Energy Resources

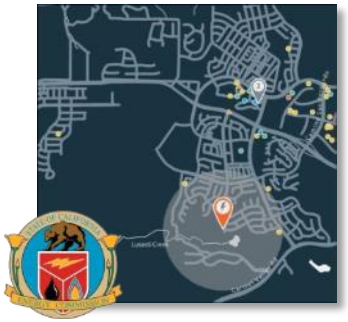
California Environmental Protection Agency
Air Resources Board

SANDAG

CALIFORNIA PLUG-IN ELECTRIC VEHICLE COLLABORATIVE

Stakeholder Engagement

Fleet Assistance & Clean Cities



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

2nd Life Battery Research & Vehicle-Grid Integration

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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

CALIFORNIA CLEAN VEHICLE REBATE PROJECT℠

California Environmental Protection Agency
Air Resources Board

Massachusetts (MOR-EV), 2014–present

- **Department of Energy Resources**
- Regional Greenhouse Gas Initiative

MOR-EV
Massachusetts Offers Rebates for Electric Vehicles

Connecticut (CHEAPR), 2015–present

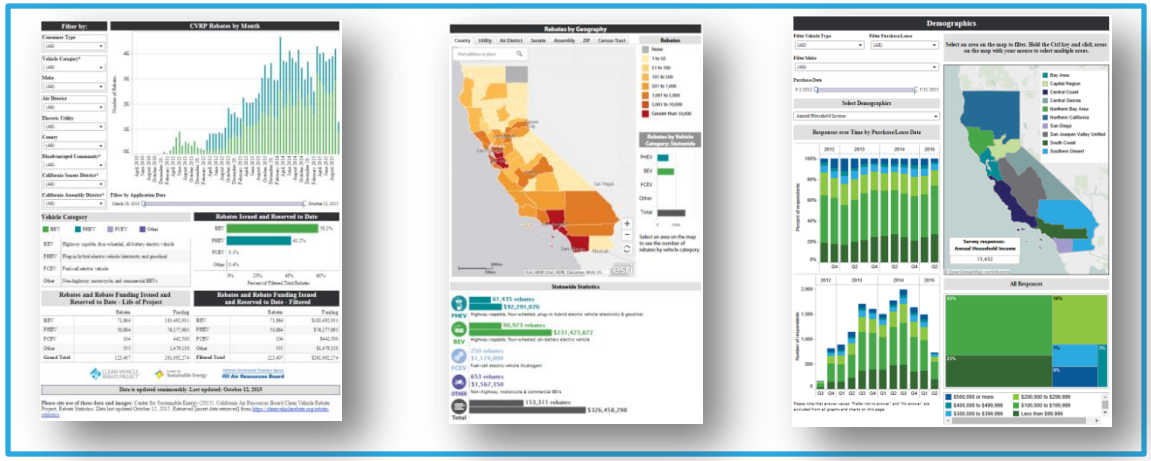
- **Department of Energy & Environmental Protection**
- Utility Settlement
- Vehicle rebate *and* dealer incentive (consumer can also assign vehicle rebate to dealer)

CHEAPR
Connecticut Hydrogen and Electric Automobile Purchase Rebate

Where can I get the data?: CSE Transparency Tools

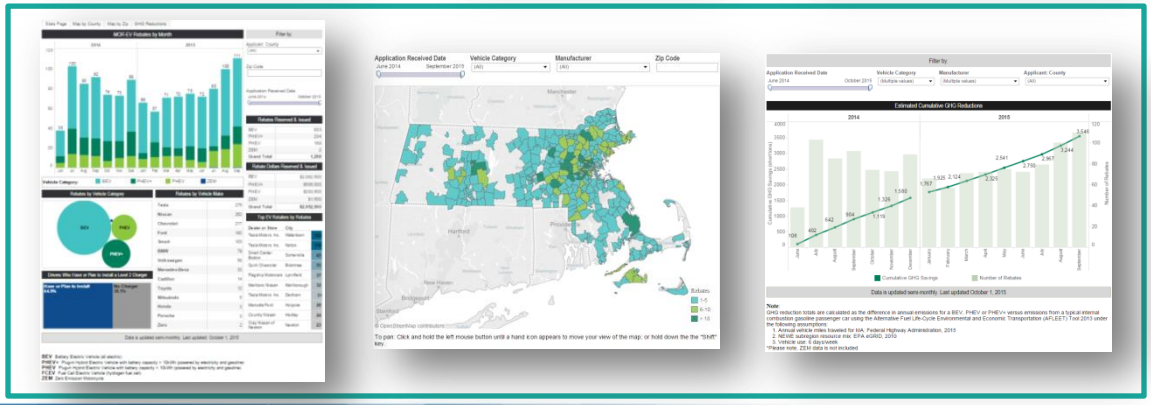
- Public, online, interactive dashboards facilitate informed action
  - Data characterizing >163,000 EVs and consumers
  - ~$350M in rebates processed
  - >19,000 survey responses statistically represent >90,000 consumers

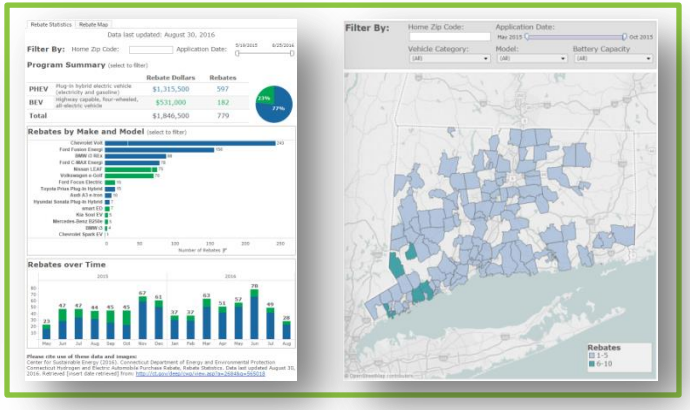
Also: zevfacts.com



cleanvehiclerebate.org

ct.gov/deep





mor-ev.org

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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

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Statewide Monetary Incentives

		CVRP	Federal Tax Credit
	Hydrogen Fuel-Cell Electric Vehicles	*$5,000*	*$8,000*
	Battery Electric Vehicles (& i3 REx)	*$2,500*	*$7,500*
	Plug-in Hybrid Electric Vehicles	*$1,500*	*$2,500–$7,500*
	Neighborhood Electric Vehicles	*$900*	
	Zero-Emission Motorcycles	*$900*	

Plug-in EVs or PEVs

California Environmental Protection Agency
Air Resources Board

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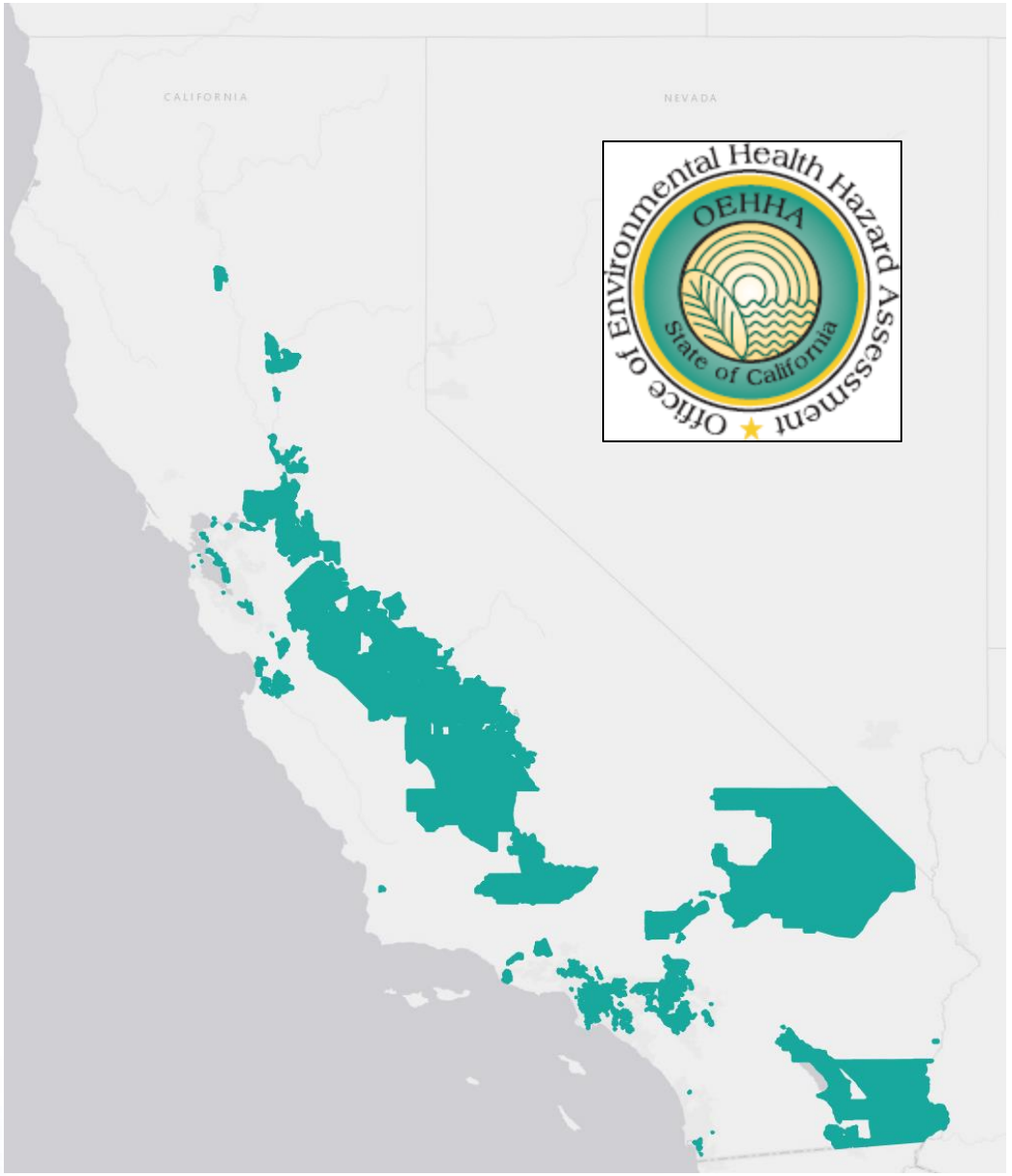
Legislative Background

- 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)

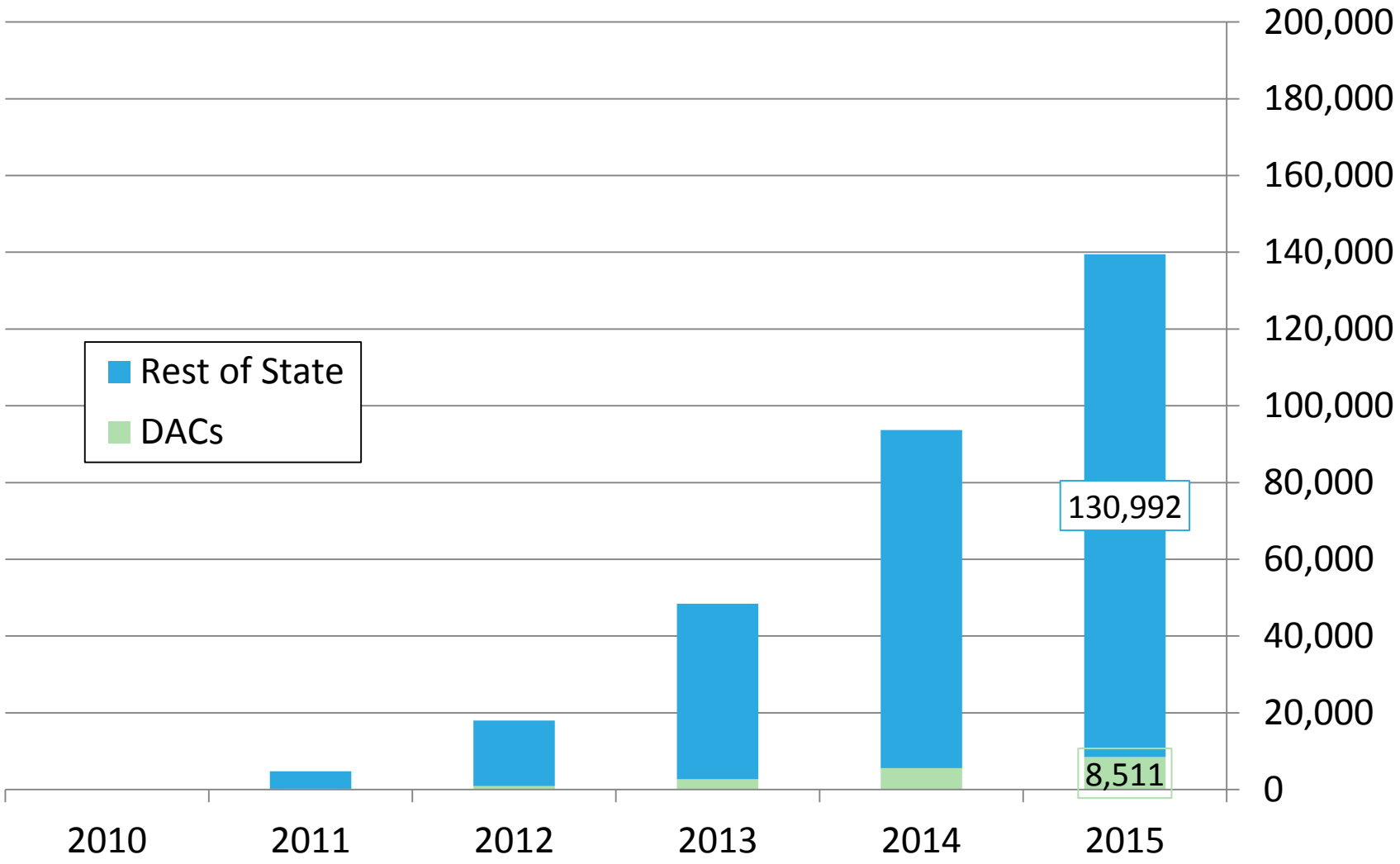
- State's OEHHA scores each Census tract by combining various indicators of:
  1. Exposure to pollution
  2. Socioeconomic vulnerability
- Top scoring tracts are designated "Disadvantaged Communities" (DACs)



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.

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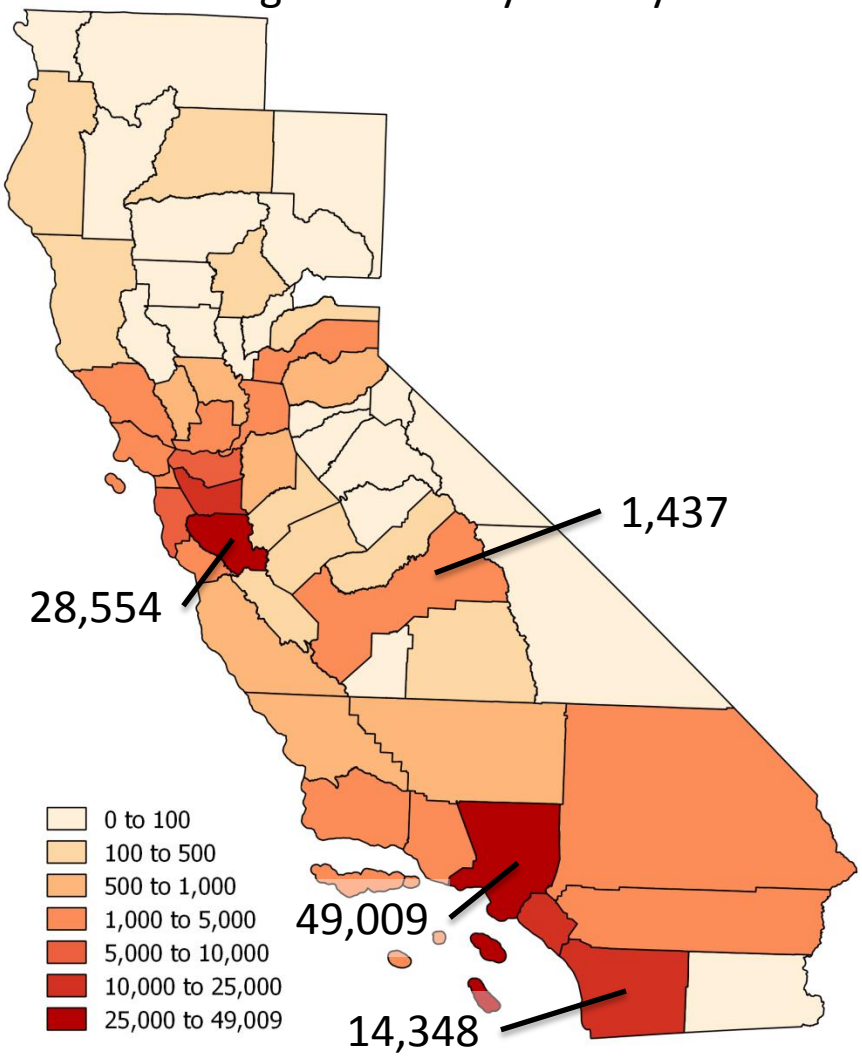
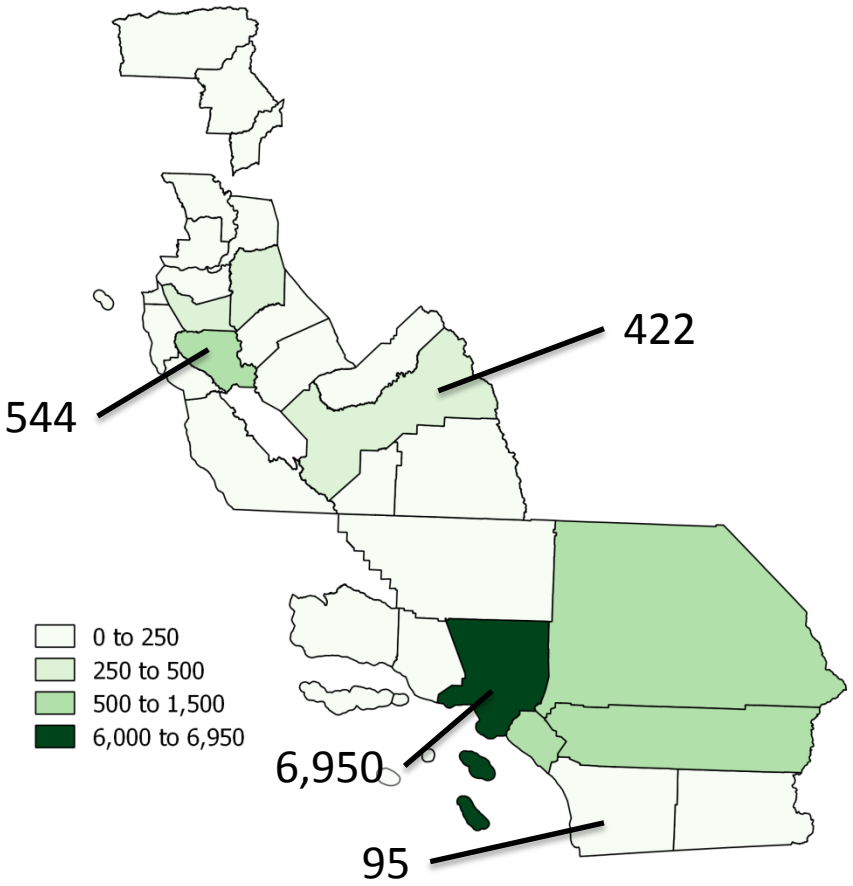
New PEV Registrations by County (thru Dec 2015)

Overall Registrations by County



DAC Registrations by County



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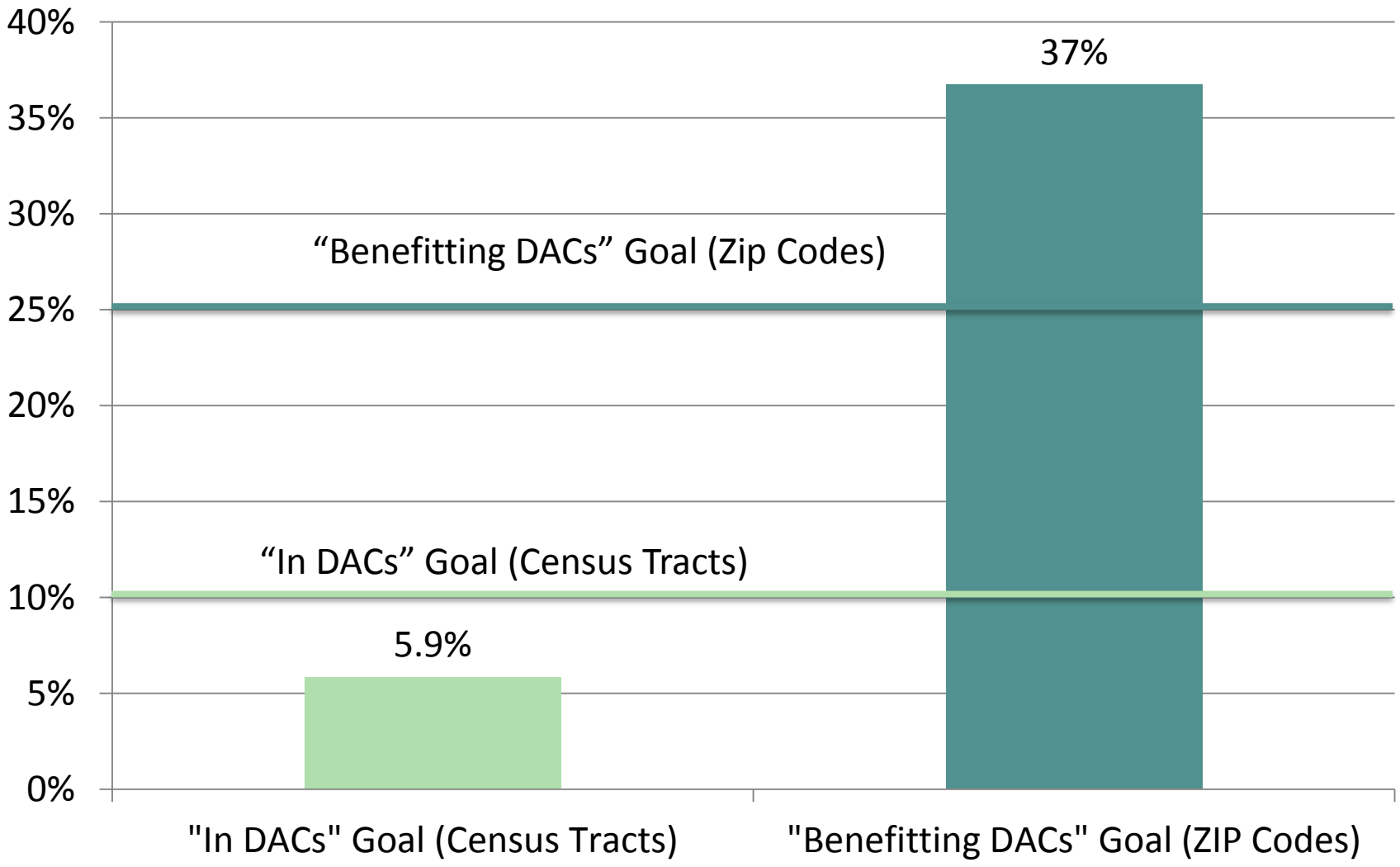
How is the program doing in DACs?

Indicators of Progress in DACs

Context is Important

PEV Rebate Dollars to Disadvantaged Communities
(Life of Program thru 2015)



Approved BEVs and PHEVs purchased/leased through Dec 2015 as of 3 October 2016.

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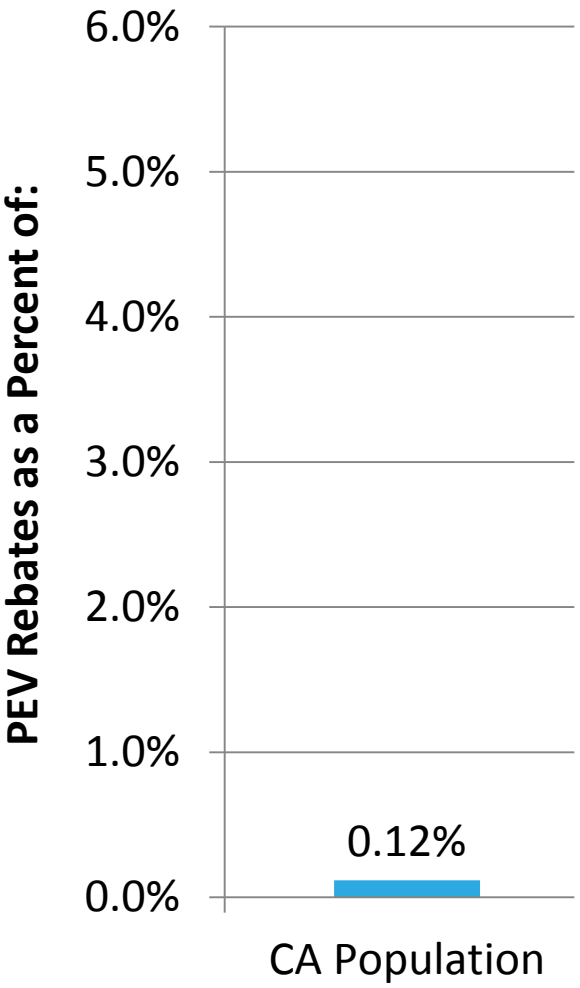
Are these appropriate indicators?

Relative to what?

Context Is Important (2015)



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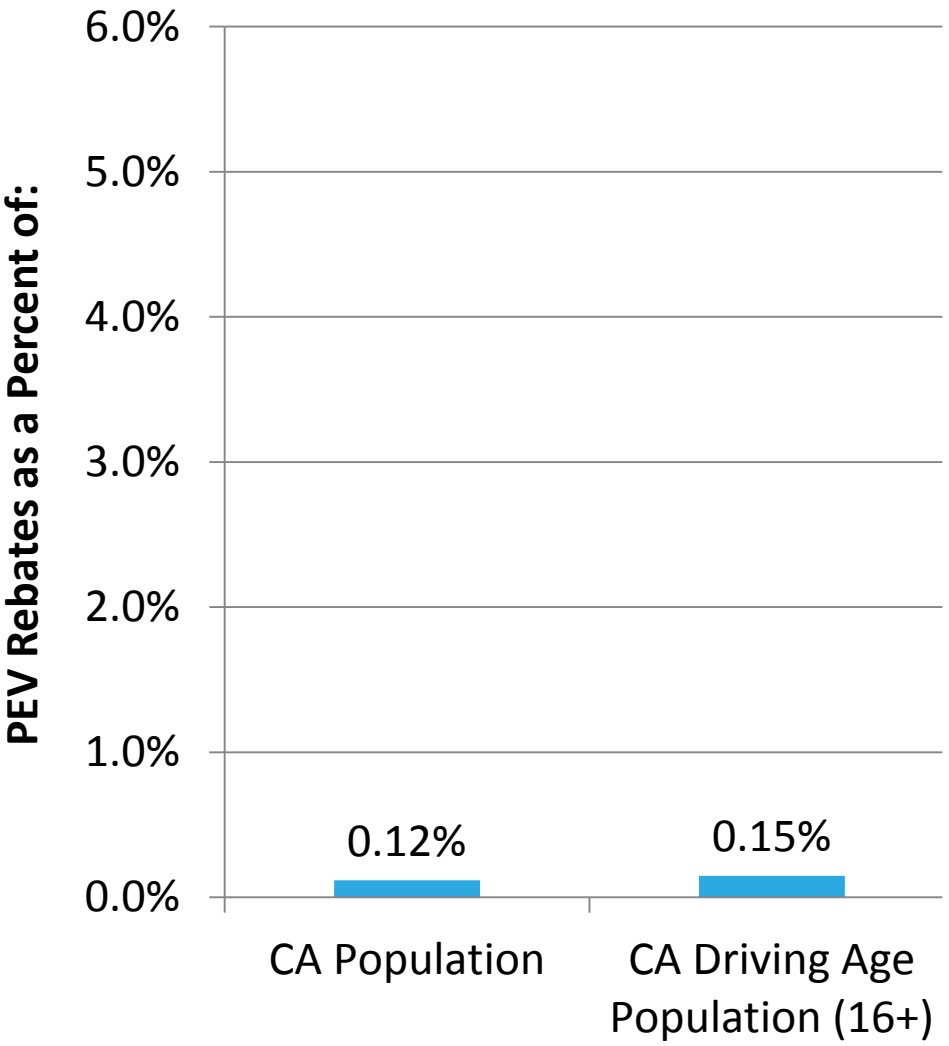
Context Is Important (2015)



Includes vehicles purchased/registered in 2015. Population data from American Community Survey (B23001 and S0101), 2015 1-year estimates. Uses content supplied by R.L. Polk & Co.;

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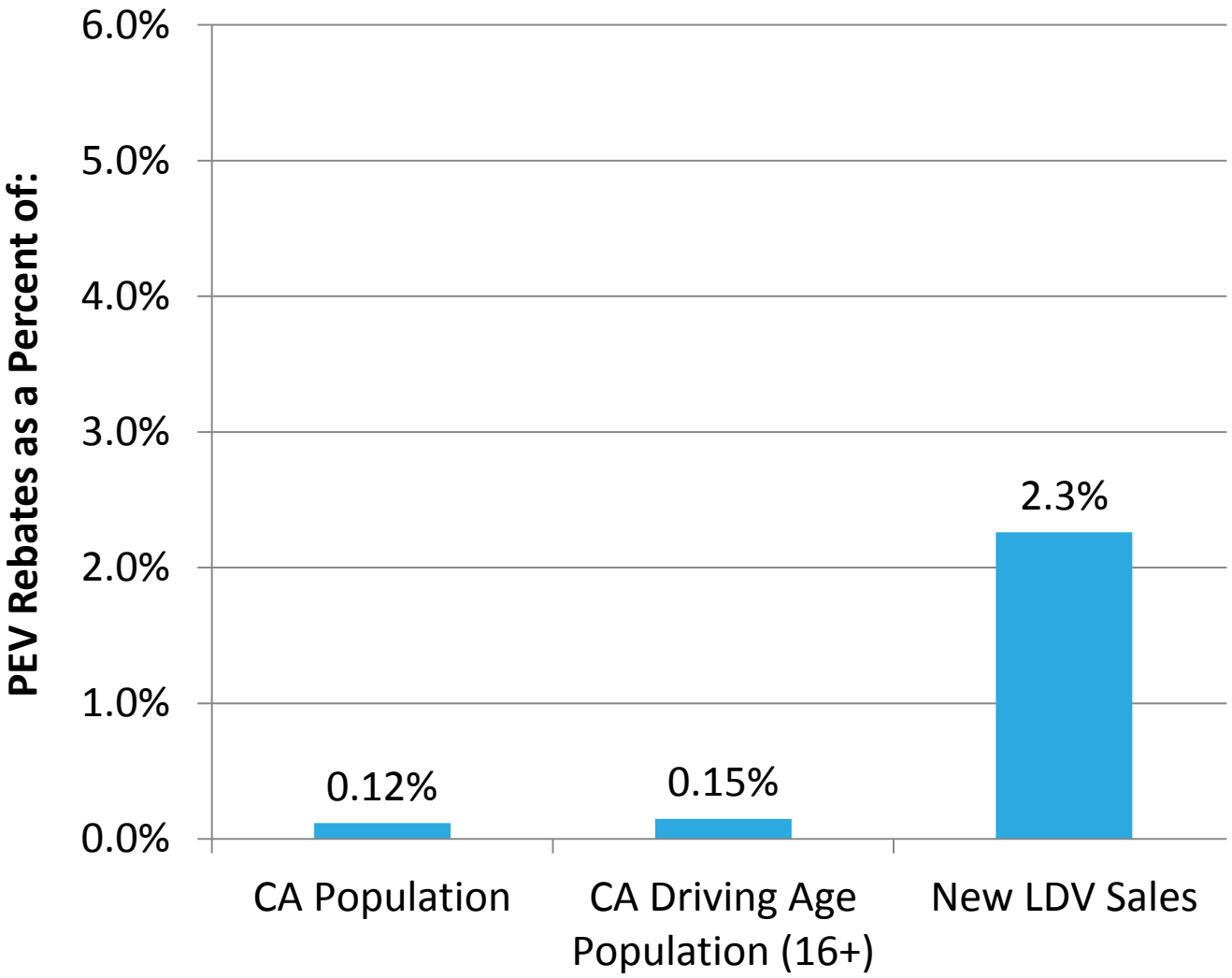

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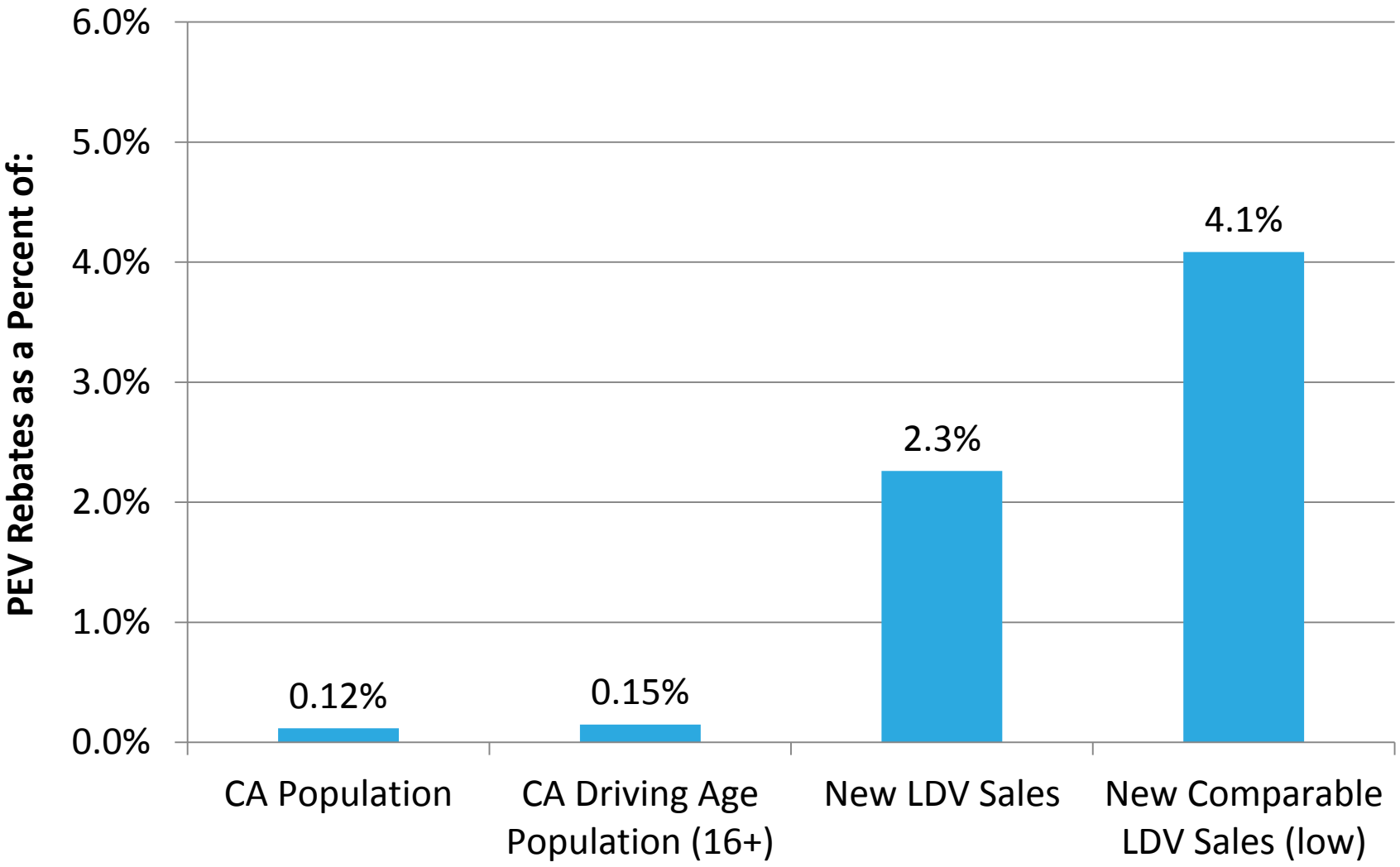

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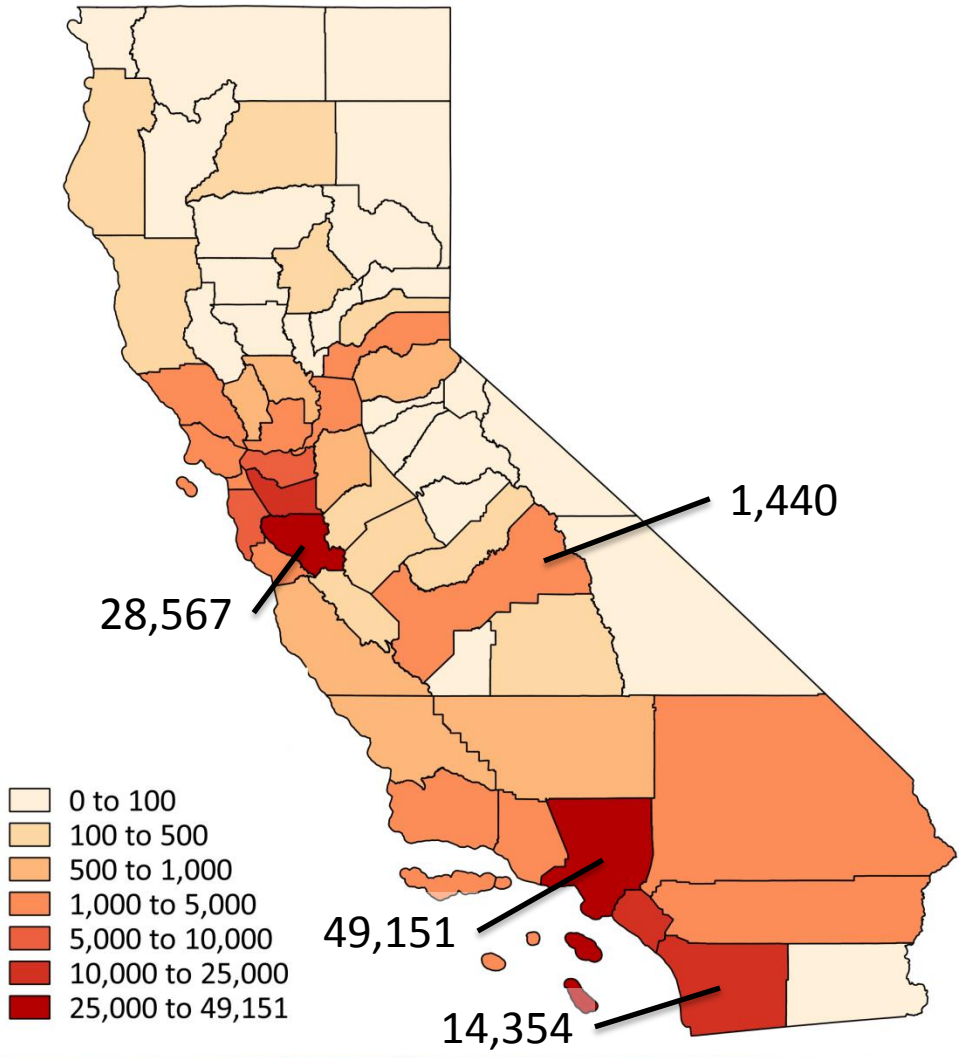
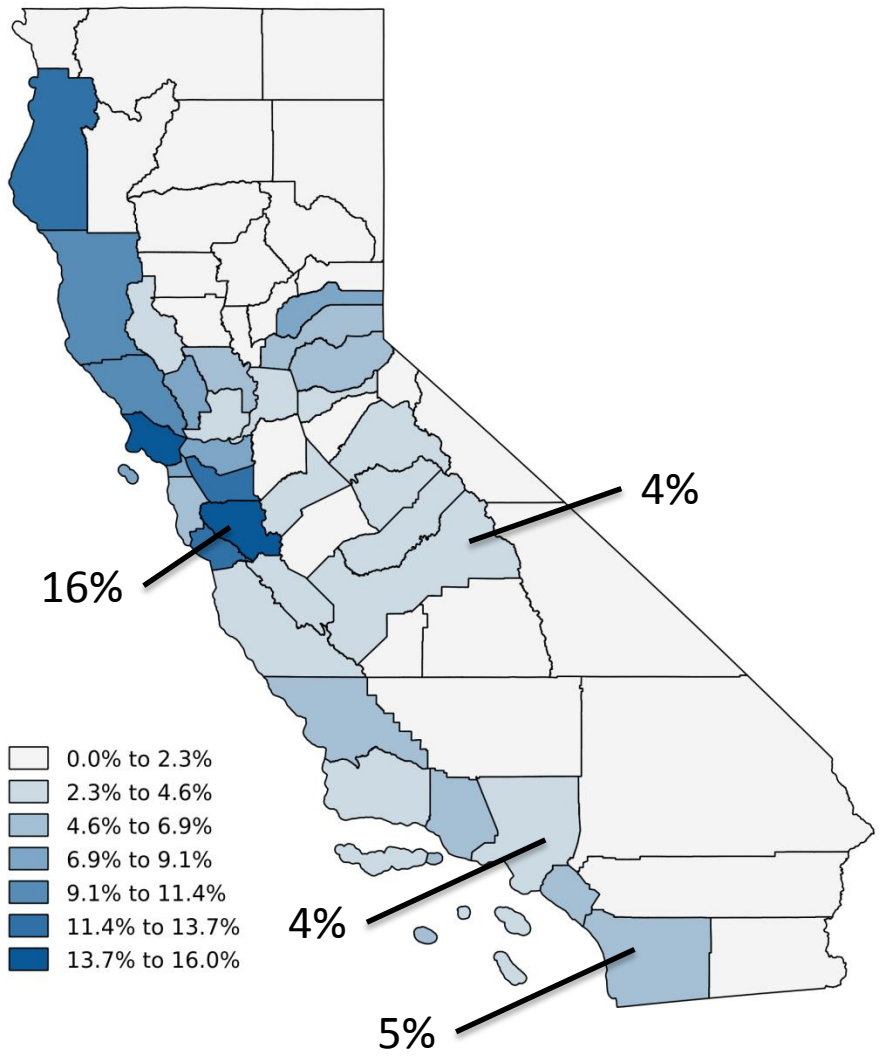
New PEV Registrations: By County & Normalized to Comparable Sales

(2015)





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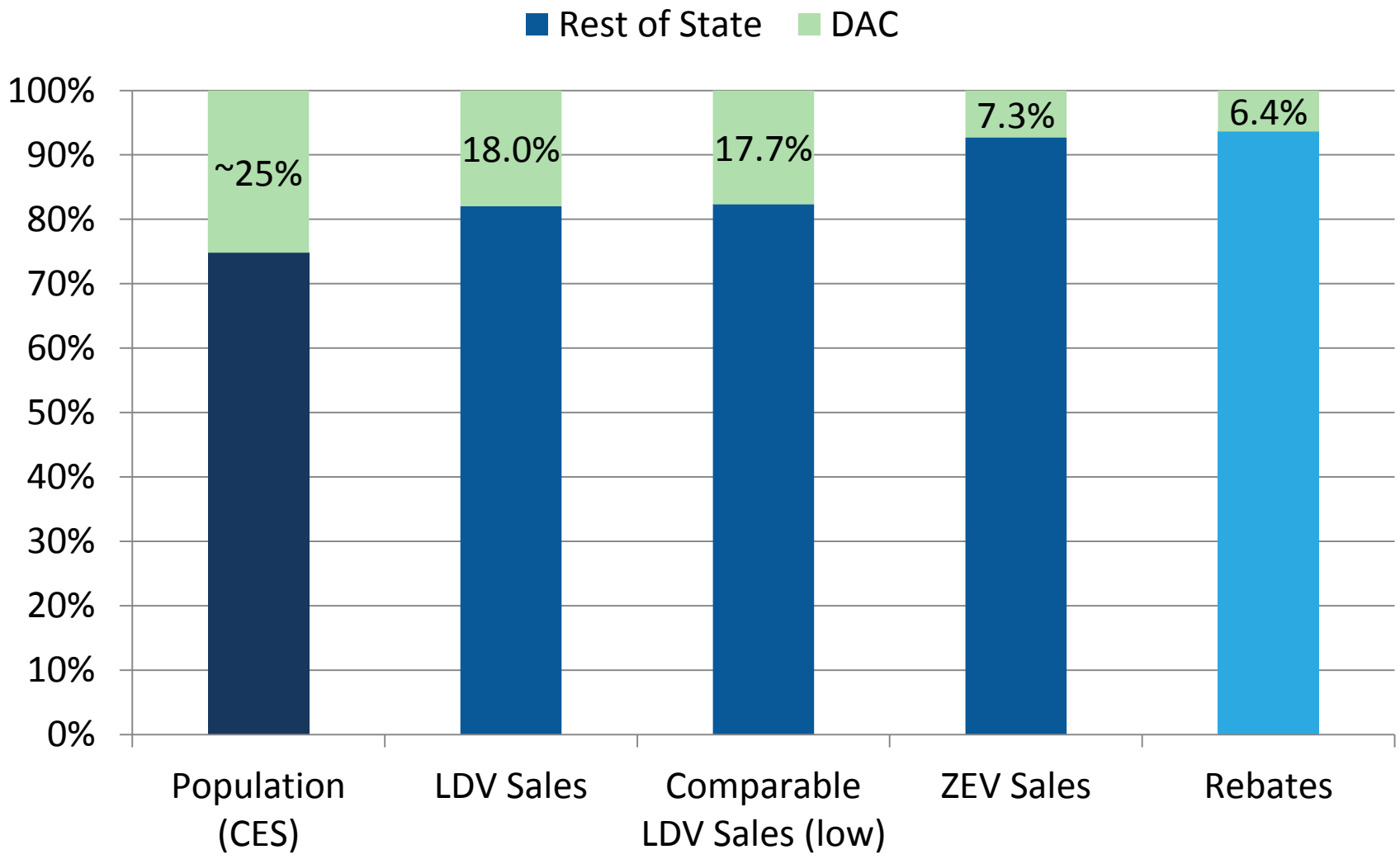
DACs as a Percentage of Entire State (2015)



Includes vehicles purchased/registered in 2015. Population data from OEHHA CalEnviroScreen 2.0 (2014).

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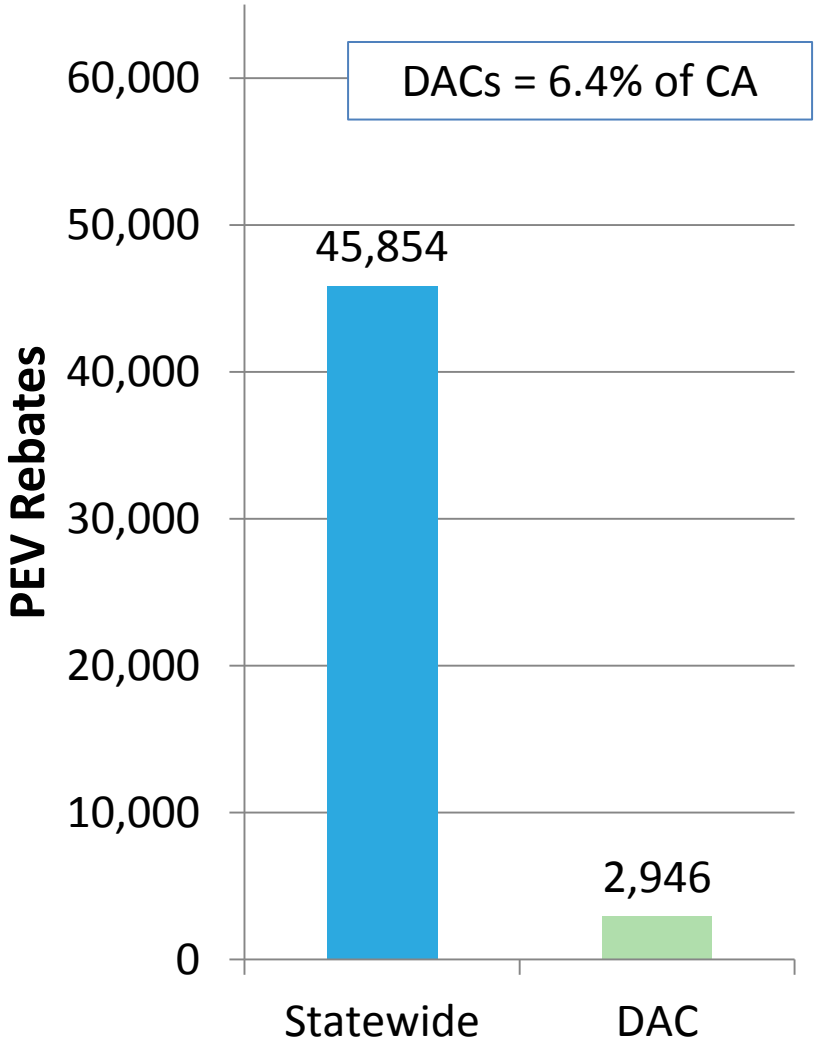
Rebates as a % of Comparable New Car Sales

(2015 calendar year)



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Rebates as a % of Comparable New Car Sales

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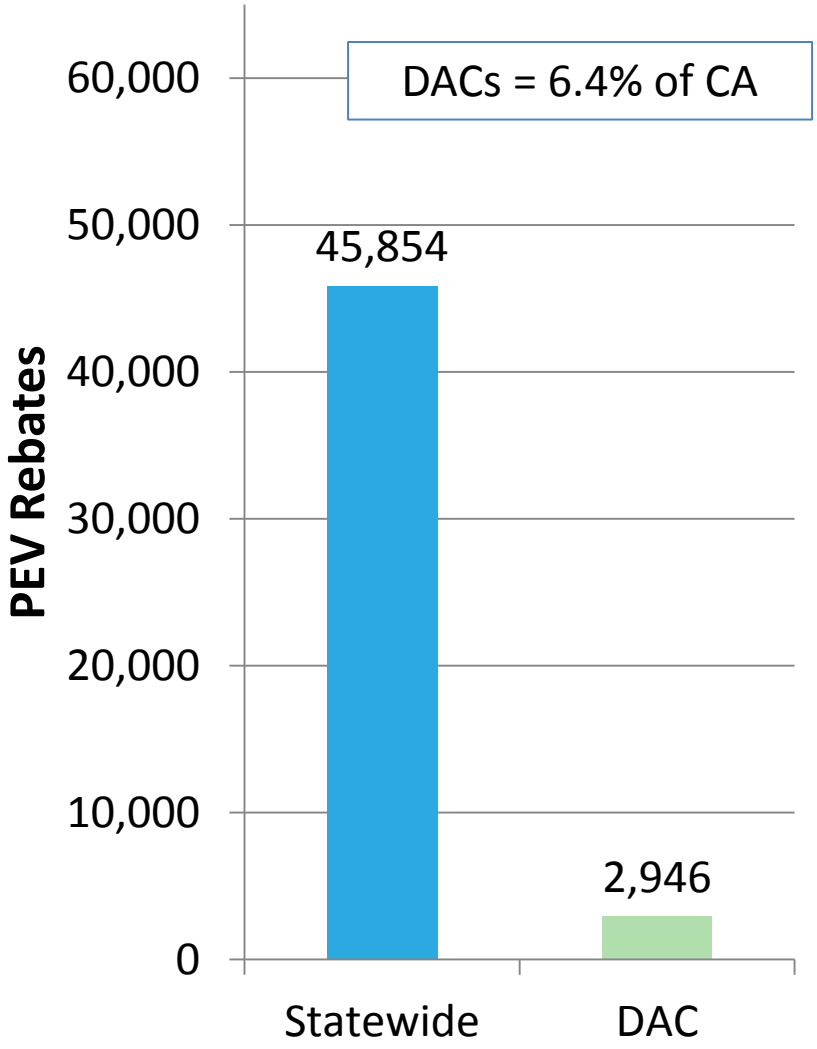

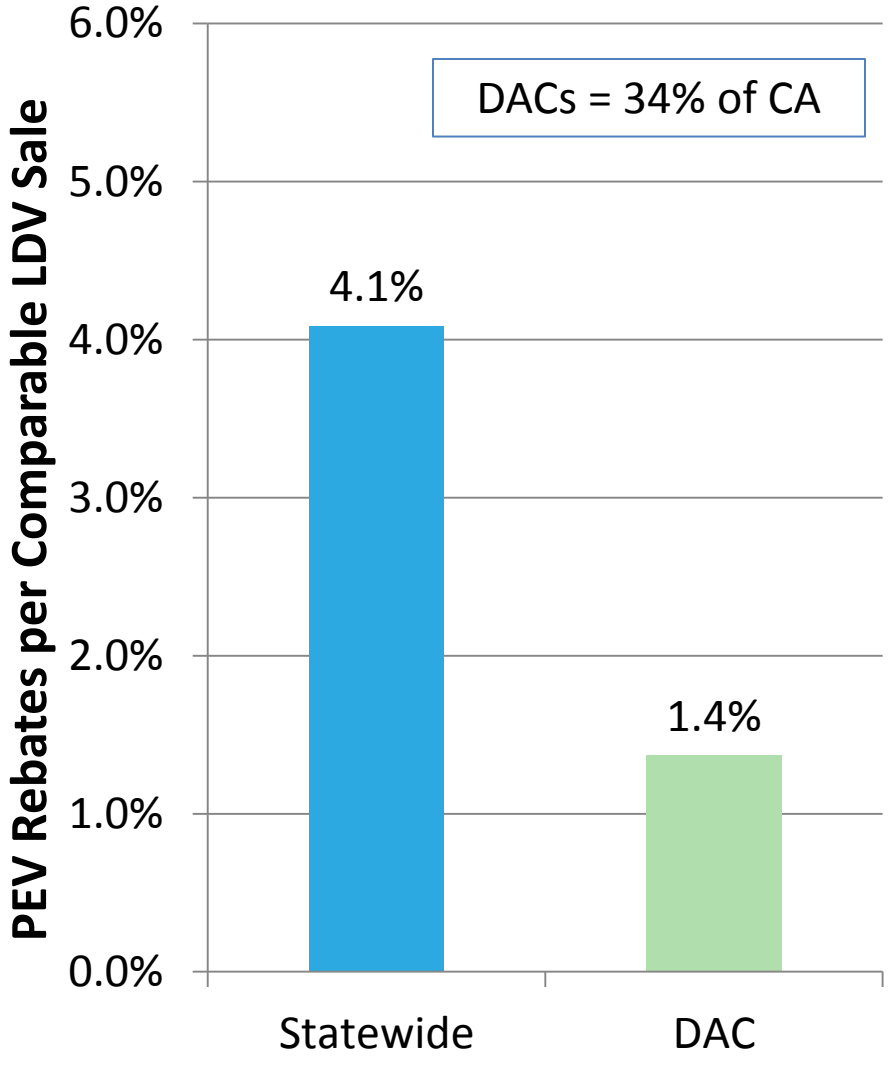

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Underlying Differences

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*

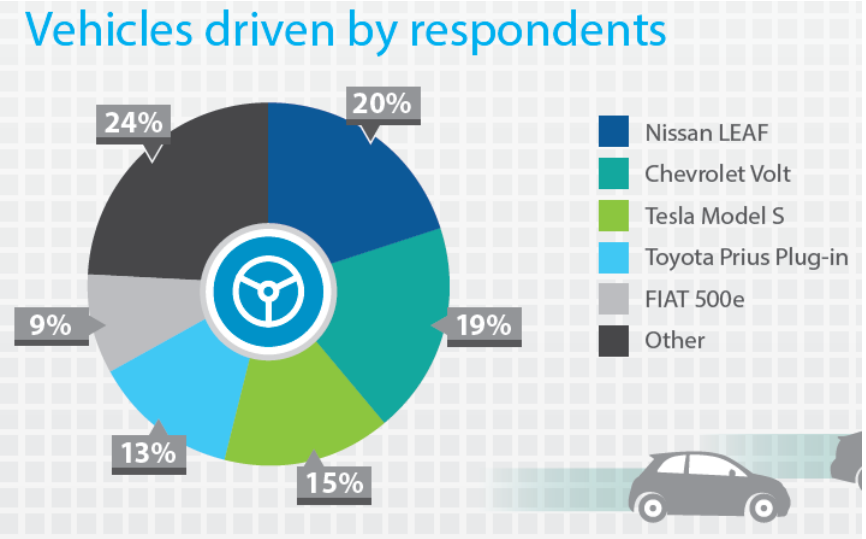
39,325
Plug-in hybrid electric vehicles (PHEVs)

51,760
Battery electric vehicles (BEVs)

Survey sample

19,460

individuals responded to the survey**



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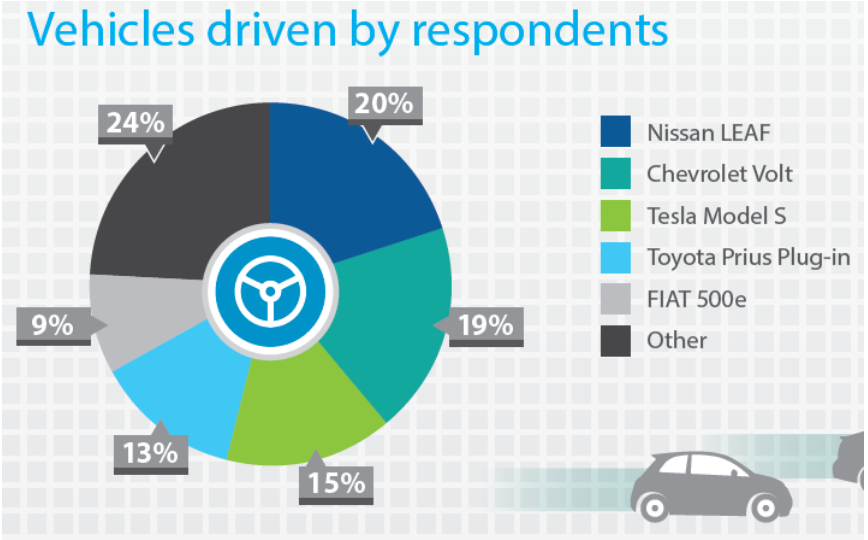


DACs:

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†

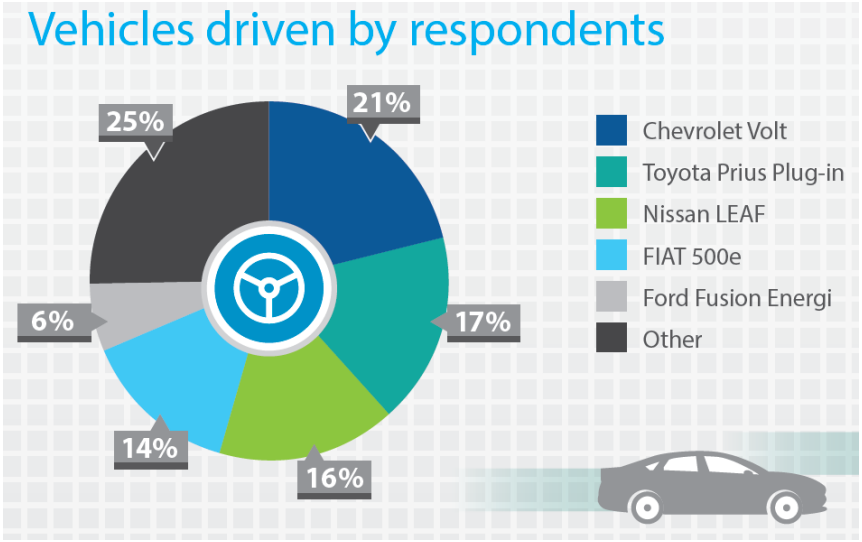
2,608
Plug-in hybrid electric vehicles (PHEVs)

2,712
Battery electric vehicles (BEVs)

Survey sample

1,120

individuals responded to the survey‡



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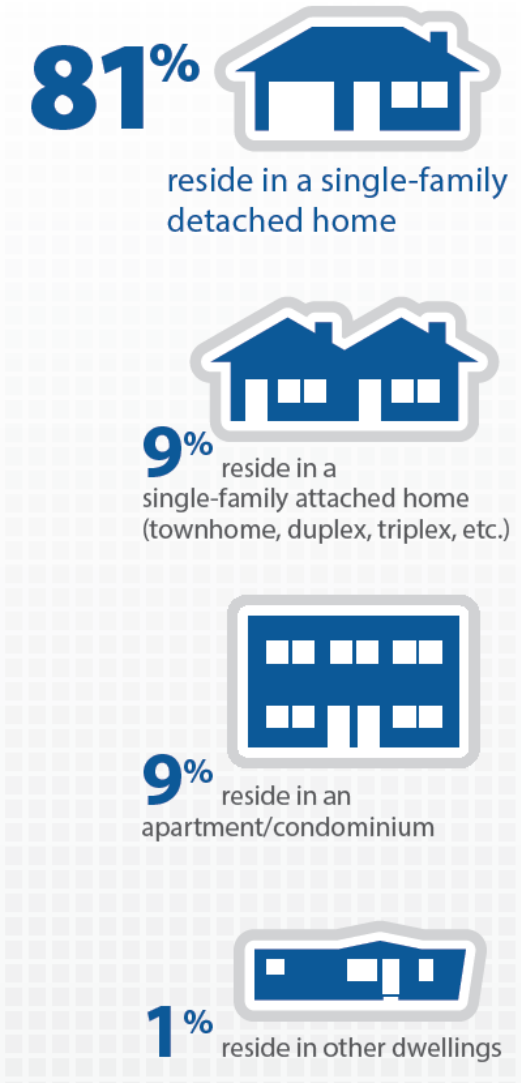
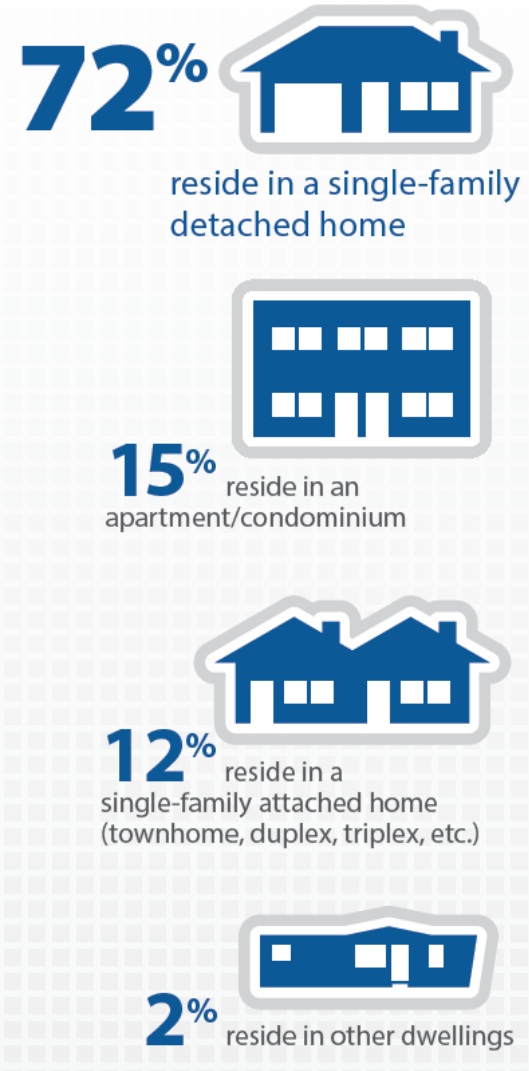
Housing: CVRP Overall and DACs

Overall:



DACs:



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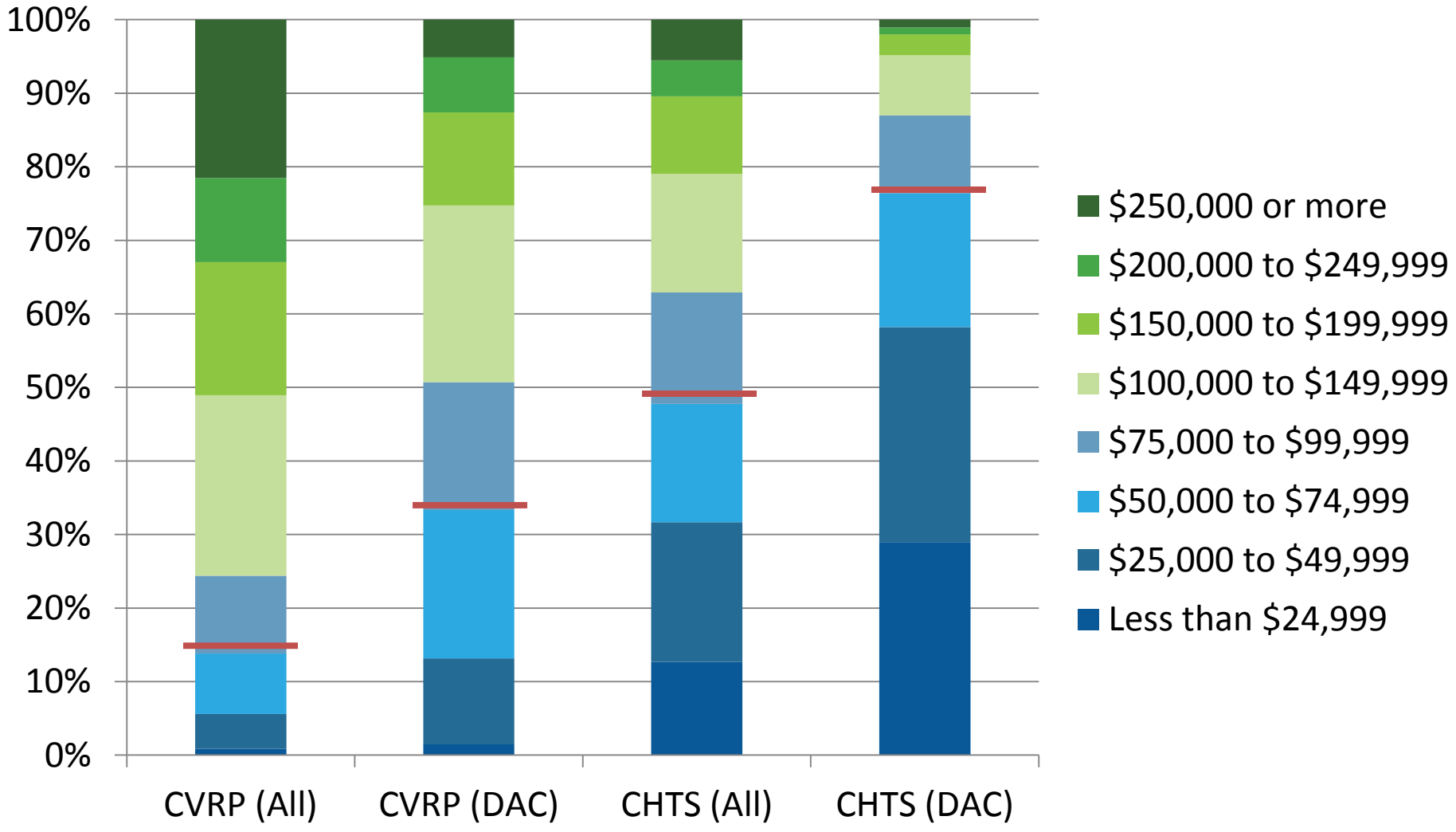
CVRP and New-vehicle "Intender" Income Distributions: All vs. DACs



Weighted CVRP (2014) & weighted CHTS (2012) data

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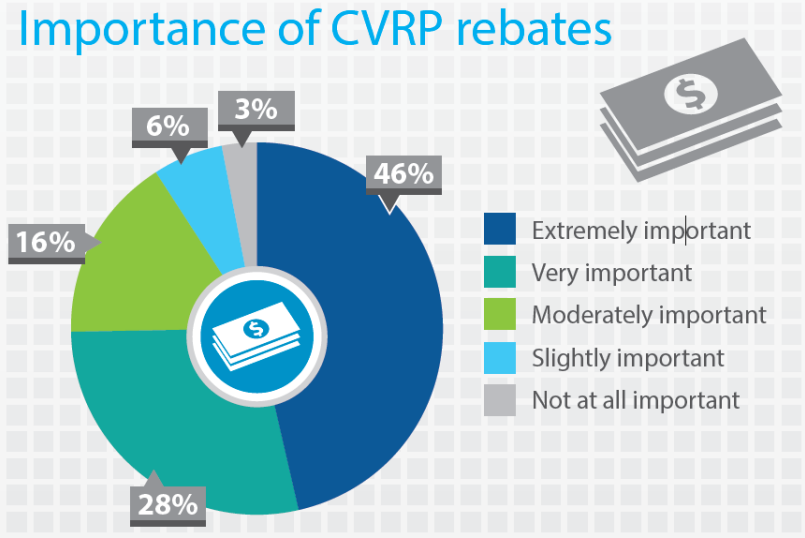
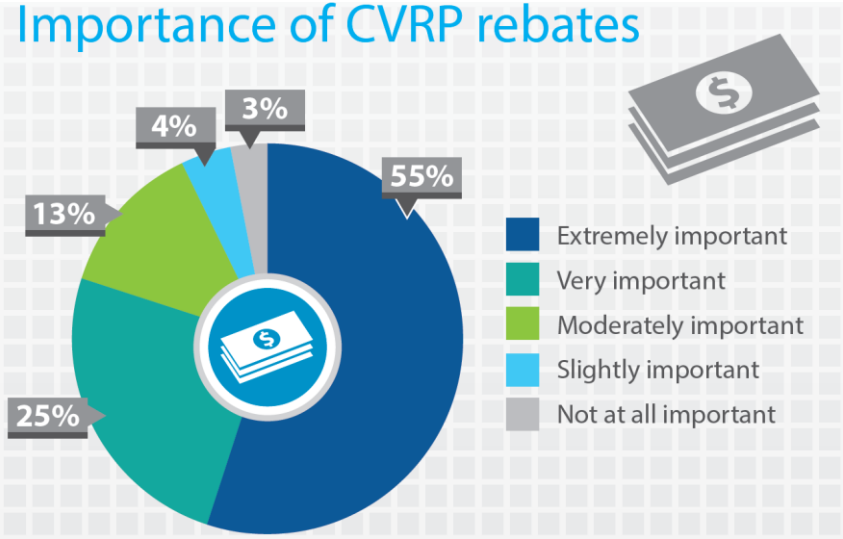
Importance of Rebate: Overall and DACs

Overall:



DACs:



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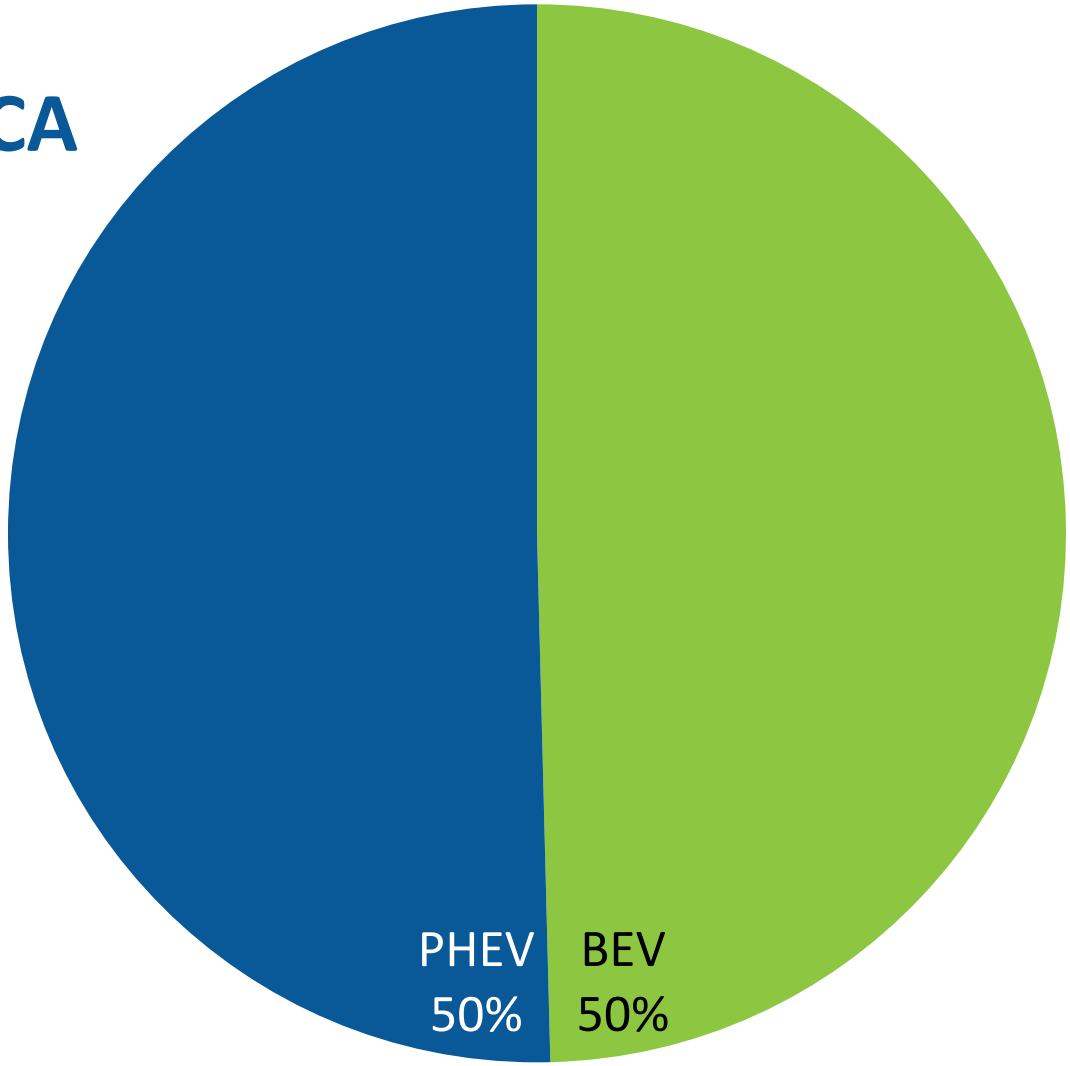
Understanding Underlying Differences

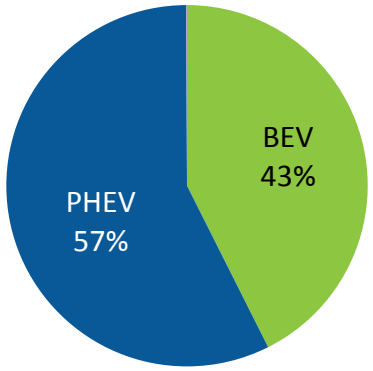
DAC Plug-in Electric Vehicles by Product Type

Technology Share: Sales

CA



DACs



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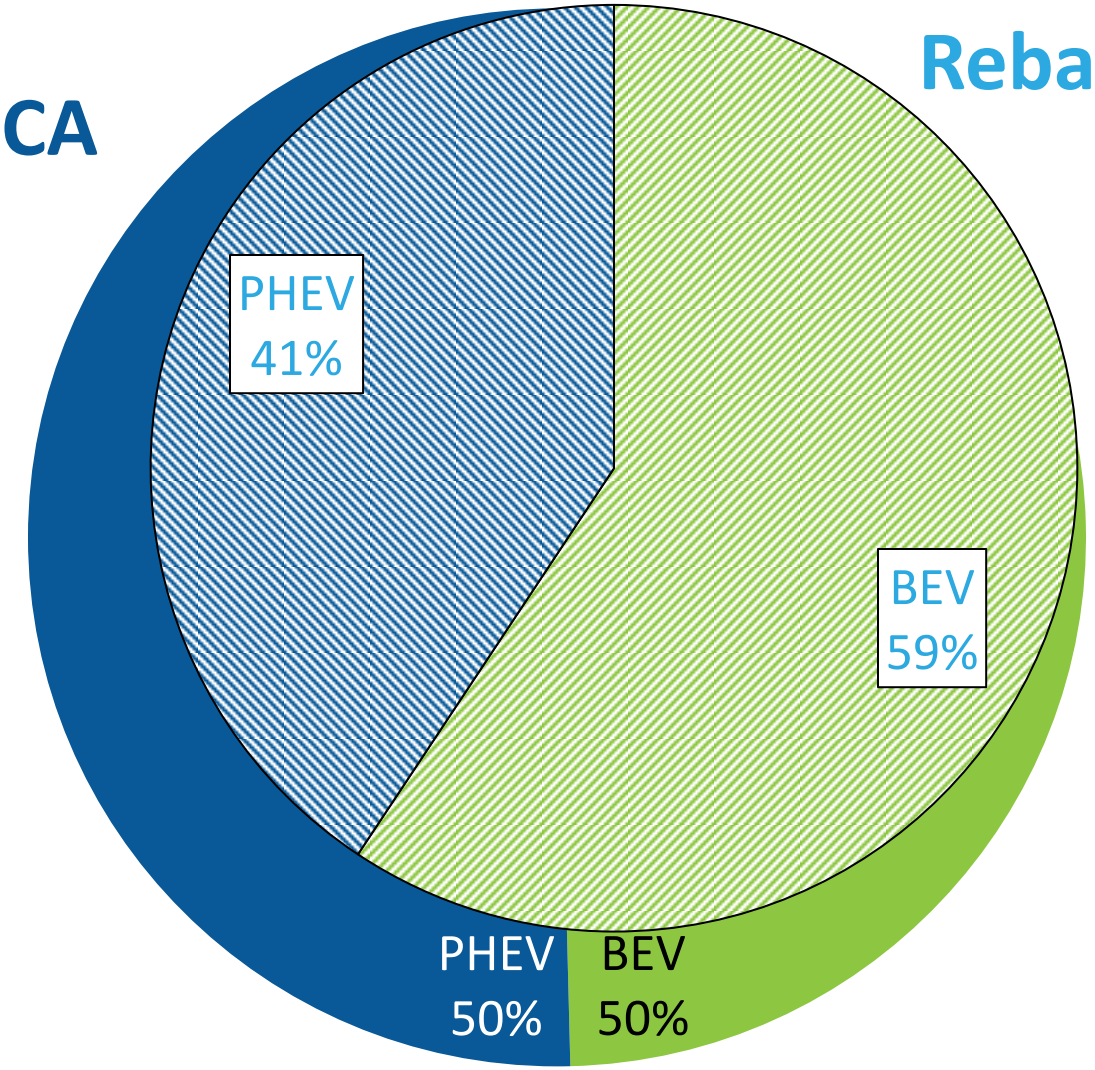
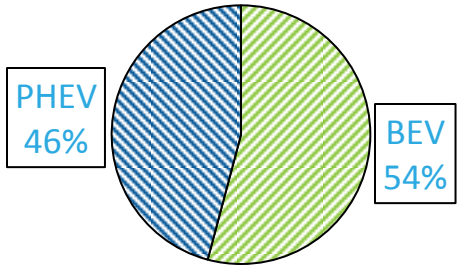
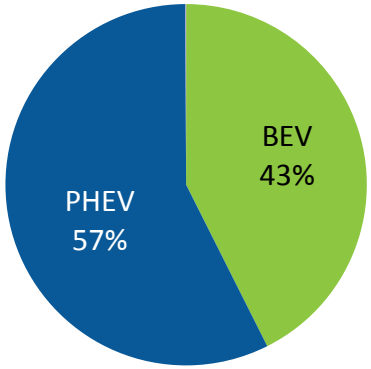
Technology Share: Sales and Rebates



Rebates



DACs



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.

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Vehicle Replacement Rates

	PEV Replaced Previous Vehicle	
	Statewide	DACs
PHEVs	72%	68%
non-Tesla BEVs	56%	51%

EV Survey
Total Responses: 16,306
Overall Time Frame: 9/1/2012–5/31/2015

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Recent Legislative Action

Legislation: New CVRP Eligibility Requirements

	Took effect March 2016	To take effect November 2016
Consumer Income Cap*:		
Single filers	$250,000	$150,000
Head-of-household filers	$340,000	$204,000
Joint filers	$500,000	$300,000
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

Persons in household	Max Income*
1	$35,640
2	$48,060
3	$60,480
4	$72,900
5	$85,320
6	$97,740
7	$110,190
8	$122,670

* 300% of the Federal Poverty Level

Statewide Monetary Incentives (as of 1 Nov.)

	CVRP	CVRP-LMI (≤300% FPL)
 **Hydrogen Fuel-Cell Electric Vehicles**	*$5,000*	*$7,000*
 **Battery Electric Vehicles (& i3 REx)**	*$2,500*	*$4,500*
 **Plug-in Hybrid Electric Vehicles**	*$1,500*	*$3,500*
Neighborhood Electric Vehicles	*$900*	*$900*
 **Zero-Emission Motorcycles**	*$900*	*$900*

California Environmental Protection Agency
Air Resources Board

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Rebate Recipients with Low-to-Moderate Income

	CVRP LMI (2014)
CA Overall	4% - 10%
In DACs	10% - 25%

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%

Rebate Influence

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

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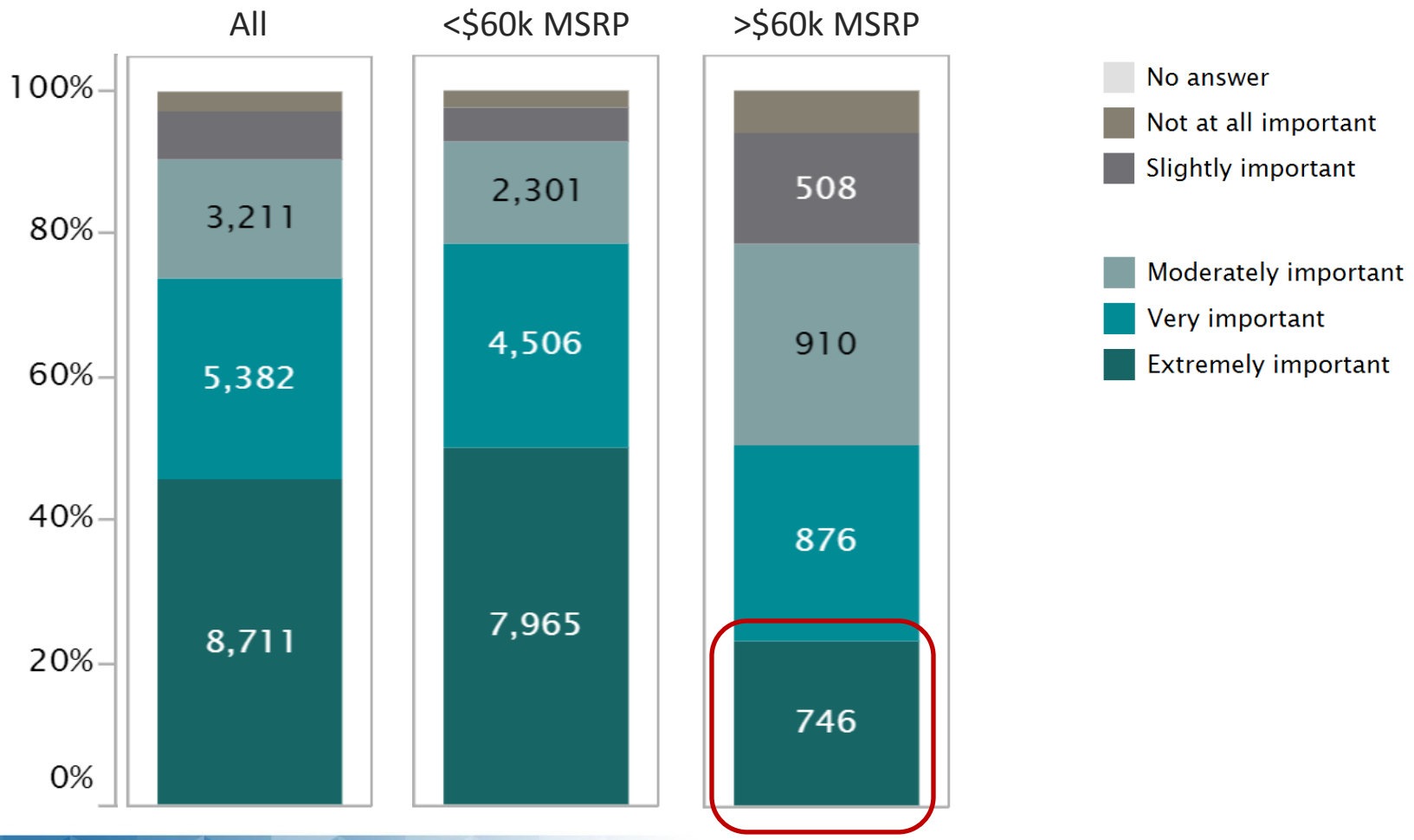
Rebate Influence

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



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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 1/4th of the population, but only ~1/6th of new-car market and ~1/14th 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 ~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)
  - EV purchase/lease dates 3/2010–5/2015

Market:

- EV Registration Data (Polk, N=150,287)
  - EV registration dates 3/2010–5/2015

Thank You for Your Attention

What would you like to know more about?
What decisions are you facing?

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We work nationally in the clean energy industry and are always open to exploring partnership opportunities.

Center for Sustainable Energy™