

# Electric Vehicles: Rebates, Adoption, and a Dealer Incentive for EV Sales

SANDAG Energy Working Group, 26 Oct 2017, San Diego CA  
Brett Williams, Ph.D. – Principal Advisor, Clean Transportation  
John Anderson, Analyst & Nick Pallonetti, Analyst Assistant

Thanks also to others at CSE

# CSE Electric Vehicle Activities

**Incentives Design & Administration**

**Consumer & Dealer Outreach**

**Stakeholder Engagement**

**Fleet Assistance & Clean Cities**

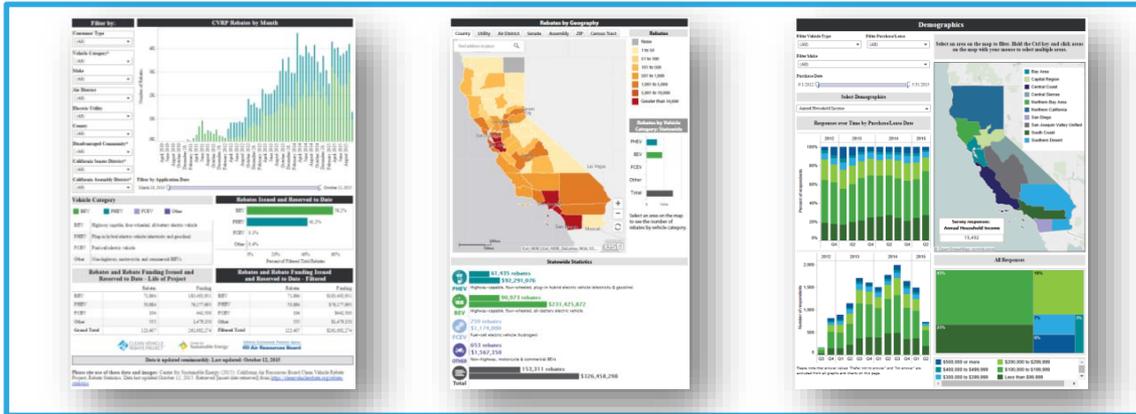
**PEV, Alt.-Fuel, & ZEV Planning & Implementation**

**2<sup>nd</sup> Life Battery Research & Vehicle-Grid Integration**

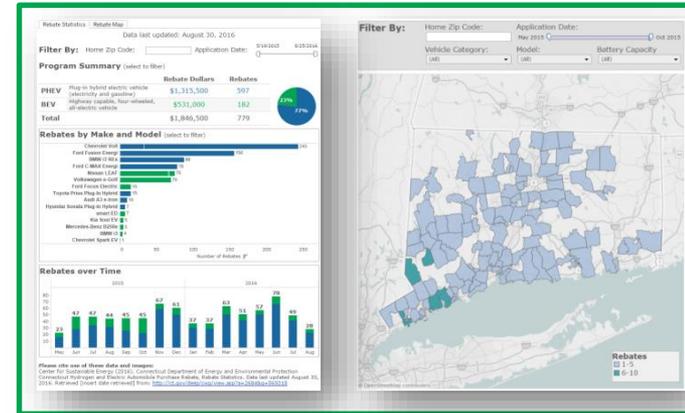
# Where can I get the data?: Transparency Tools

## Public dashboards facilitate informed action

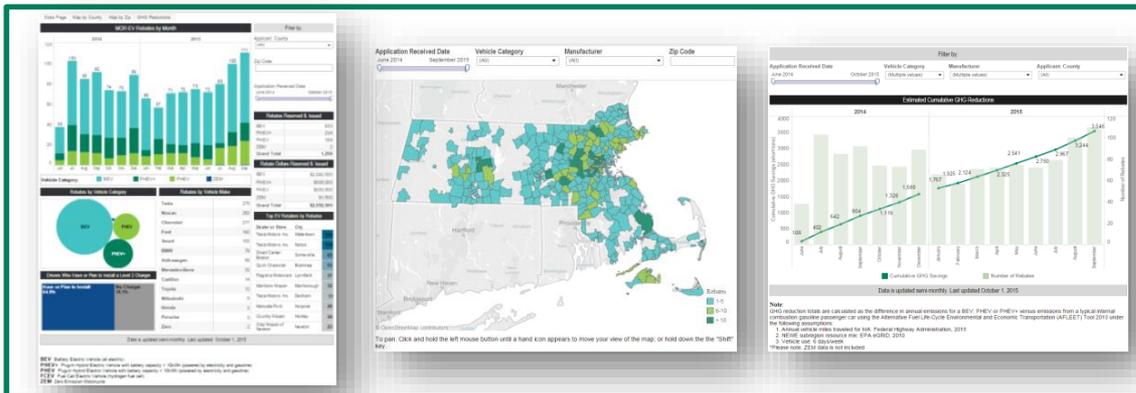
- >215,000 EVs and consumers
- >19,000 survey responses statistically represent >91,000 consumers
- >\$470M in rebates processed



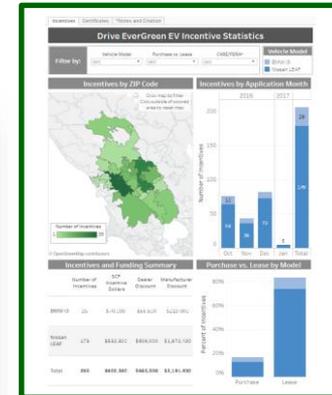
cleanvehiclerebate.org



ct.gov/deep



mor-ev.org



sonomacleanpower.org



zevfacts.com

# Outline

- Clean Vehicle Rebate Project (CVRP) Update
  - Overview
  - Program Changes & Funding Availability
- California & San Diego EV Market Update
  - EVs
  - EV consumers
- Select Evaluation Highlights
  - CVRP Impact
  - CT Dealer Incentive

# Clean Vehicle Rebate Project (CVRP)

October 2017 update

# Statewide Monetary Incentives

		CVRP	Federal Tax Credit
	<b>Hydrogen Fuel-Cell Electric Vehicles</b>	\$5,000	
	<b>Battery Electric Vehicles (&amp; i3 REx)</b>	\$2,500	\$7,500
	<b>Plug-in Hybrid Electric Vehicles*</b>	\$1,500	\$2,500–\$7,500
	<b>Zero-Emission Motorcycles</b>	\$900	
	<i>* ≥ 20 electric-mile range only</i>		

# CVRP Vehicle Requirements

≥ 20 electric-mile range (as certified by CARB based on UDDS)



Select currently available EVs <20 e-mi	e-mi range
2017 Mercedes-Benz GLE550e	12
2017 BMW 330e	14
2017 Volvo XC90	14

# CVRP Eligibility Requirements (legislative)

	November 2016 – present
<b>Vehicle requirement:</b>	
Electric range	Must be $\geq$ 20 e-mi
<b>Consumer Income Cap*:</b>	
Single filers	\$150,000
Head-of-household filers	\$204,000
Joint filers	\$300,000

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

# Increased Rebate Amounts for Low-to-Moderate-Income (LMI) Consumers

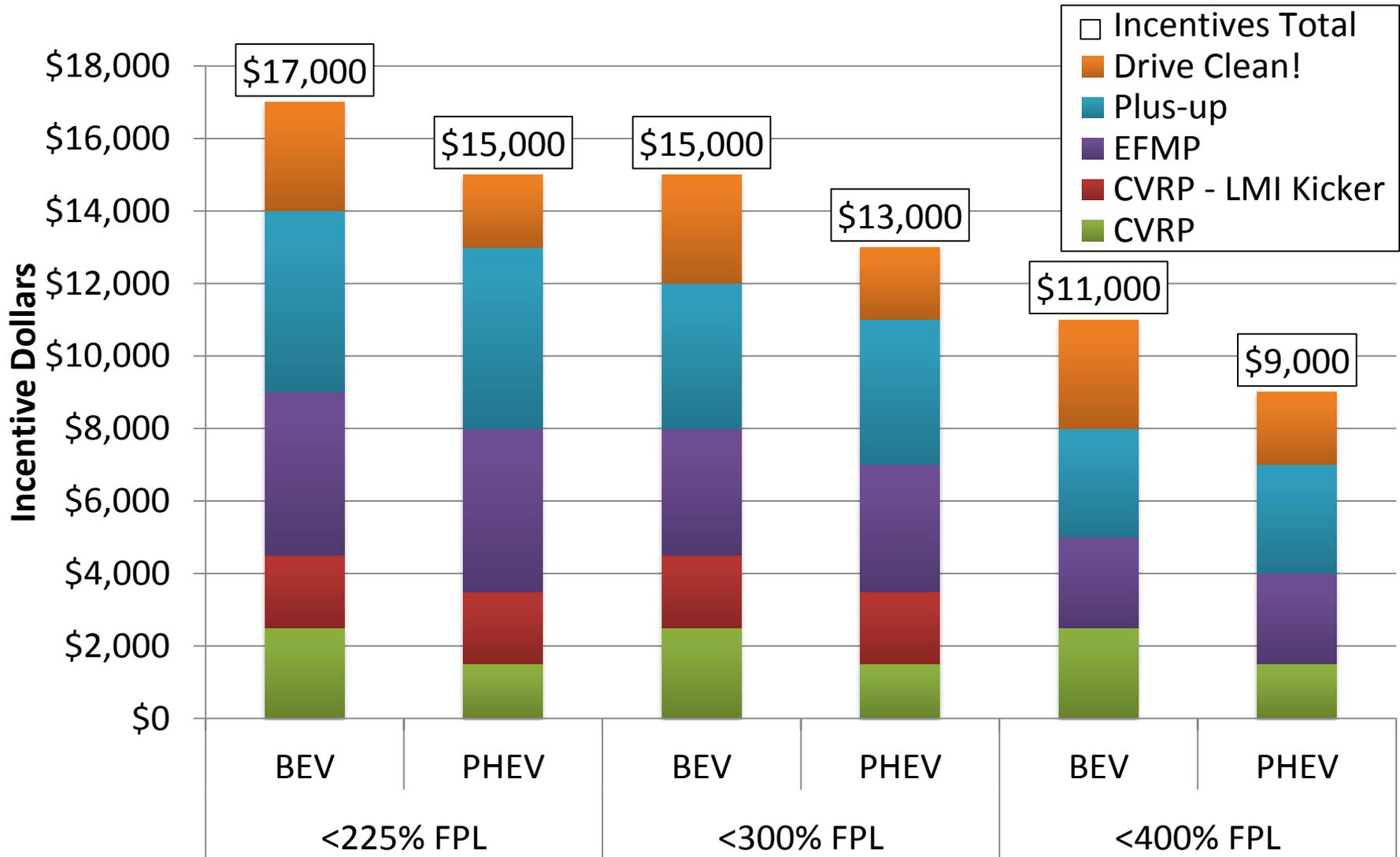
- Additional \$2,000 available to consumers with household incomes  $\leq$  300% of the federal poverty level (FPL)
- Prioritization of rebate payments to low income consumers

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

# Statewide Monetary Incentives (as of 1 Nov. 2016)

		CVRP	CVRP-LMI ( $\leq 300\%$ FPL)
	<b>Hydrogen Fuel-Cell Electric Vehicles</b>	<i>\$5,000</i>	<i>\$7,000</i>
	<b>Battery Electric Vehicles (&amp; i3 REx)</b>	<i>\$2,500</i>	<i>\$4,500</i>
	<b>Plug-in Hybrid Electric Vehicles</b>	<i>\$1,500</i>	<i>\$3,500</i>
	<b>Zero-Emission Motorcycles</b>	<i>\$900</i>	<i>\$900</i>

# Incentive Summary: San Joaquin (as of 1 Nov. 2016)



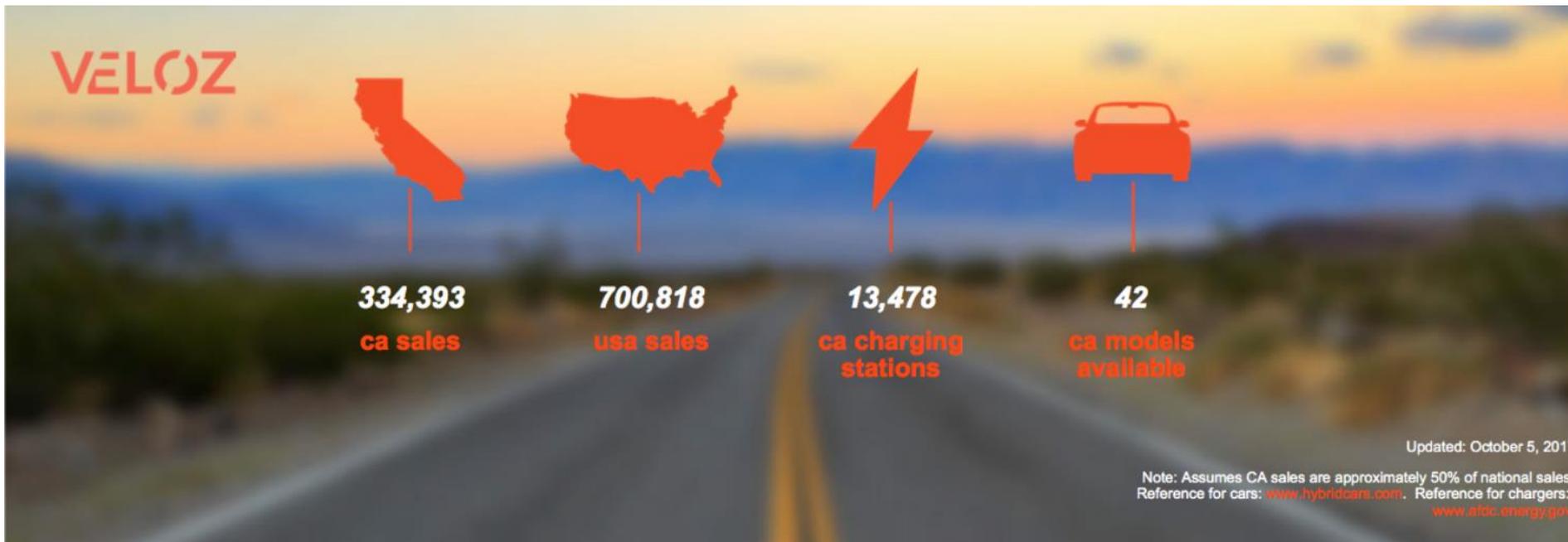
# CVRP Rebate Funding

- Current (FY 2016–2017 funding):
  - Waitlist for standard rebates began June 2016
  - Increased Rebates for Low-/Moderate-Income (LMI) consumers unaffected
- FY 2017–2018 funding:
  - Will remove waitlist soon (November)
  - Waitlisted standard applications (Jun–Nov) will be paid in Q4 2016 and Q1 2017
  - \$140 million allocated for CVRP
    - Proposed additional funding for LMI increased rebates

# CA & San Diego EV Market Update

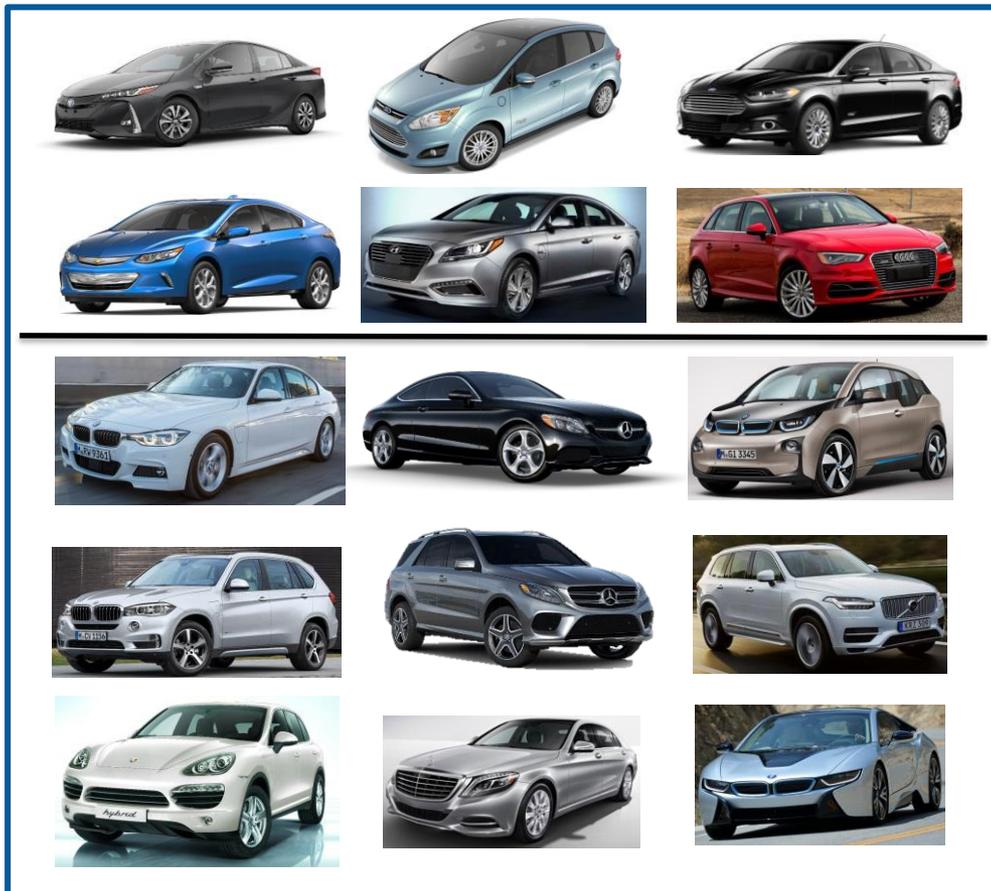
# Getting Up to Speed

What electric cars are available? How are they selling?

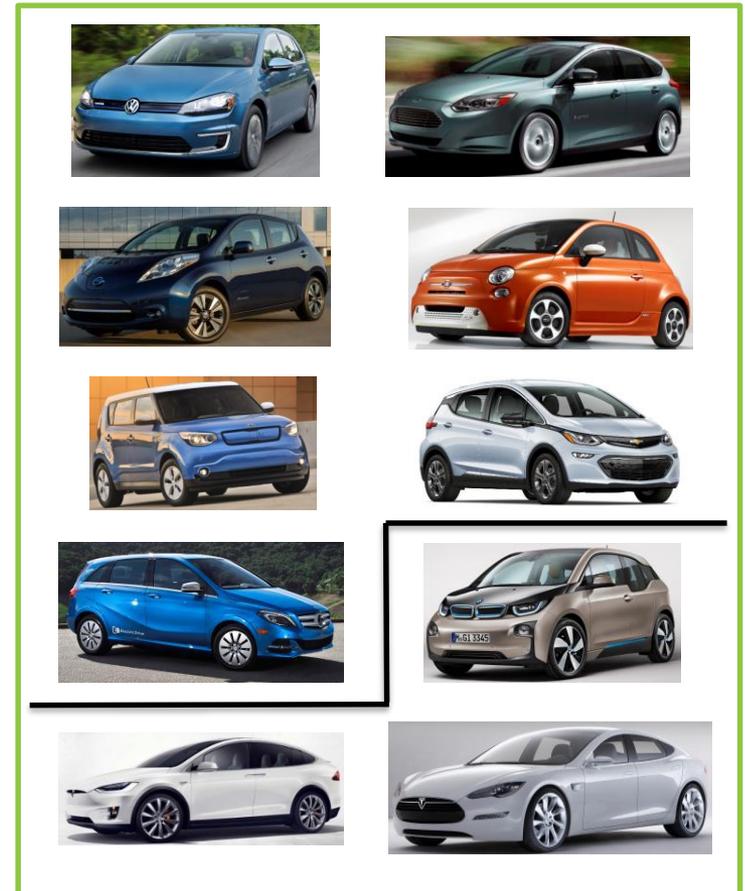


# Getting Up to Speed: More Choice

## Plug-in hybrid EVs



## All-battery EVs

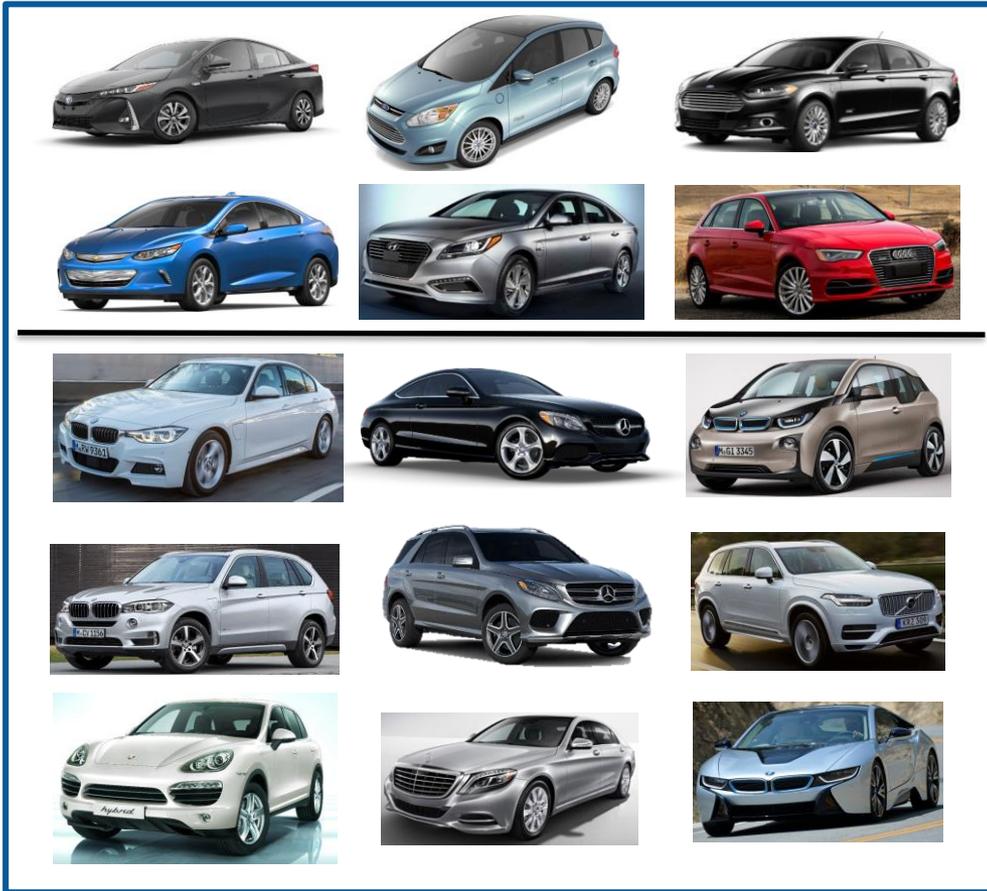


## Fuel-cell EVs



# Plug-in Hybrid Electric Vehicles (PHEVs)

## Plug-in hybrid EVs



Depending on the model...

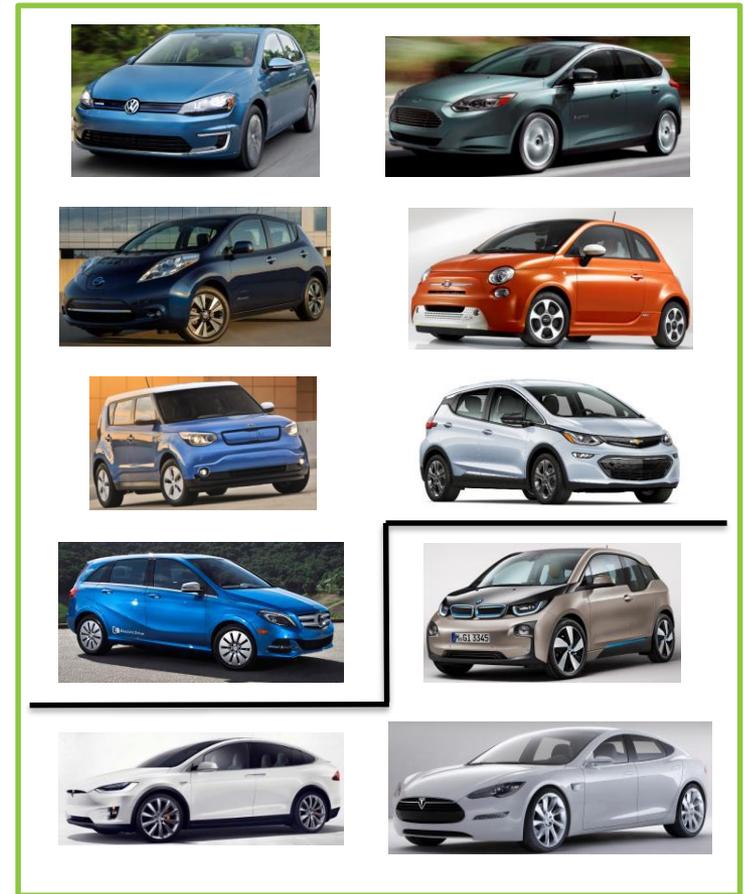
- Range: 180–640 miles total
  - 10–97 mi. on electricity plus
  - 83–615 on gasoline
- If forget to charge, acts like efficient gasoline hybrid
- If charge frequently driving can be electric
  - U.S. avg. commute: ~15 mi.
  - U.S. avg. daily driving: ~30 mi.
- MSRP: \$27,100–\$140,700

# All-Battery Electric Vehicles (BEVs)

Depending on the model...

- Range: 81–315 electric miles
- 0 to 60 mph: 2.3–10.1 seconds
- Full torque when stoplight turns green
- No shifting, smooth acceleration to maximum speed
- MSRP: \$28,995–\$137,800

## All-battery EVs



# Select Recent Releases

	Vehicle	Vehicle Category	Base MSRP	EPA Fuel Economy	EPA Range
	<b>Prius Prime</b>	Midsize PHEV	\$27,100	133 MPGe	25 e-mi 640 total mi
	<b>Hyundai Ioniq Electric</b>	Midsize BEV	\$29,500	136 MPGe	124 e-mi
	<b>Chevrolet Bolt</b>	Small wagon BEV	\$36,620	119 MPGe	238 e-mi
	<b>Chrysler Pacifica Hybrid</b>	Minivan PHEV	\$41,995	84 MPGe	33 e-mi 570 total mi
	<b>BMW 330e</b>	Compact PHEV	\$44,100	71 MPGe	14 e-mi 350 total mi
	<b>Mercedes-Benz GLE 550e</b>	SUV PHEV	\$66,300	43 MPGe	10 e-mi 460 total mi

e-mi = electric miles  
Specs from fueleconomy.gov



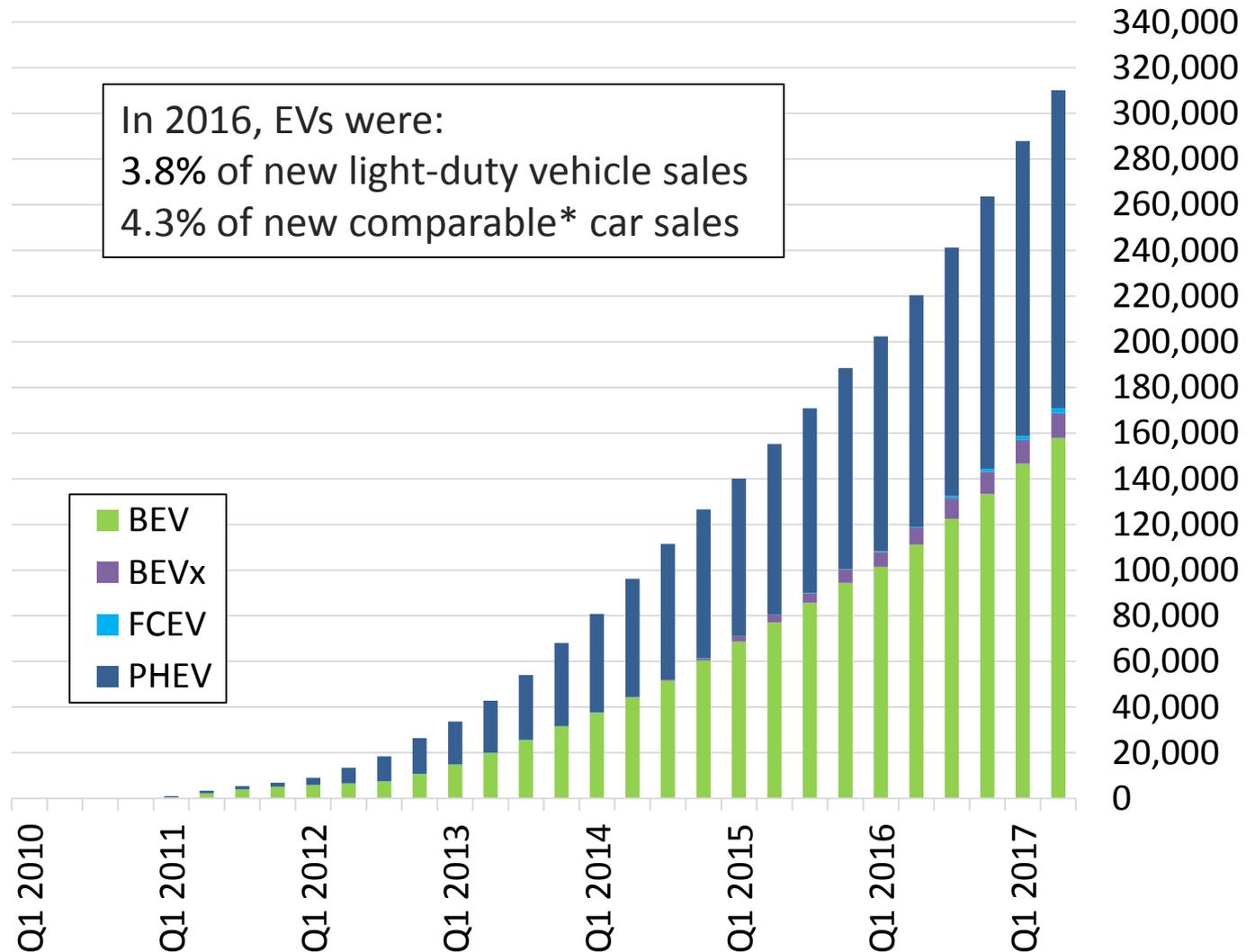


# EVs: How many? What Type? Where?

March 2010 – December 2016 (unless stated otherwise)

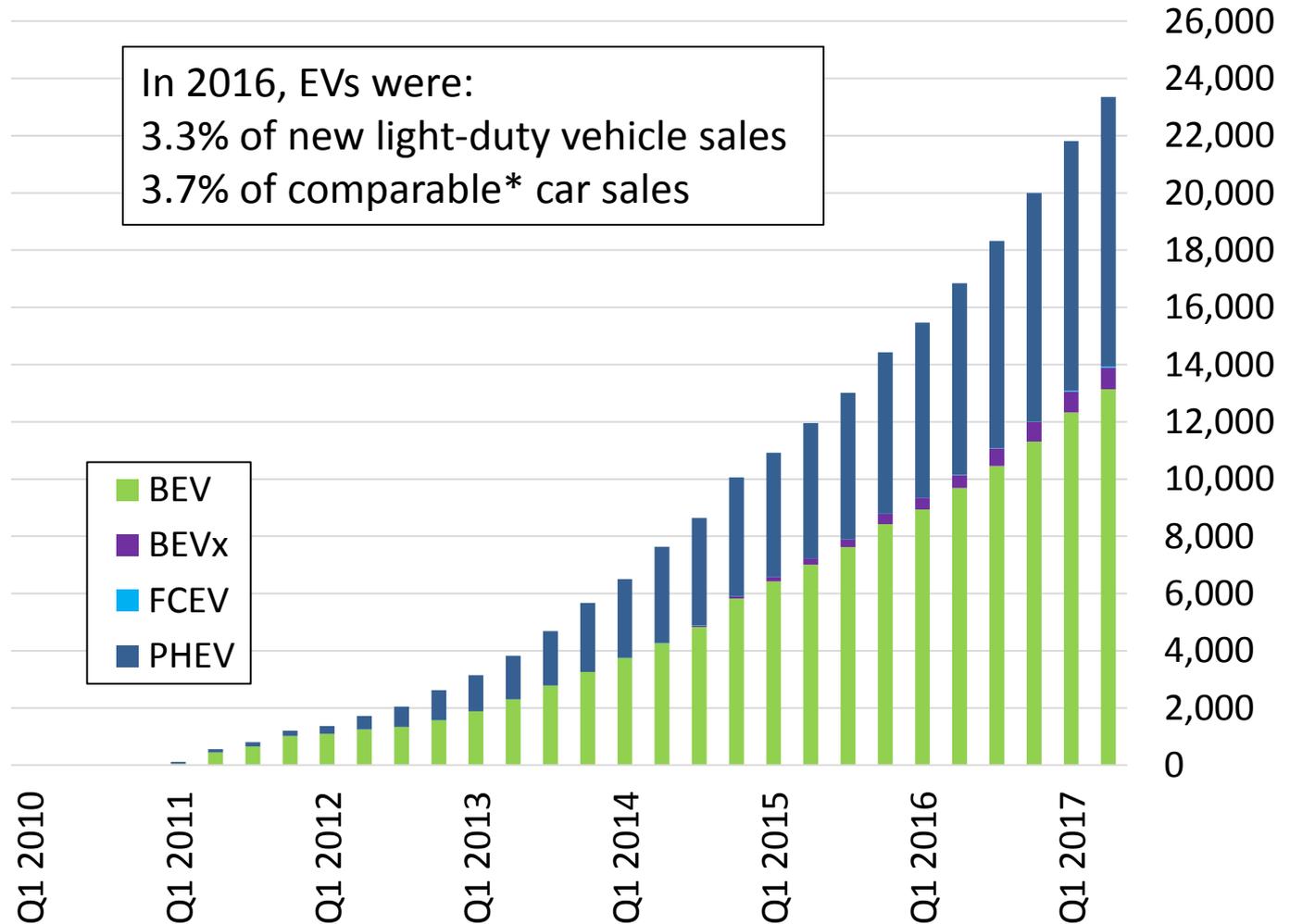
# California Cumulative PHEV, BEV, FCEV Registrations

EV registrations	
2010	195
2011	6,737
2012	19,540
2013	41,524
2014	58,615
2015	61,813
2016	75,211
2017 (Q1-Q2)	46,495
<b>Total</b>	<b>310,130</b>



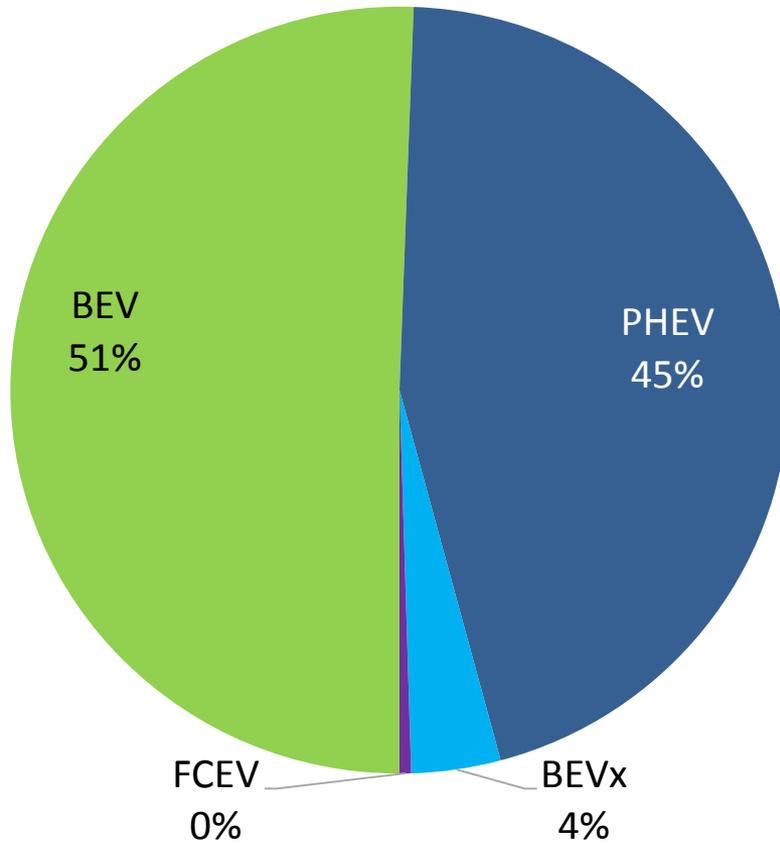
# San Diego: PHEV, BEV, FCEV Registrations

EV registrations	
2010	16
2011	1,185
2012	1,421
2013	3,051
2014	4,382
2015	4,376
2016	5,563
2017 (Q1-Q2)	3,360
<b>Total</b>	<b>23,354</b>

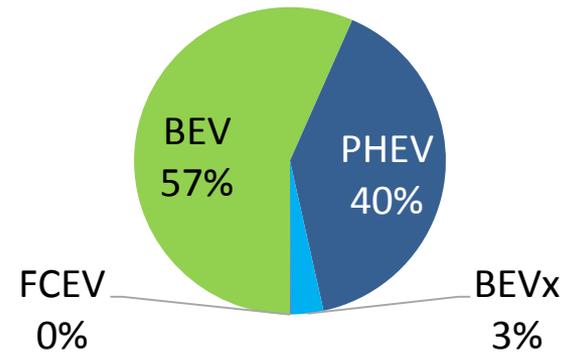


# New Registrations by Vehicle Category (thru 2016)

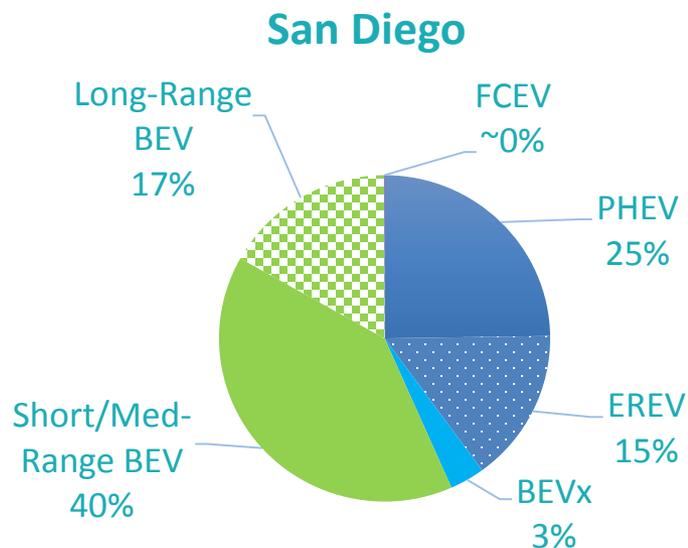
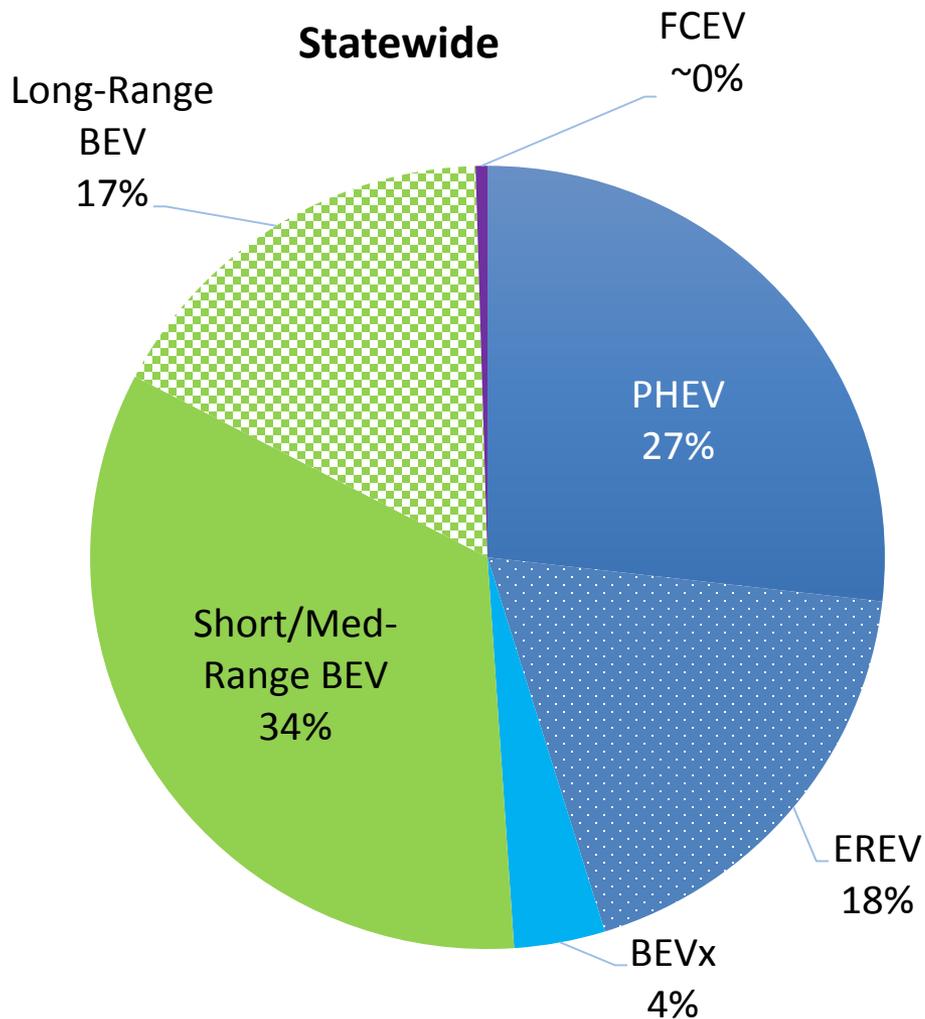
## Statewide



## San Diego

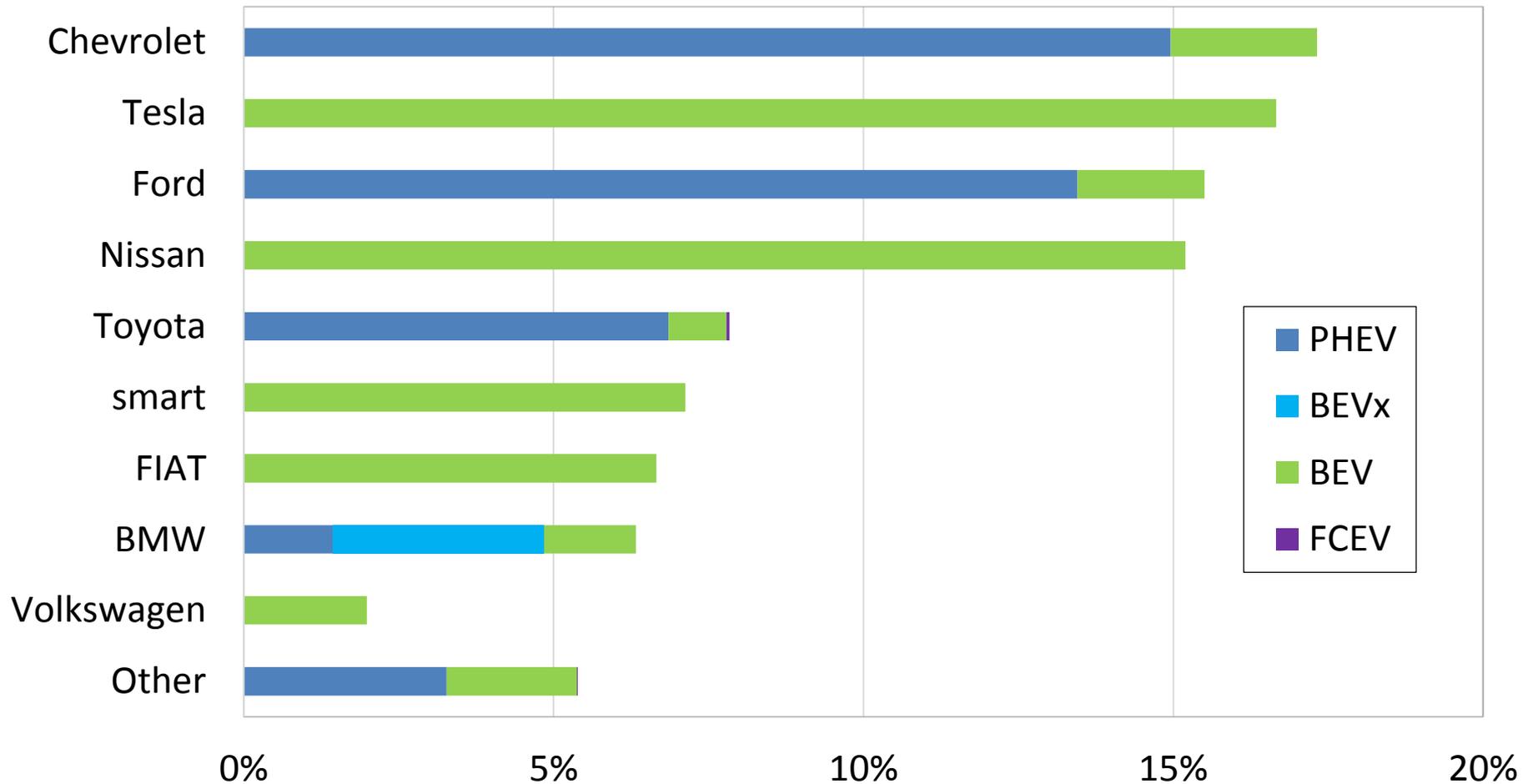


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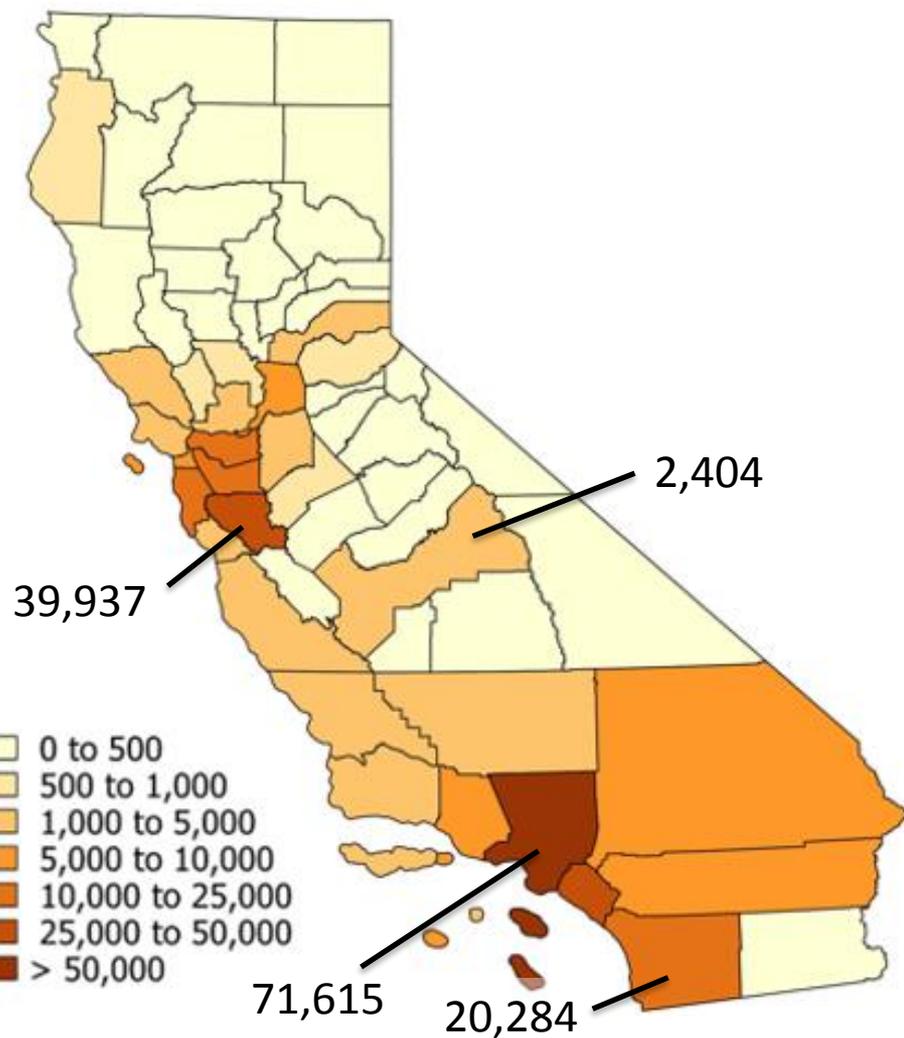


PHEV	Parallel hybrid or < 35 mi e-range
EREV	Series hybrid and ≥ 35 mi e-range
BEVx	≥ 75 mi e-range and must deplete e-range before using engine
Short/Med-Range BEV	<200 mi range
Long-Range BEV	≥200 mi range

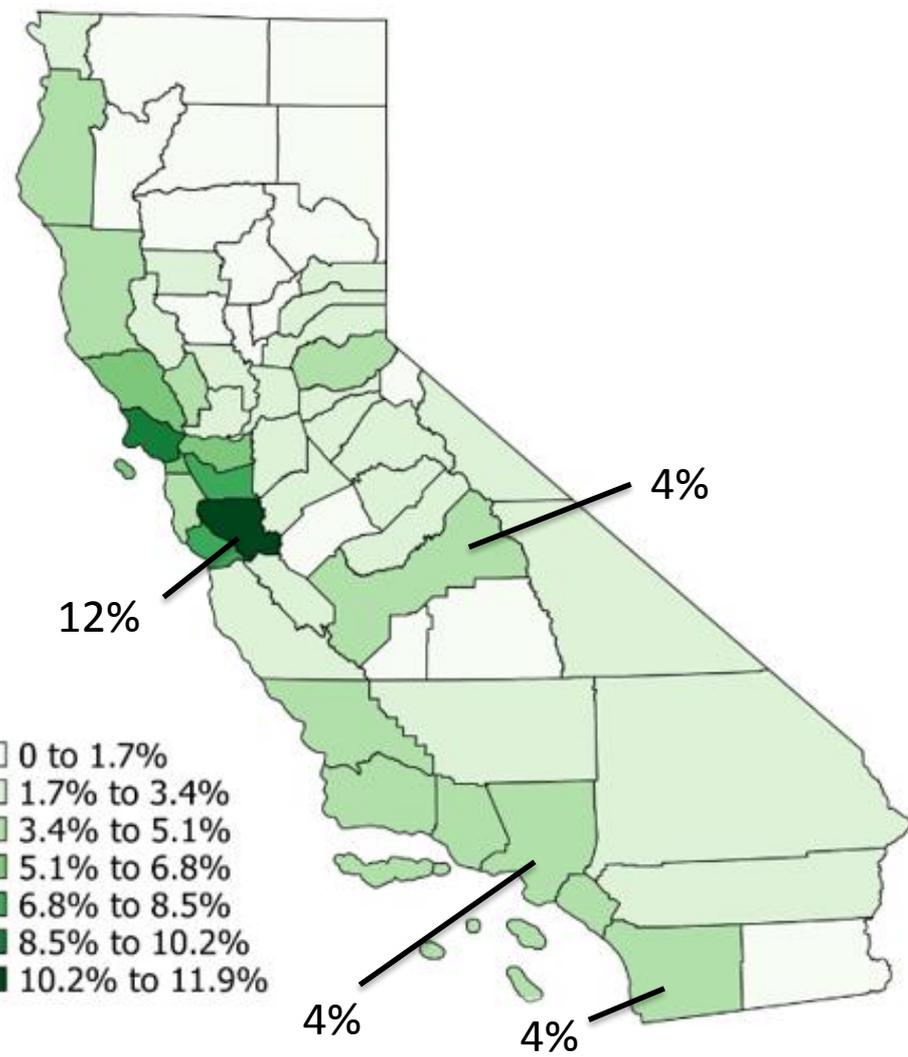
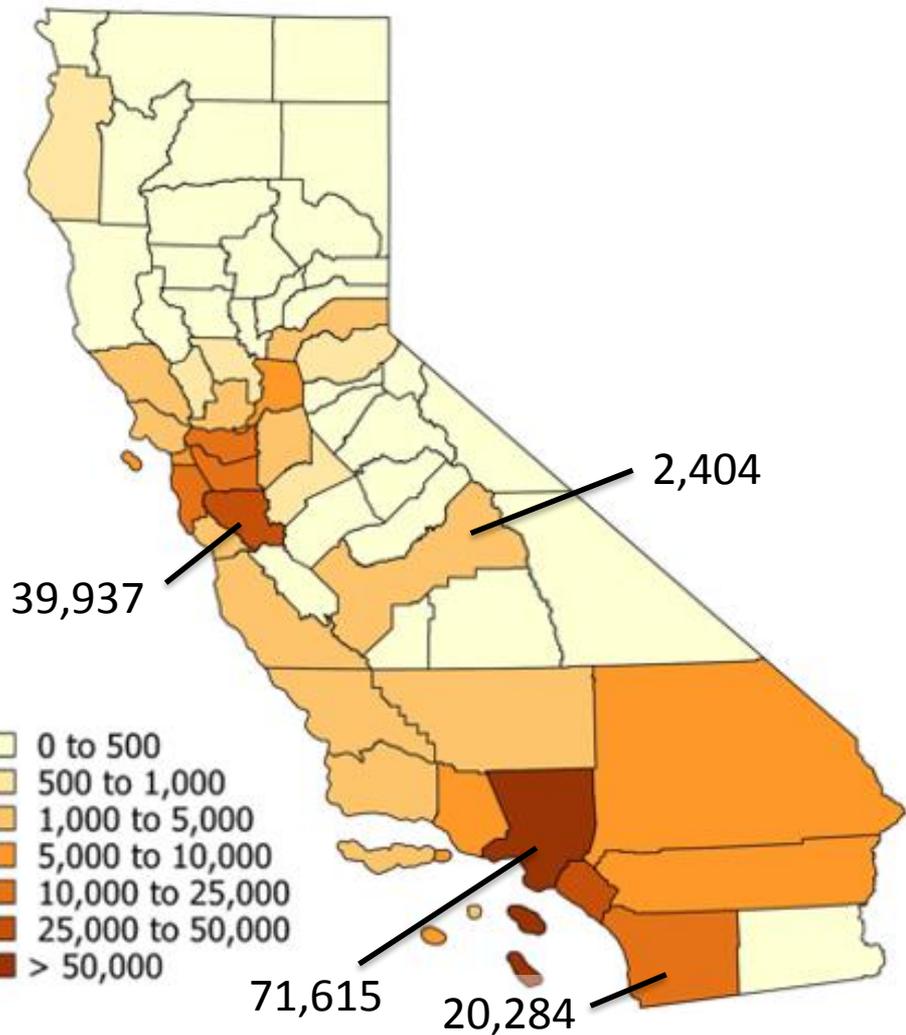
# San Diego: Registrations (thru 2016)



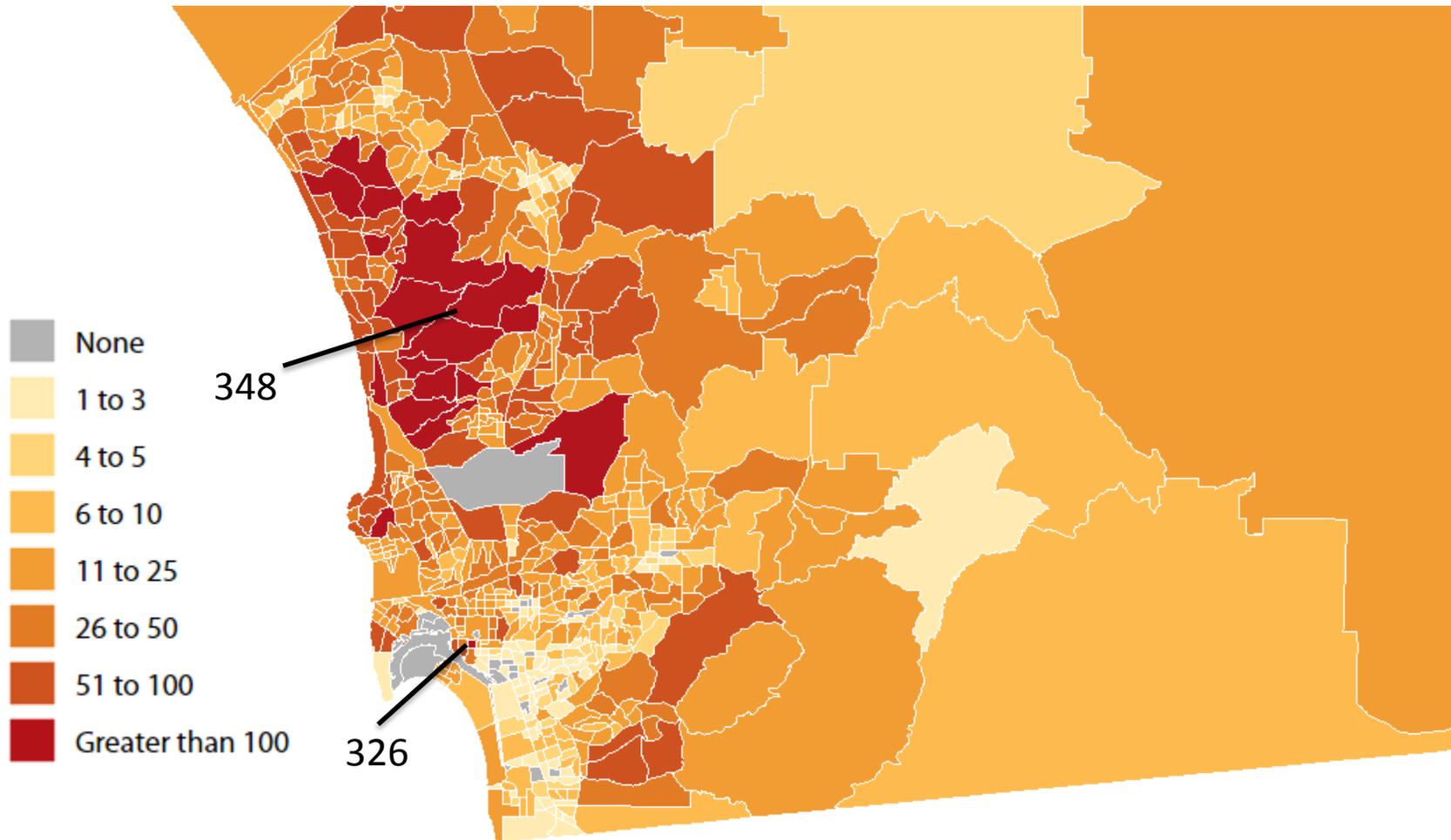
# New Registrations by County (thru Dec 2016)



# New Registrations by County & Normalized to Comparable Sales (2016)



# San Diego County Rebates by Census Tract





# EV Consumers



# Data Summary (Rebates to Individuals Only)

## CVRP Consumer Survey

	<b>2013–2015 Edition</b>	<b>2015–2016 Edition</b>	<b>Total</b>
Responses	n = 19,460	n = 11,611	n = 31,071
Vehicle Purchase/Leases	Sep 2012 – May 2015	April 2015 – May 2016	Sep 2012 – May 2016

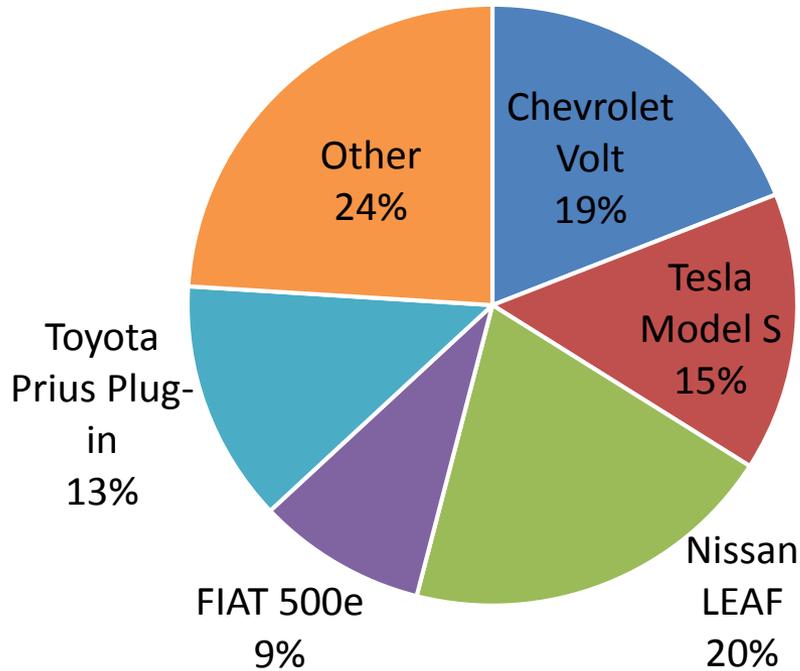
## CVRP Program Population (Application Data)

Participants survey was weighted to represent*	N = 91,081	N = 45,698	N = 136,779
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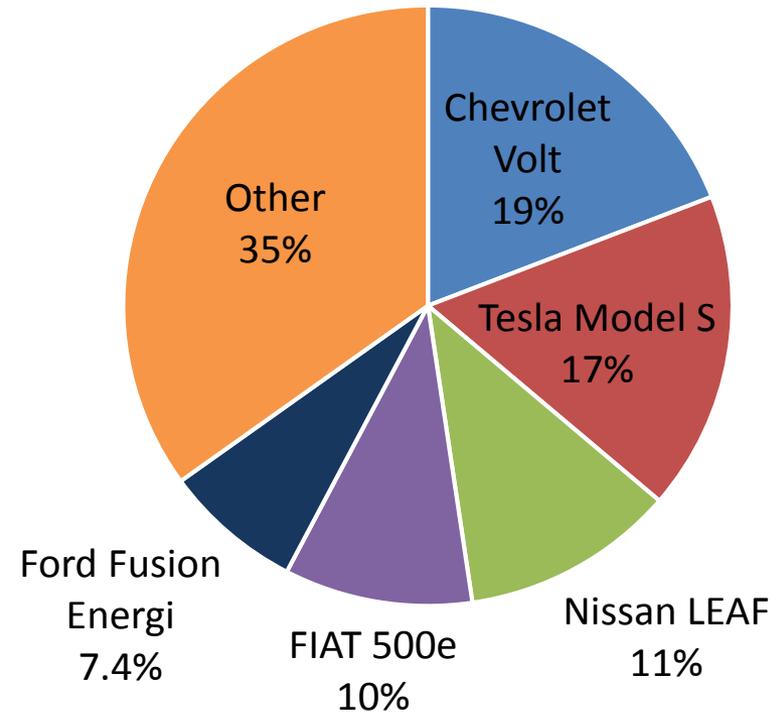
**Note: Before Income Cap. These results are conservative.**

# Vehicles Driven by Respondents

2013–15



2015–16



Source: CVRP Consumer Survey, 2013-15 edition  
Respondents: 19,460  
Purchase dates 9/1/12-5/31/15  
Sampling weights applied

Source: CVRP Consumer Survey, 2015–16 edition  
Respondents: 11,611  
Purchase dates 4/1/15-5/31/16  
Sampling weights applied

# Majority Characteristics of CVRP Participants

	CVRP 2015–2016 Survey
40–59 years old	53%
\$50–200k/y household income	58%
White/Caucasian	65%
Male	74%

# Majority Characteristics of Car Buyers

	CVRP 2015–2016 Survey	New- vehicle “intenders” (CHTS 2012)
40–59 years old	53%	52%
\$50–200k/y household income	58%	58%
White/Caucasian	65%	76%
Male	74%	49%

# Majority Characteristics: Comparison

	CVRP 2015–2016 Survey	New- vehicle “intenders” (CHTS 2012)
40–59 years old	53%	52%
\$50–200k/y household income	58%	58%
White/Caucasian	65%	76%
Male	74%	49%
≥ Bachelor’s	83%	66%
≥ Postgraduate	50%	34%
Detached homes	80%	75%

# Majority Characteristics: San Diego

	CA (CVRP '15-'16)	San Diego (CVRP '15-'16)
40–59 years old	53%	52%
\$50–200k/y household income	58%	61%
White/Caucasian	65%	76%
Male	74%	75%
≥ Bachelor's	83%	82%
≥ Postgraduate	50%	50%
Detached homes	80%	82%

# How can consumer research help us grow markets for electric vehicles?



- **Disadvantaged Communities**

- [\(AEA pres 2016\)](#)
- [\(CVRP DAC infographic, 2017\)](#)

- **Information Channels**

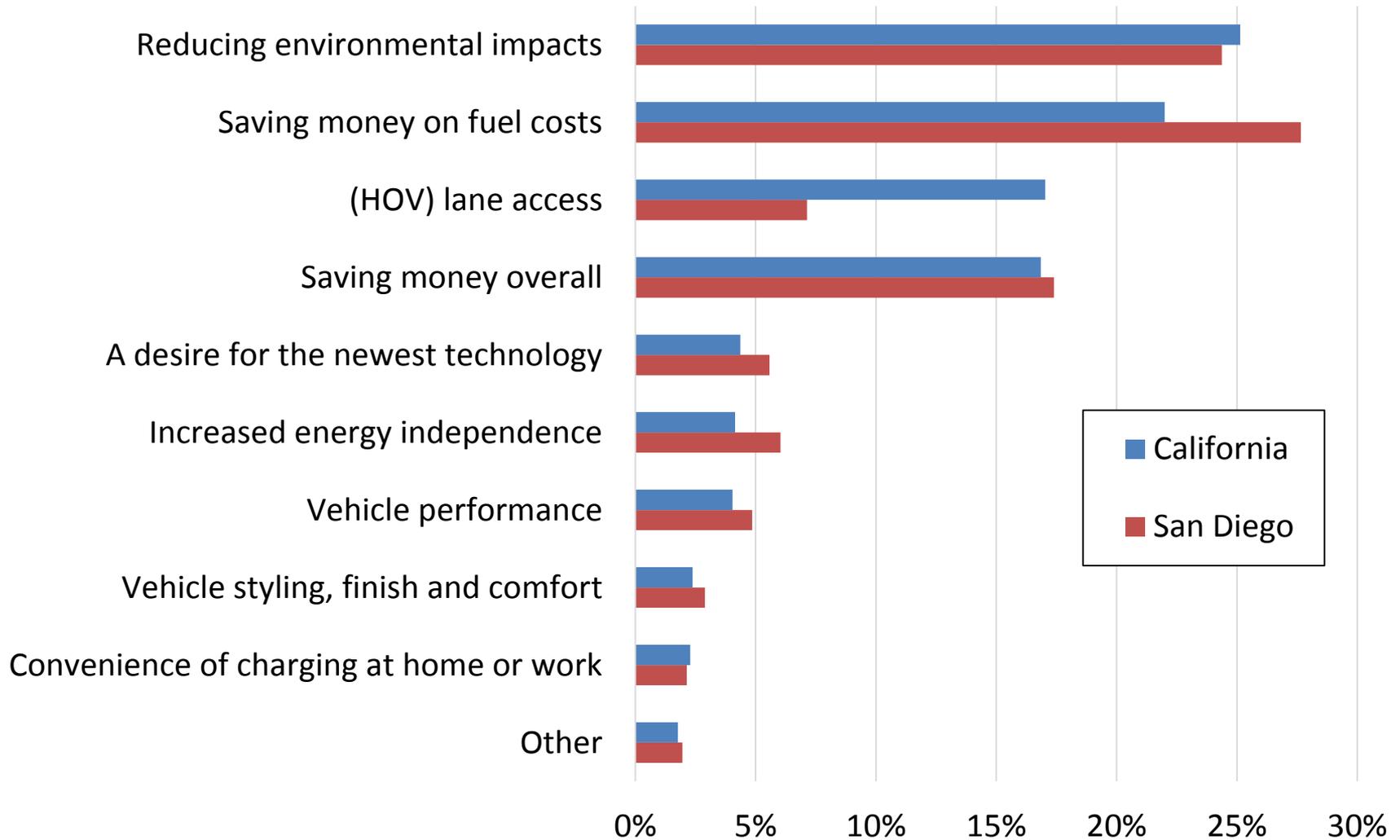
- [\(EV Roadmap pres, 2016\)](#)



- **Target Segments**

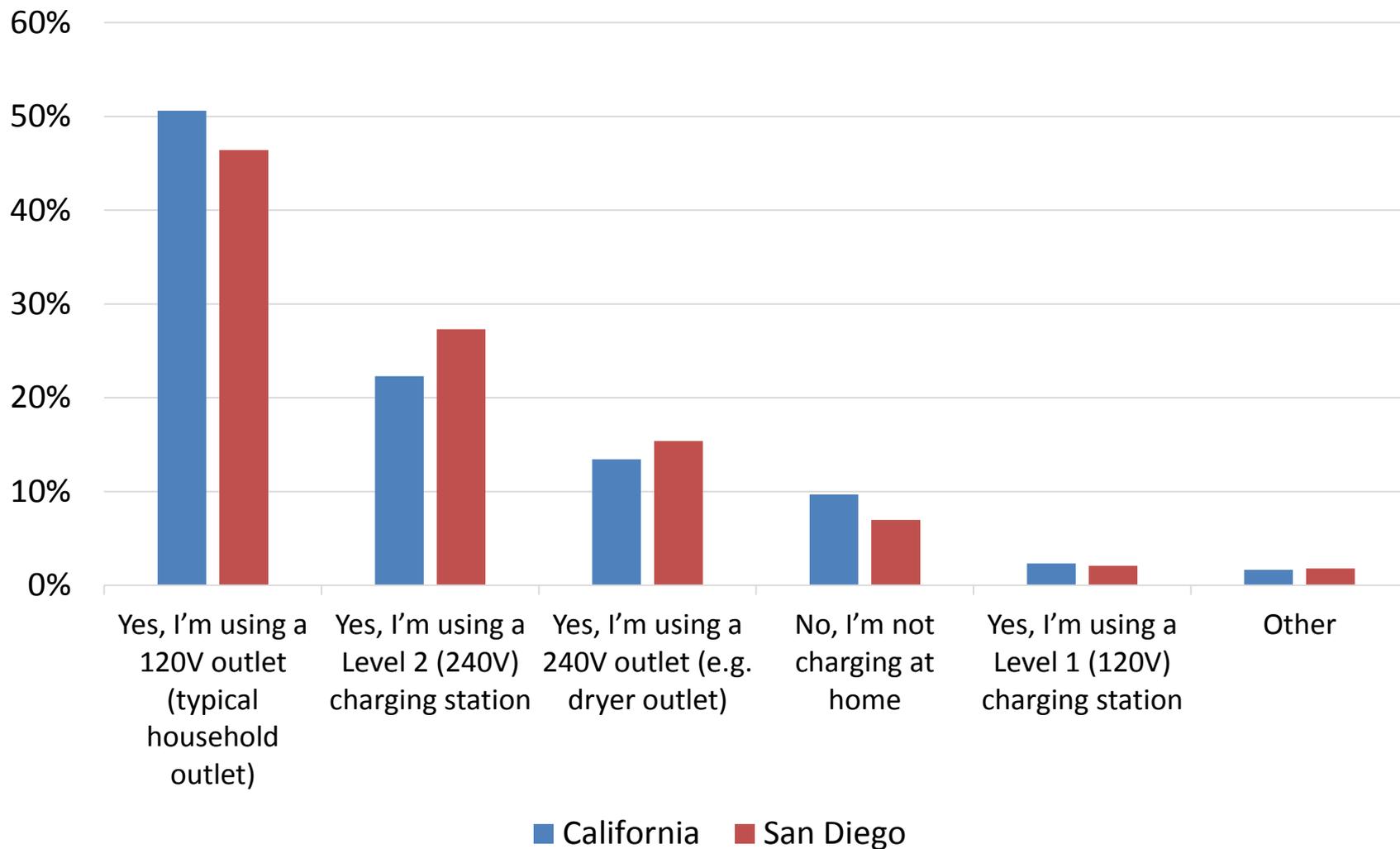
- [\(TRR 2016 research paper\)](#)
- [\(AEA 2016 pres\)](#)
- [\(TRB 2017 poster\)](#)

# Most Important Reason Why Decided to Acquire



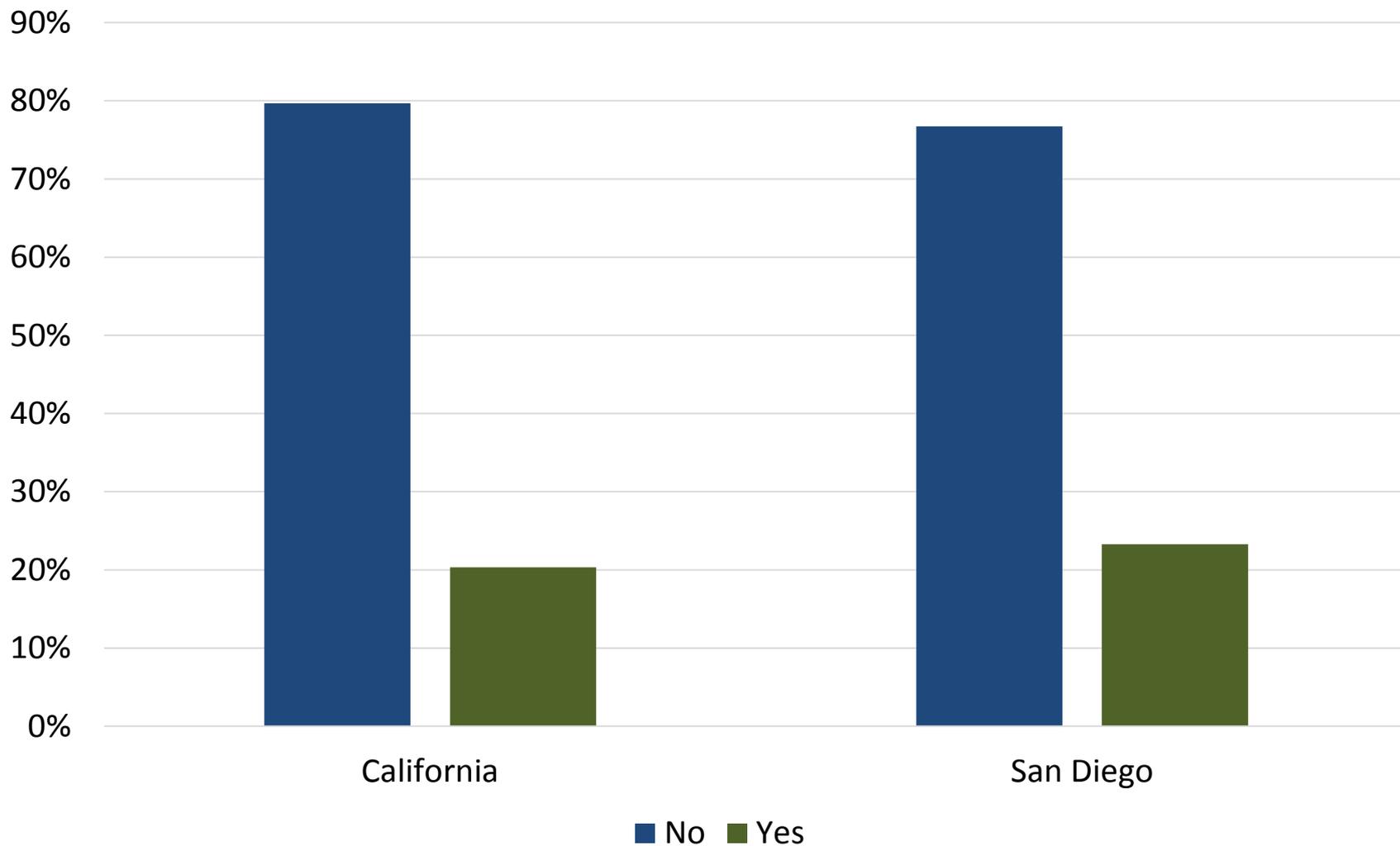
Source: CVRP Consumer Survey, 2015–16 edition  
Respondents: 11,611  
Purchase dates 4/1/15-5/31/16  
Sampling weights applied

# Do you charge your PEV at home?



Source: CVRP Consumer Survey, 2015–16 edition  
Respondents: 11,611  
Purchase dates 4/1/15-5/31/16  
Sampling weights applied

# Did you have to make any electrical upgrades to be able to charge your vehicle at home?

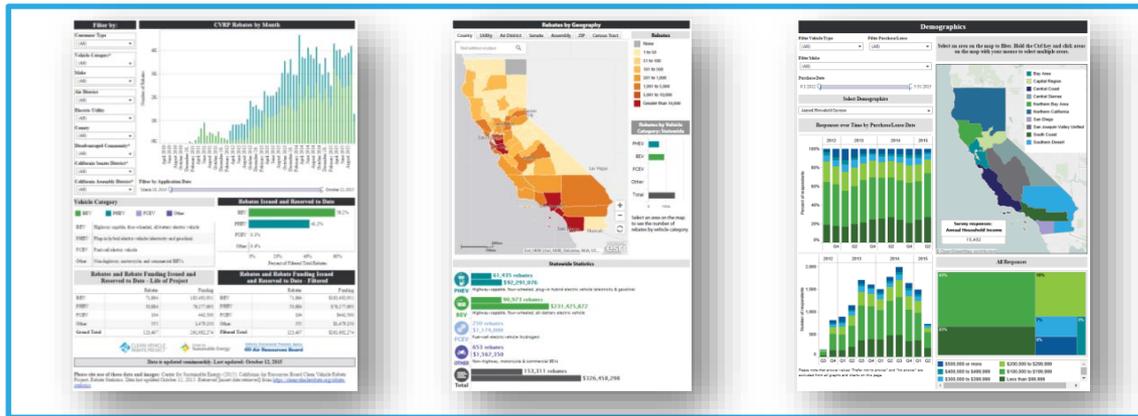


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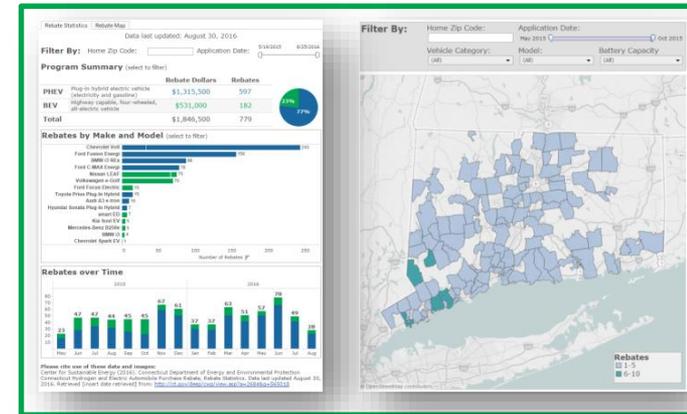
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## Public dashboards facilitate informed action

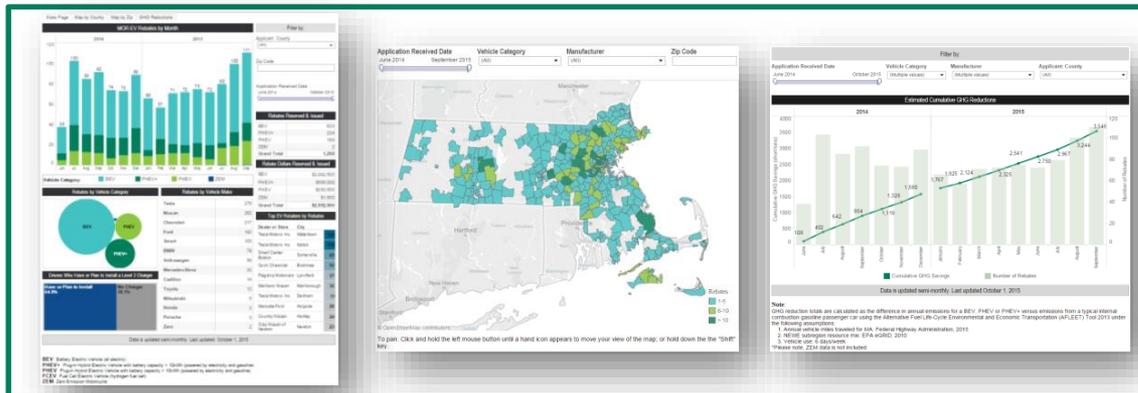
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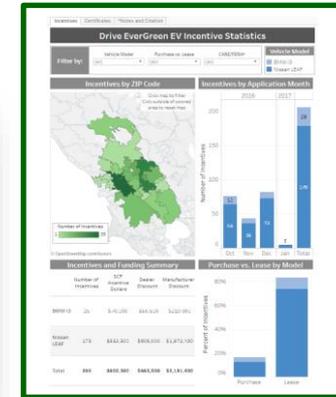
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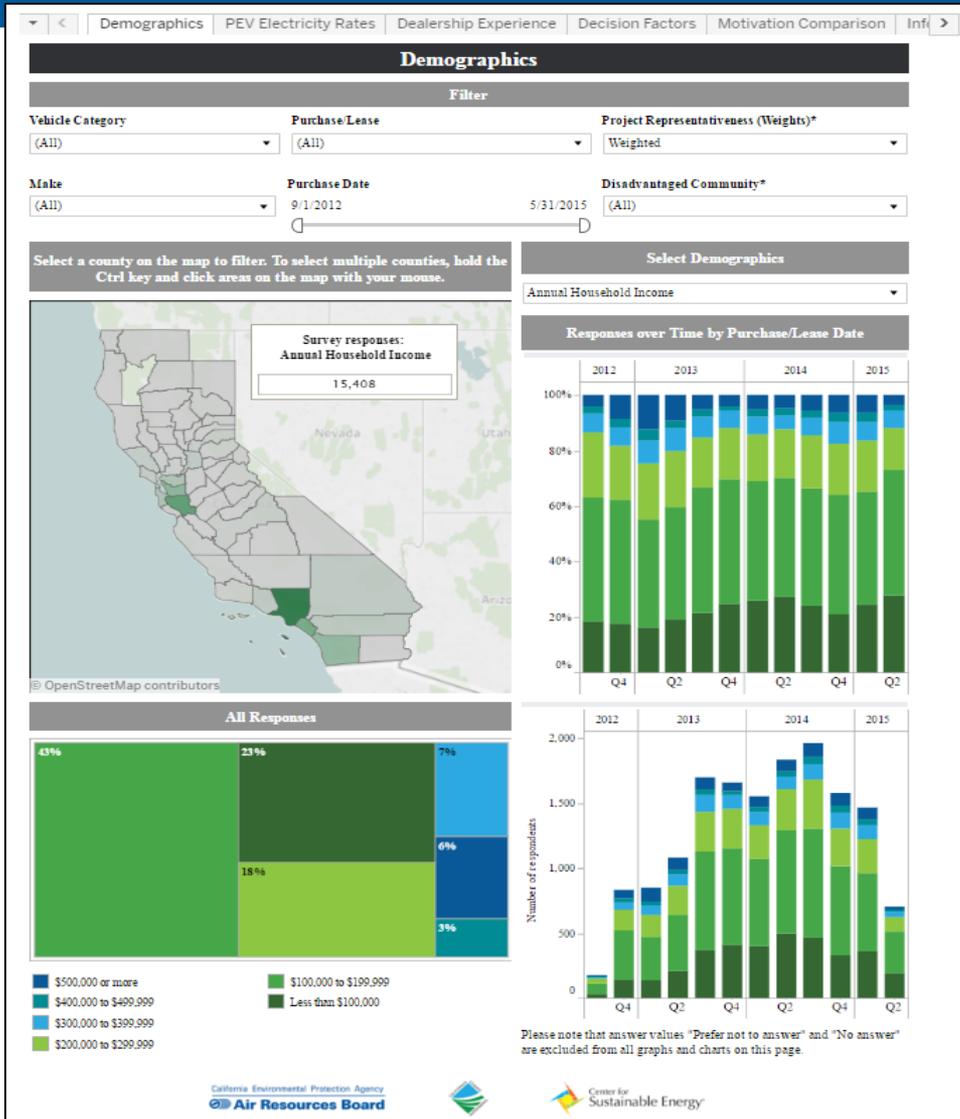


sonomacleanpower.org



zevfacts.com

# 2013–2015 Survey: Dashboard and Summary Documentation



## The Clean Vehicle Rebate Project Summary Documentation of the Electric Vehicle Consumer Survey, 2013–2015 Edition

June 2017

Prepared for  
California Air Resources Board

Prepared by  
Center for Sustainable Energy®



Excerpts from:

# California's Electric Vehicle Rebates: Exploring Impact

BECC, 17 October 2017, Sacramento

Brett Williams, M.Phil. (cantab), Ph.D. – Principal Advisor, Clean Transportation

Kipp Searles – Analyst

Thanks to Nick Pallonetti, Michelle Jones, Jamie Orose, John Anderson, and others at CSE



Center for  
Sustainable Energy™

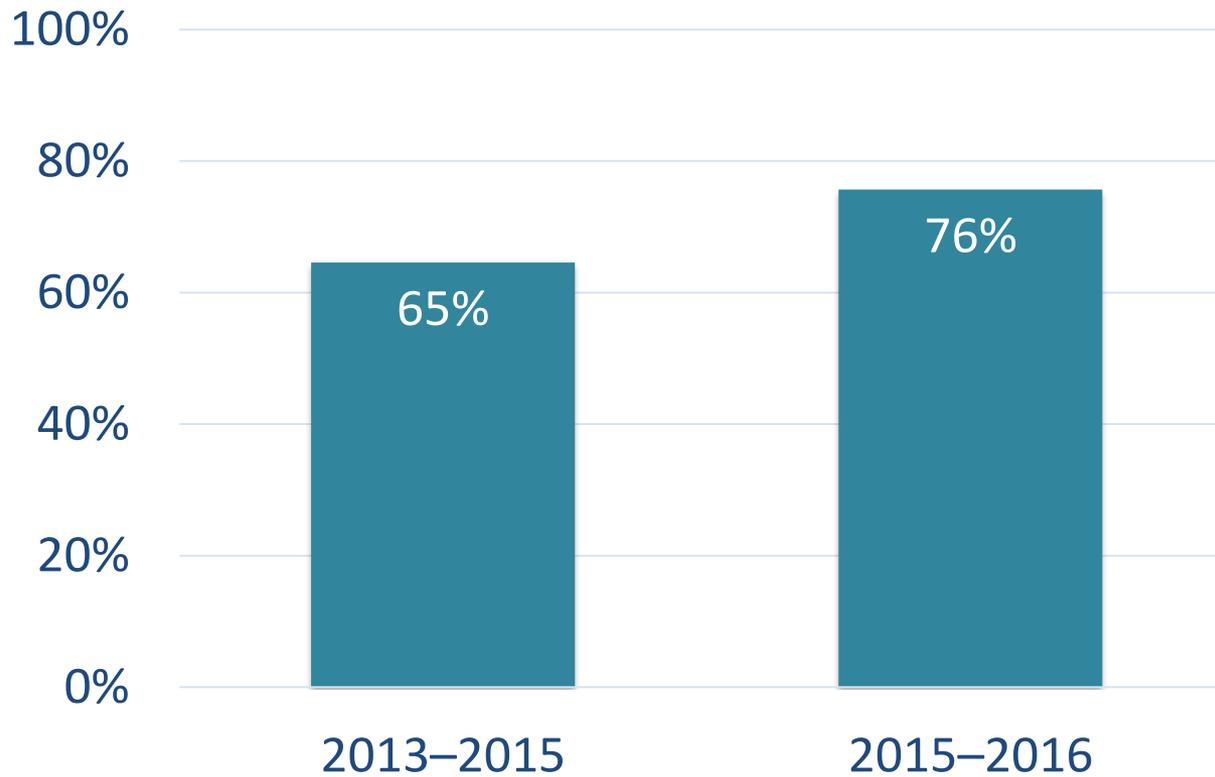
A close-up photograph of a person's hand holding a charging cable connected to an electric vehicle. The scene is set in a city street during sunset, with a bright sun in the upper right corner creating a lens flare. In the background, a bicycle is parked on the sidewalk, and a building is visible. The overall atmosphere is warm and modern.

## Program Outcomes

Influenced Behaviors

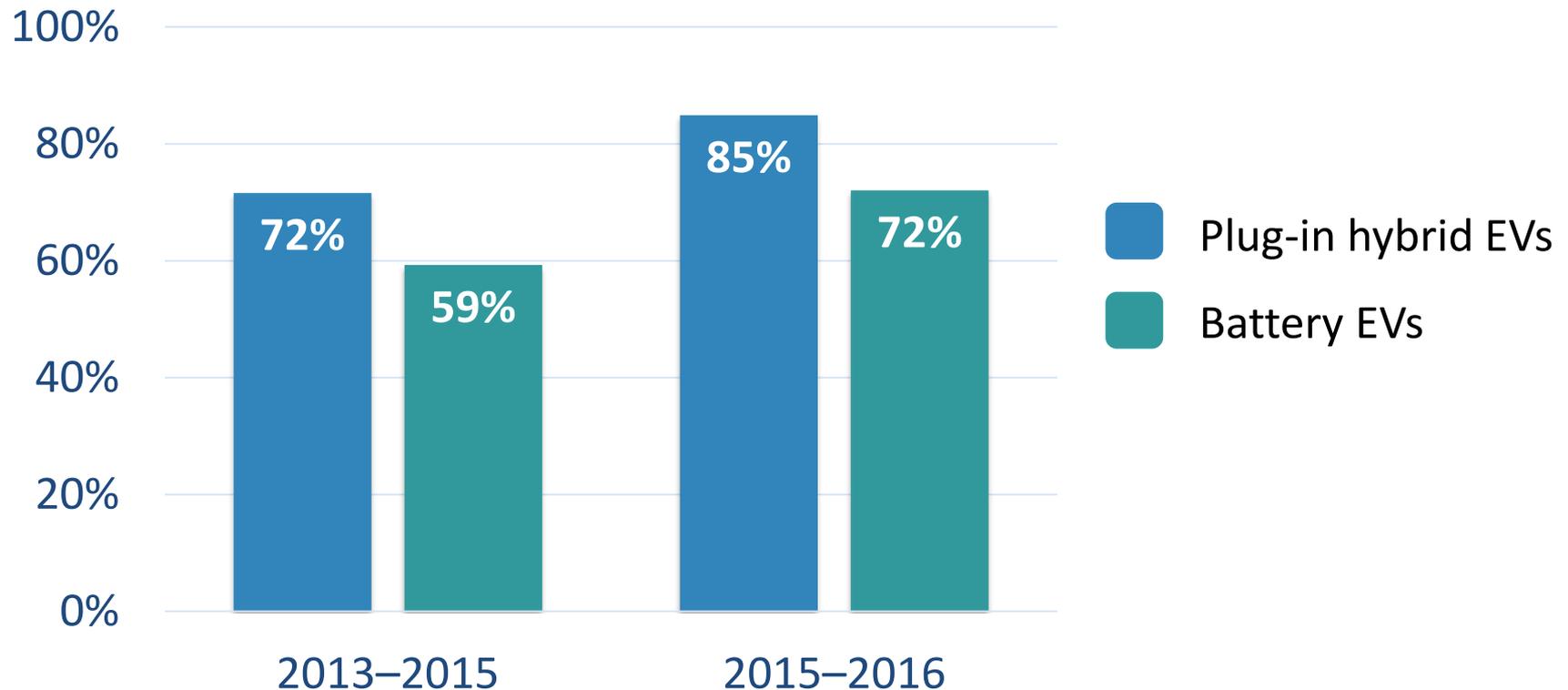
# Do EVs get used?

## Replaced a vehicle with their rebated EV

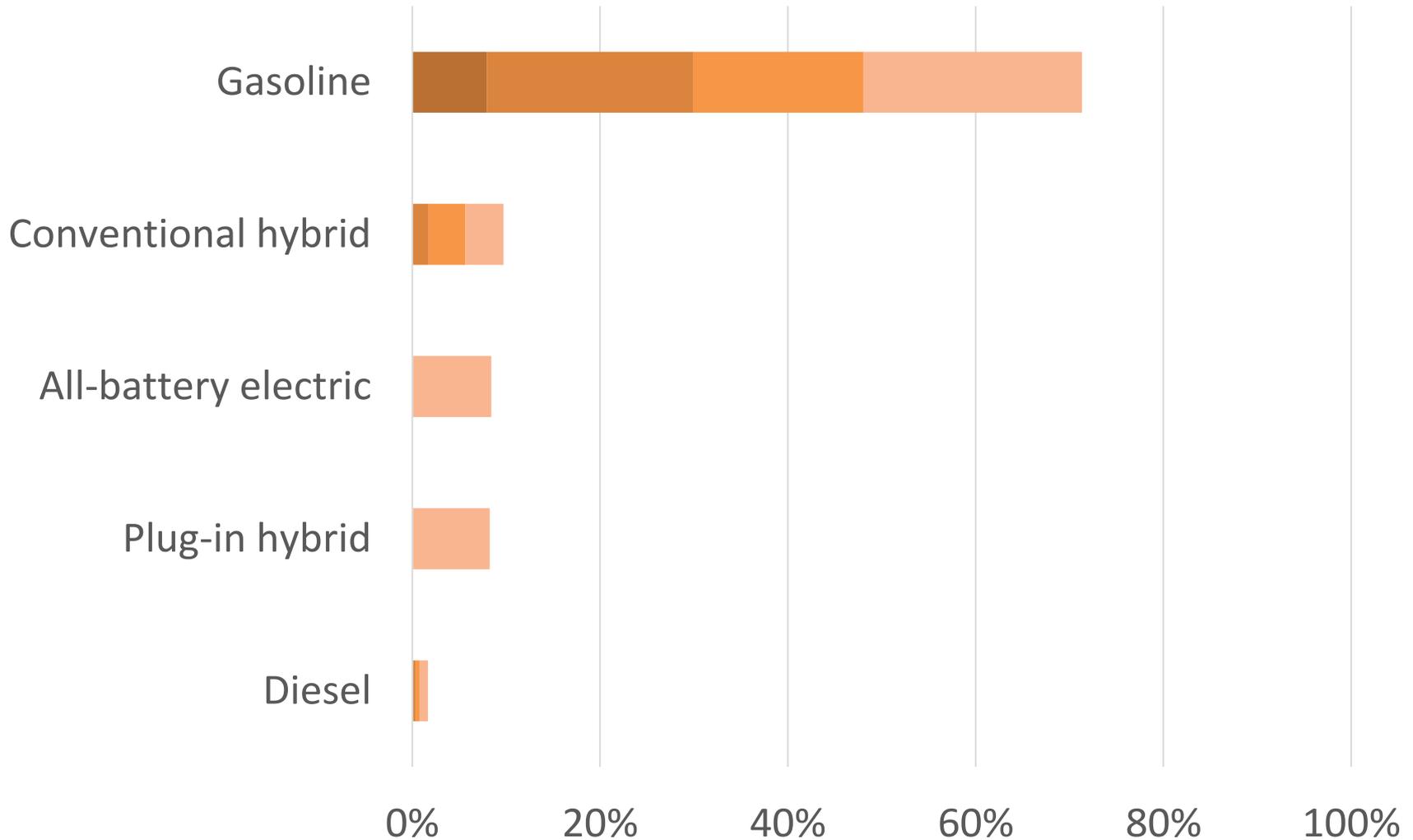


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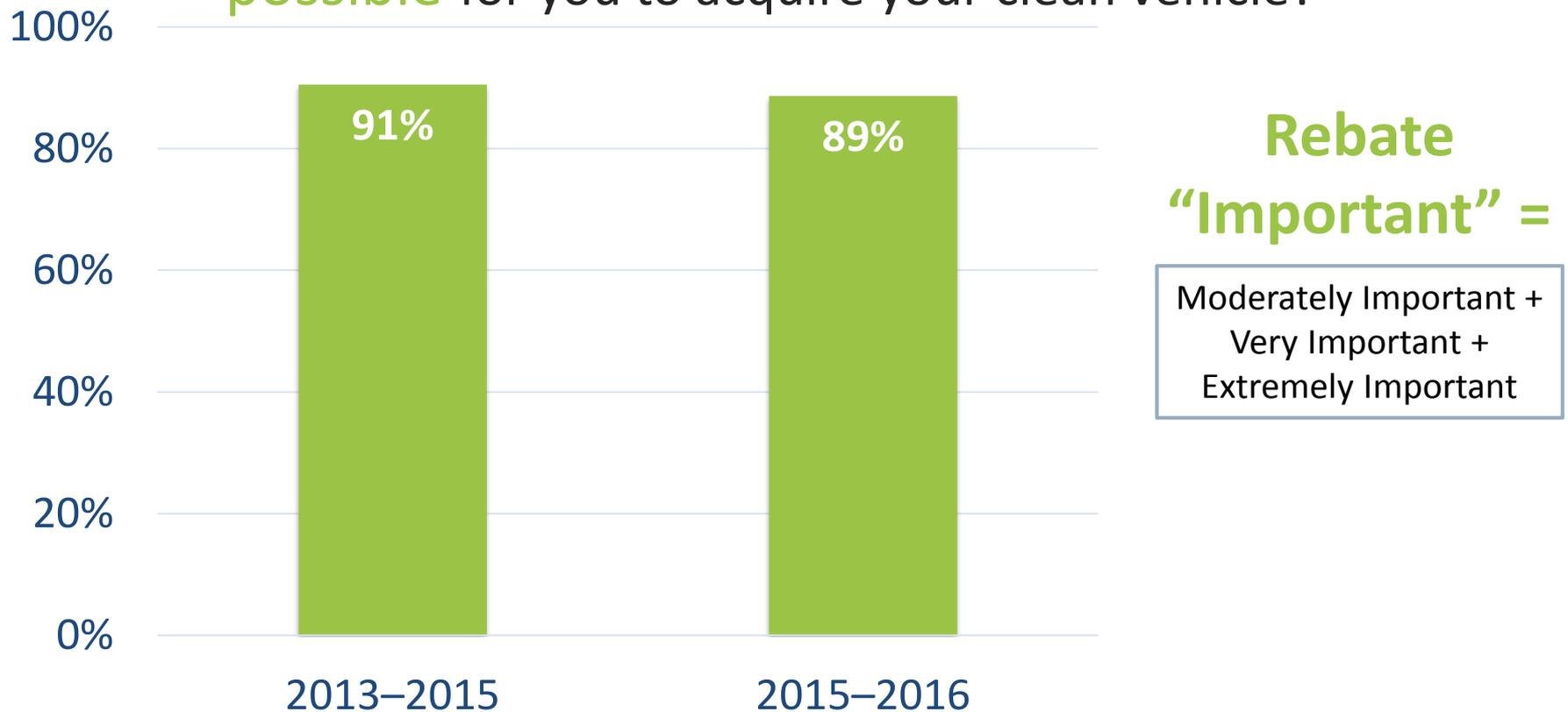


# What vehicles have rebates helped replace?



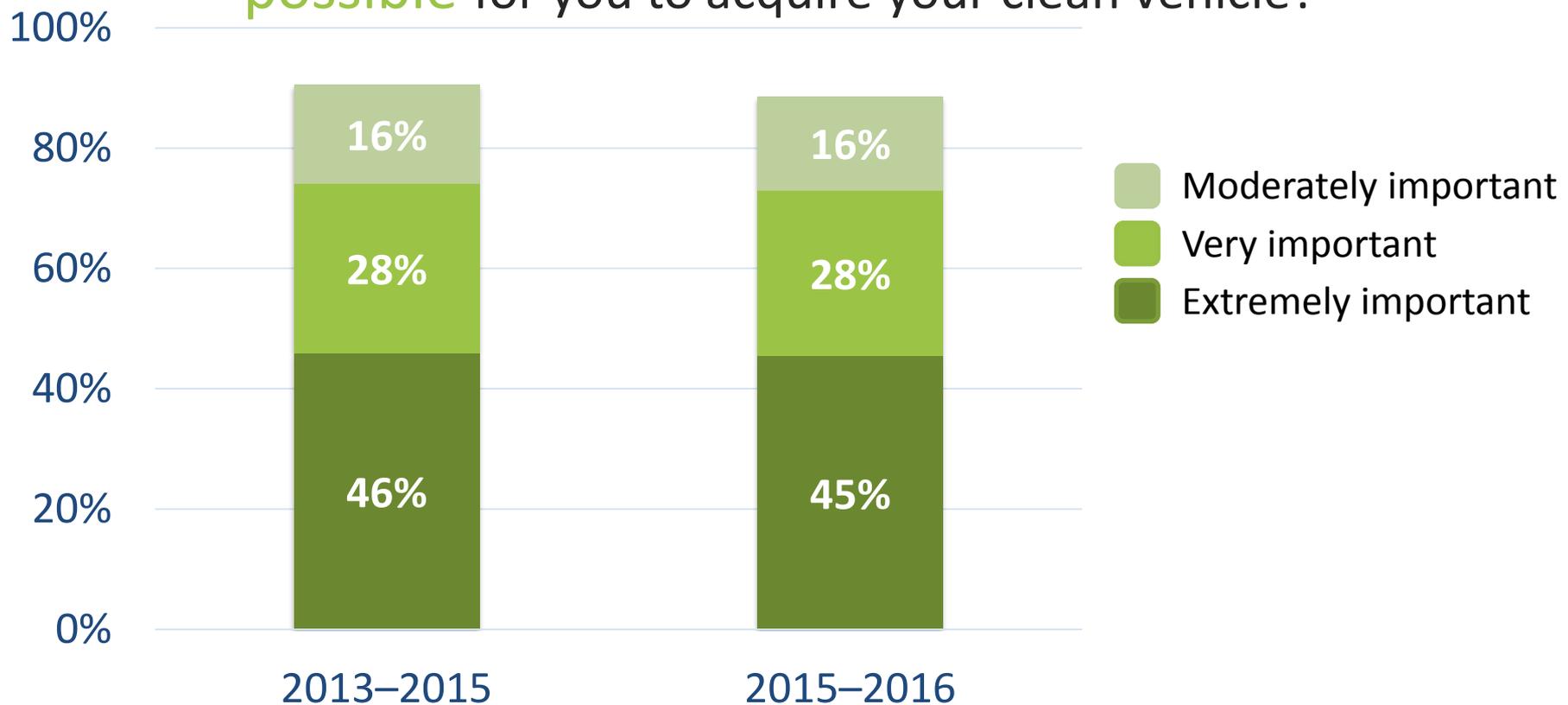
# What are indicators of rebate influence?: Importance

How **important** was the State Rebate (CVRP) in **making it possible** for you to acquire your clean vehicle?



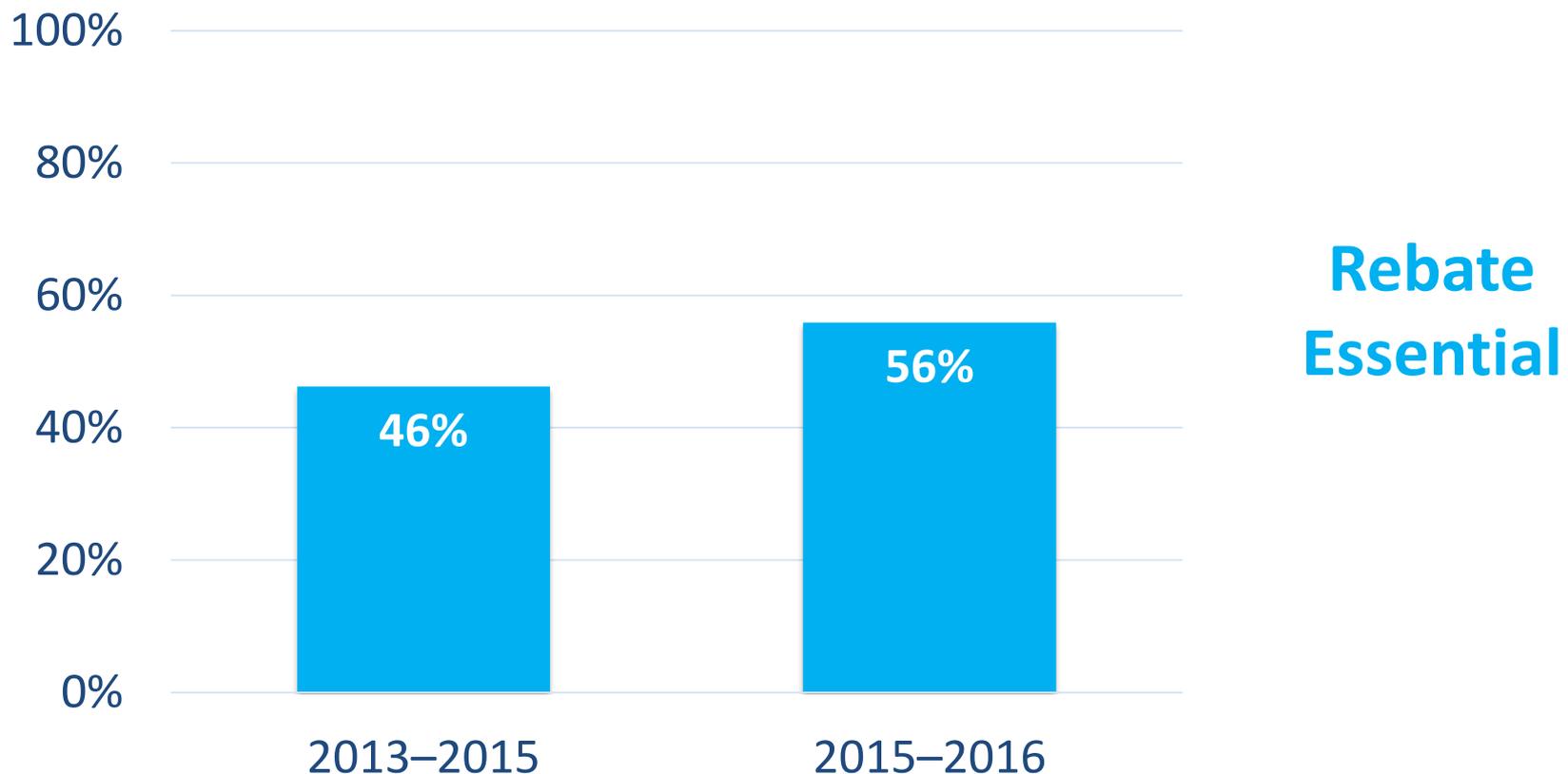
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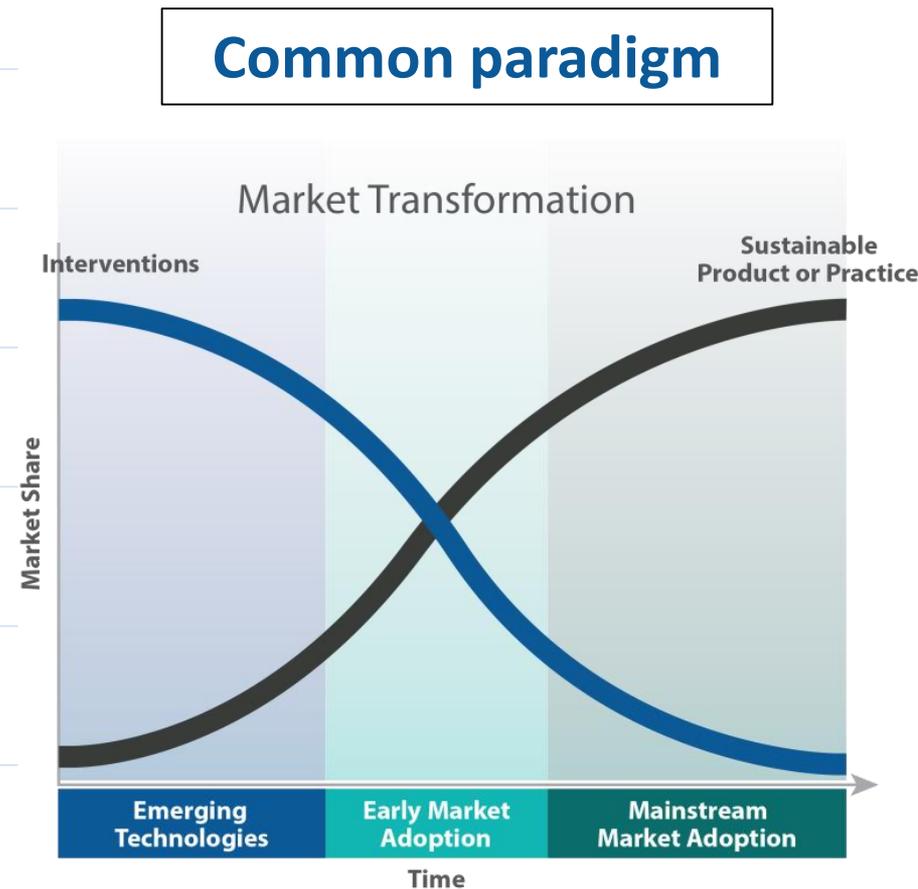
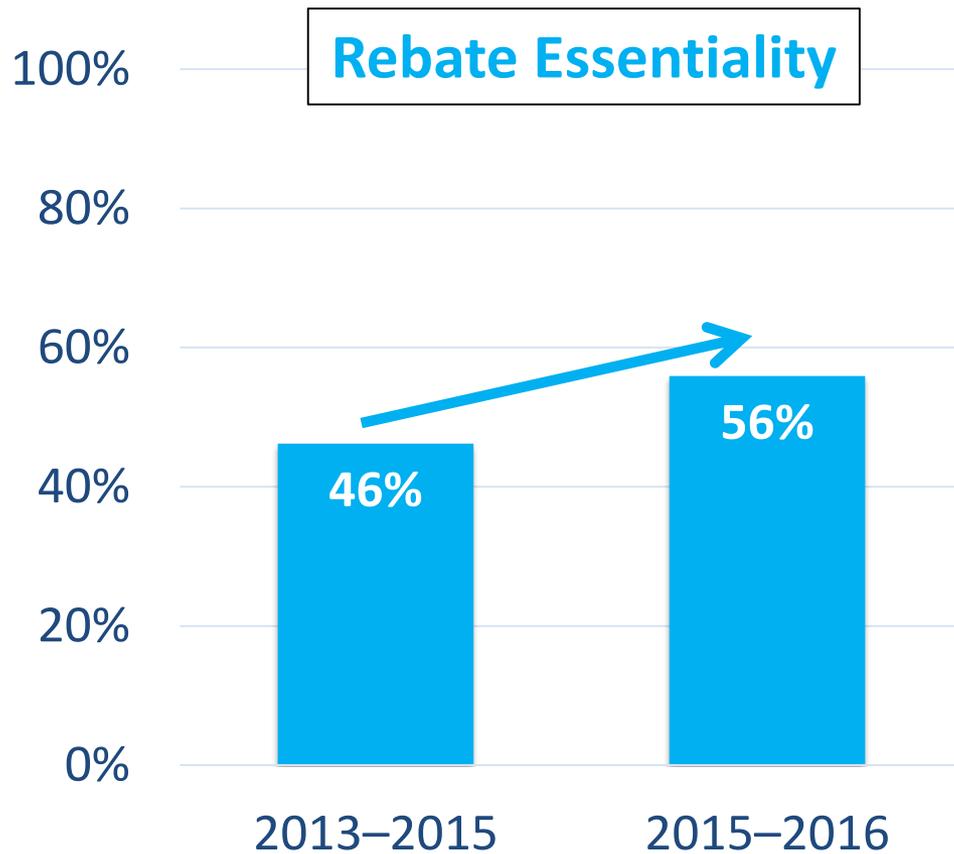


# What are indicators of rebate influence?: Essentiality

Would **not** have purchased/leased their EV **without rebate**



# Rebate essentiality is growing; phase-out appears premature



Excerpts from:

# Evaluating the Connecticut Dealer Incentive for Electric Vehicle Sales

BECC, 17 Oct 2017

Brett Williams, Ph.D. – Principal Advisor, Clean Transportation

Thanks to: lead author Clair Johnson, PhD; co-authors John Anderson & Nicole Appenzeller; and to K. Searles, C. Santulli, N. Pallonetti, & L. Parsons



Center for  
Sustainable Energy™

# EV Incentive Programs: Rebate Design



**Fuel-Cell EVs**



\$5,000

\$2,500

\$5,000

e-miles

**All-Battery EVs**



\$2,500

\$2,500

e-miles

≥ 175      \$3,000  
 ≥ 100      \$2,000  
 < 100      \$500

≥ 120      \$2,000

≥ 40      \$1,700

**Plug-in Hybrid EVs**



\$2,500 (i3 REx)  
 \$1,500

≥10 kWh      \$2,500  
 <10 kWh      \$1,500

≥ 40      \$2,000  
 < 40      \$500

≥ 20      \$1,100

< 20      \$500

**Zero-Emission Motorcycles**



\$900

\$750

e-miles ≥ 20 only;  
 Consumer income cap and increased rebates

MSRP ≥ \$60k =  
 \$1,000 max.

MSRP ≤ \$60k only; dealer assignment;  
 \$300 dealer incentive

MSRP > \$60k =  
 \$500 max.;  
 point-of-sale

# How is the dealer incentive working?

## Evaluating the Connecticut Dealer Incentive for Electric Vehicle Sales

April 2017

Prepared by  
Center for Sustainable Energy

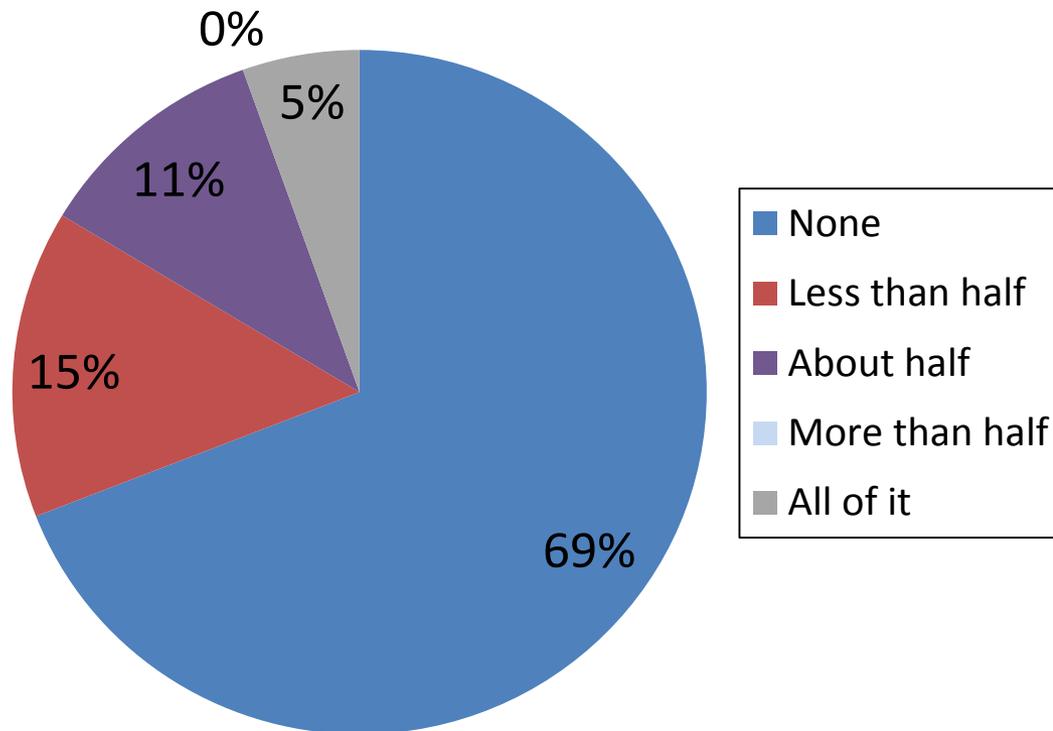


Download report [here](#)

A photograph of two men in business attire examining a white car with a red interior in a showroom. The man on the left is wearing a black suit and a pink tie, while the man on the right is wearing a light blue shirt. They are standing next to the open driver's side door of the car. The background is a bright, modern showroom with other cars visible.

## Select Evaluation Findings

# At your dealership, how much of the dealer incentive does the salesperson responsible for the sale receive?



- 27% of all respondents and 31% of **sales employees** were not aware of the dealer incentive.

## Additional incentive uses, e.g.:

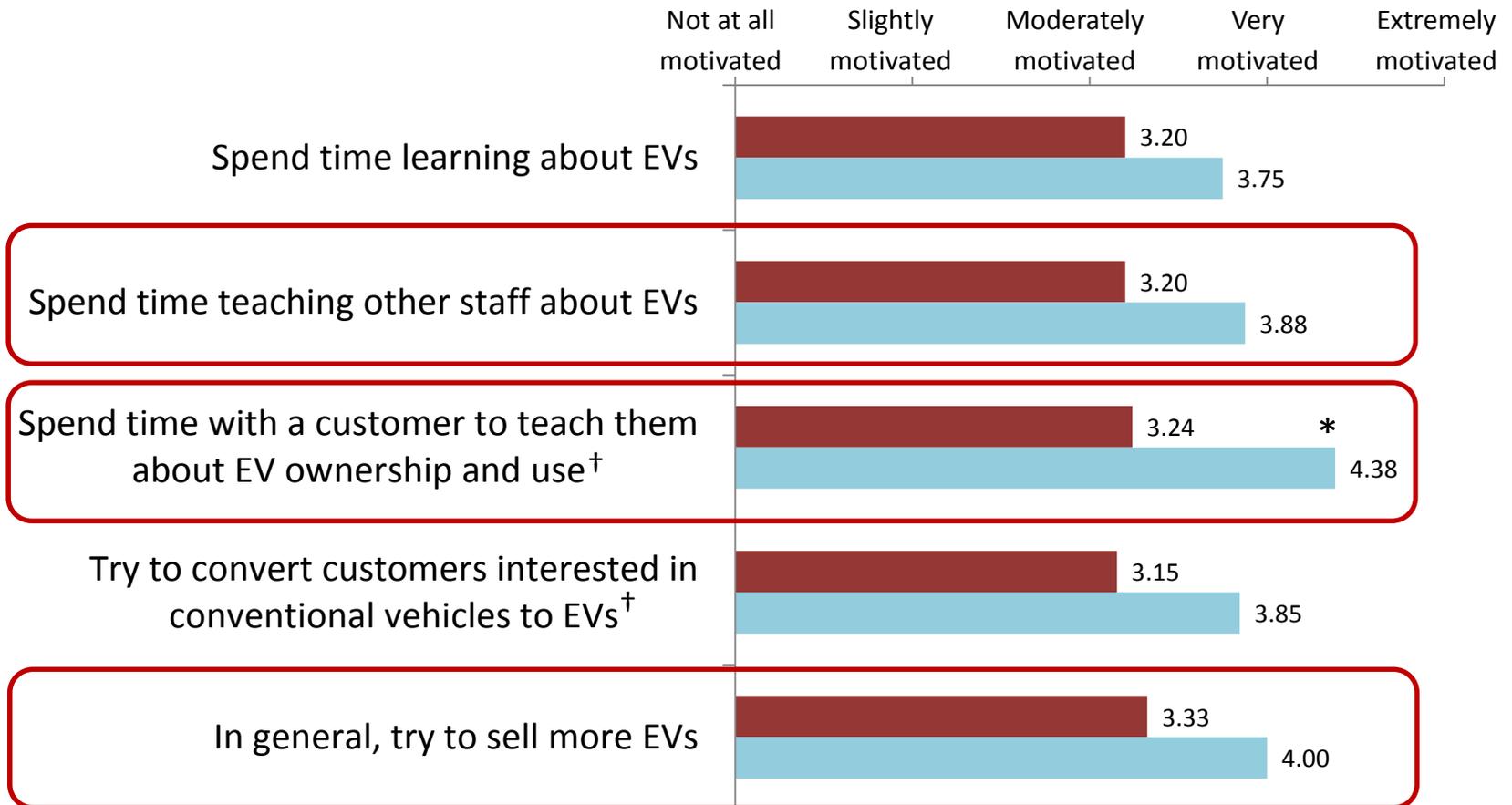
- Written into the vehicle profit (upon which commission is based)
- To cover the cost of participating in CHEAPR
- To pay for free charging at the dealership
- To defray the cost of a customer's charging installation

# Recommended *Minimum* Levels for the Dealer Incentive

	Mean	Minimum	Maximum	Median
What is the minimum dealer incentive amount <b>salespeople</b> would need to receive personally to motivate them to increase their EV sales? ( <i>n</i> =76)	\$233	\$0	\$500	\$200
Additionally, what is the minimum dealer incentive amount that would motivate your <b>dealership</b> to increase your EV sales? ( <i>n</i> =73)	\$565	\$0	\$5,000	\$500

# To what extent are you motivated by the current dealer incentive to do each of the following?

■ Have Never Owned an EV   ■ Have Owned an EV



Respondents=57

<sup>†</sup> Fourth and fifth statements only appeared to sales employees; respondents=40

\*Statistically significant difference ( $p < 0.05$ )

# Key Takeaways

- Plug-in EV purchases/leases in SD are eligible for \$1,500 (PHEV) or \$2,500 (BEV) rebates
  - \$3,500 or \$4,500 if a lower-income consumer
- Funds are available, waitlist ending soon
- EV consumers are no longer guinea pigs
- EV product choices are growing
- Policies supporting both EV purchases and sales are having a positive impact

# Thank You for Your Attention

What would you like to know more about?  
What decisions are you facing?  
[brett.williams@energycenter.org](mailto:brett.williams@energycenter.org)

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



**See you next year?**



# Additional Participant Evaluation Examples

- Progress in **Disadvantaged Communities** ([AEA pres 2016](#))
- **Information Channels** ([EV Roadmap pres, 2016](#))
  - Exposure & importance of various channels, consumer time spent researching various topics
- **Infographics**
  - Overall ([CVRP infographic, 2016](#))
  - Disadvantaged Communities ([CVRP DAC infographic, 2017](#))
- Characterization of **Participating Vehicles and Consumers** ([CVRP research workshop pres, 2015](#))
- **Program Participation by Vehicle Type and County** ([CVRP brief 2015](#))
- **Dealer services: Importance and Prevalence** (EF pres 2015)



# Zero Emission Vehicle Dashboard

ZEV Sales | ZEV Market Share | ZEV Goals

## U.S. Light-Duty Zero Emission Vehicle (ZEV) Sales (2011-2017)

### Filters

#### ZEV Regulation Region\*

- (All)
- California
- East Coast
- West Coast
- Other

#### State

(All)

#### ZEV Category

- (All)
- BEV
- FCEV
- PHEV

#### Registration Type

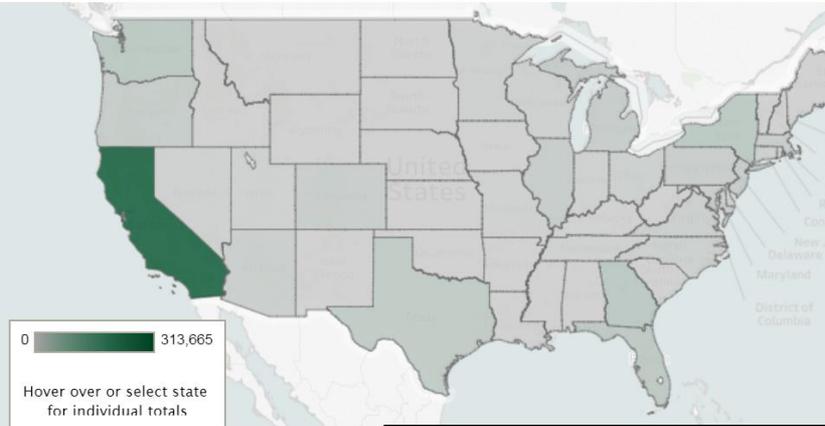
- Retail
- Other Fleet
- Government Fleet

#### Registration Month

Jan 2011 Jul 2017

1 79

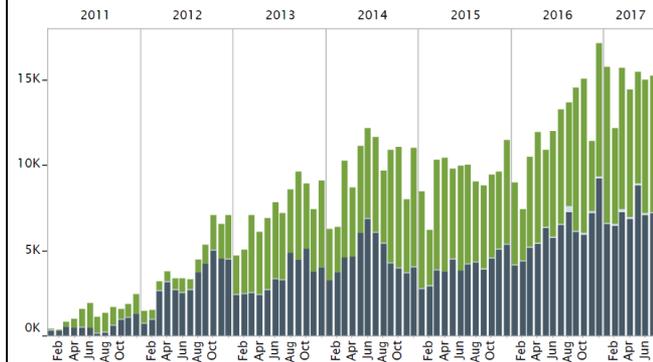
### ZEV Sales by State



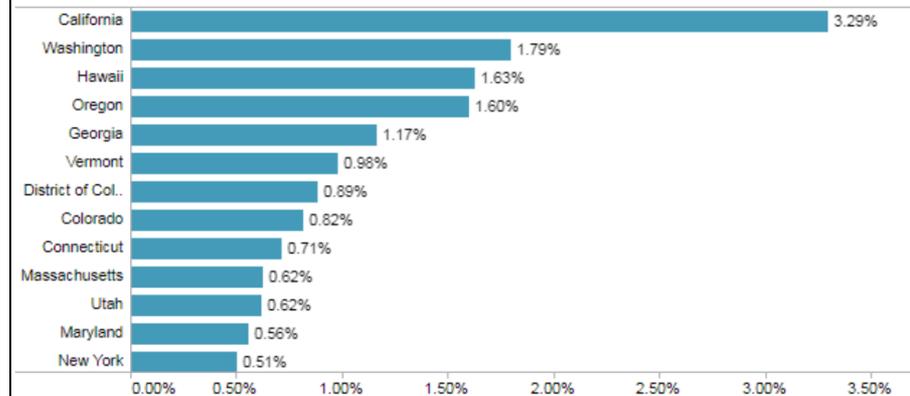
### ZEV Sales by Category

BEV	318,487
FCEV	2,048
PHEV	314,675
All	635,210

### Monthly Sales by ZEV Category



### Top States by ZEV Market Share



# Data Sources

## Program:

- CVRP Consumer Survey 2015-16 edition (n=11,611)
  - EV purchase/lease dates 4/2015–5/2016
  - Weights applied to make responses represent 45,698 program participants along the dimensions of vehicle model, county, and buy vs. lease
- CVRP Consumer Survey 2013-15 edition (n=19,460)
  - EV purchase/lease dates 9/2012–5/2015
  - Weights applied to make responses represent 91,081 program participants along the dimensions of vehicle model, county, and buy vs. lease
- Applications (n=179,719)
  - Application date 3/2010–12/2016

## Market:

- EV Registration Data (Polk, N=292,738)
  - EV registration dates 3/2010–6/2017