

Clean Vehicle Rebate Project: Fuel-Cell Electric Vehicle Data and Lessons Learning

CaFCP Executive Board Meeting, 18 October 2016, West Sacramento

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

Thanks also to John Anderson, Kipp Searles, Clair Johnson, Colin Santulli,
and others at CSE



Center for
Sustainable Energy™

Center for Sustainable Energy (CSE)



Building
Performance



Clean
Transportation



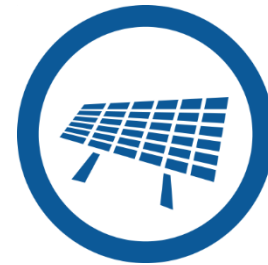
Distributed
Generation



Energy
Efficiency



Energy
Storage



Renewable
Energy

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



Plug-in Electric Vehicle Benefits

Elements of Eligibility for CVRP:

- 1 Individual, business, nonprofit or government entity based in California or has a California-based affiliate
- 2 Purchase or lease a NEW eligible vehicle
- 3 Own/lease the vehicle for at least 30 consecutive months (including CA DMV registration)
- 4 Apply for rebate within 18 months of vehicle purchase or lease date

Consumer & Dealer Outreach



DER
Massachusetts Department of Energy Resources



CONNECTICUT DEPARTMENT OF ENVIRONMENT

California Environmental Protection Agency
Air Resources Board



SANDAG



CALIFORNIA
PLUG-IN ELECTRIC VEHICLE COLLABORATIVE

Stakeholder Engagement





GREEN FLEET ACTION PLAN
2011-2013



Sustainable Assessment for
Municipal Fleet Vehicle Training in California
November 2011

Fleet Assistance & Clean Cities



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



Secondary Use Applications of Plug-in Electric Vehicle Lithium-ion Batteries

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)



Outline

- What FCEV incentives are available?
- What FCEV data are available?
- What are we seeing so far?
 - Vehicles
 - Consumers
- What else will we know?
- What are we doing for PEVs that we might do for FCEVs?
- Wrap up








What incentives are available?

Clean Vehicle Rebate Project and other Cash Incentives

EV Incentive Programs: Rebate Amounts




	Fuel-Cell Electric Vehicles	\$5,000	\$2,500	\$5,000						
	All-Battery Electric Vehicles	\$2,500	\$2,500	<table border="1"> <tr><td>\$3,000</td><td>> 25 kWh</td></tr> <tr><td>\$1,500</td><td>20 to 25 kWh</td></tr> <tr><td>\$750</td><td>< 20 kWh</td></tr> </table>	\$3,000	> 25 kWh	\$1,500	20 to 25 kWh	\$750	< 20 kWh
\$3,000	> 25 kWh									
\$1,500	20 to 25 kWh									
\$750	< 20 kWh									
	Plug-in Hybrid Electric Vehicles	\$2,500 (i3 REx) \$1,500	\$2,500 (>10kWh) \$1,500	<table border="1"> <tr><td>\$3,000</td><td>> 18 kWh</td></tr> <tr><td>\$1,500</td><td>10 to 18 kWh</td></tr> <tr><td>\$750</td><td>< 10 kWh</td></tr> </table>	\$3,000	> 18 kWh	\$1,500	10 to 18 kWh	\$750	< 10 kWh
\$3,000	> 18 kWh									
\$1,500	10 to 18 kWh									
\$750	< 10 kWh									
	Neighborhood Electric Vehicles	\$900	*MSRP > \$60k = \$1,000	*MSRP < \$60k only						
	Zero-Emission Motorcycles	\$900	\$750	<table border="1"> <tr><td>Dealer incentive:</td></tr> <tr><td>\$300</td></tr> </table>	Dealer incentive:	\$300				
Dealer incentive:										
\$300										

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

- Increased rebate for households with incomes $\leq 300\%$ of the federal poverty level (FPL)
- As of 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

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



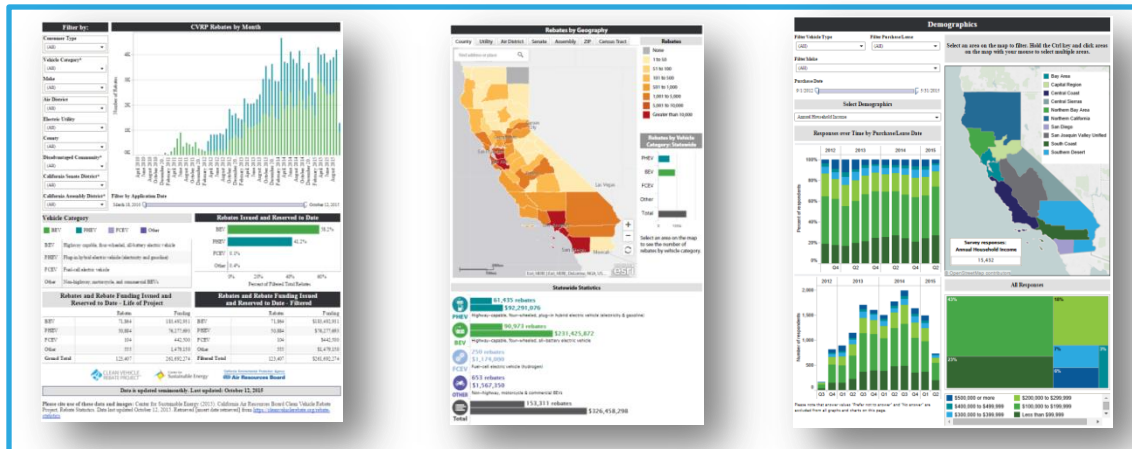
What data are available?

CVRP Transparency Tools

Where can I get the data?: CSE Transparency Tools

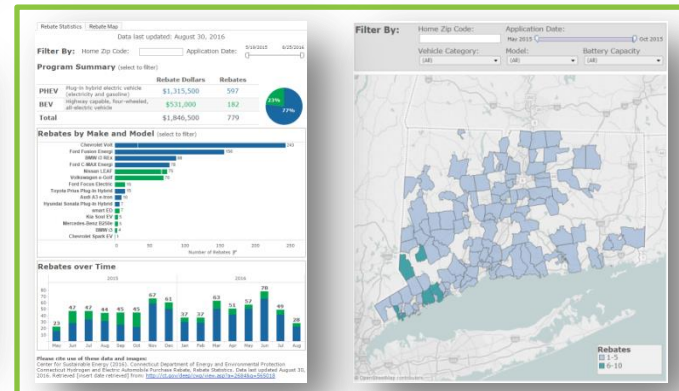
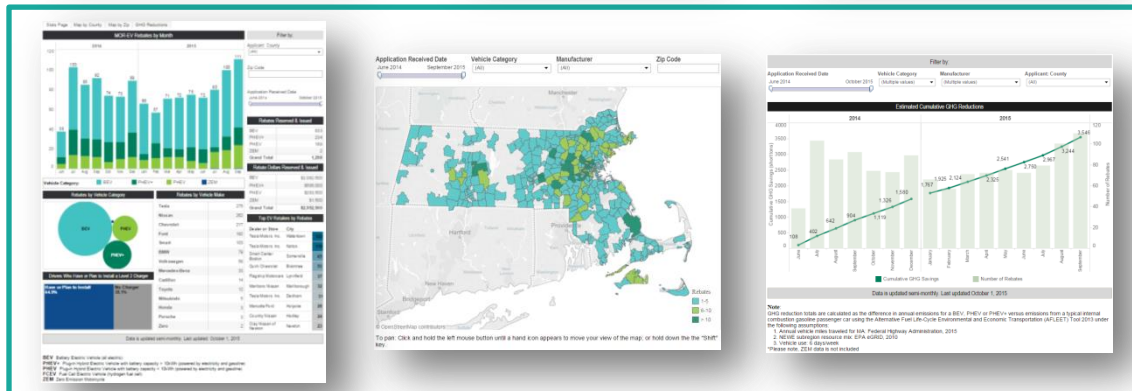
- Public, online, interactive dashboards facilitate informed action
 - Data characterizing >163,000 EVs and consumers
 - ~\$350M in rebates processed
 - >19,000 survey responses statistically represent >90,000 consumers

Also: zevfacts.com



cleanvehiclerebate.org

ct.gov/deep



mor-ev.org

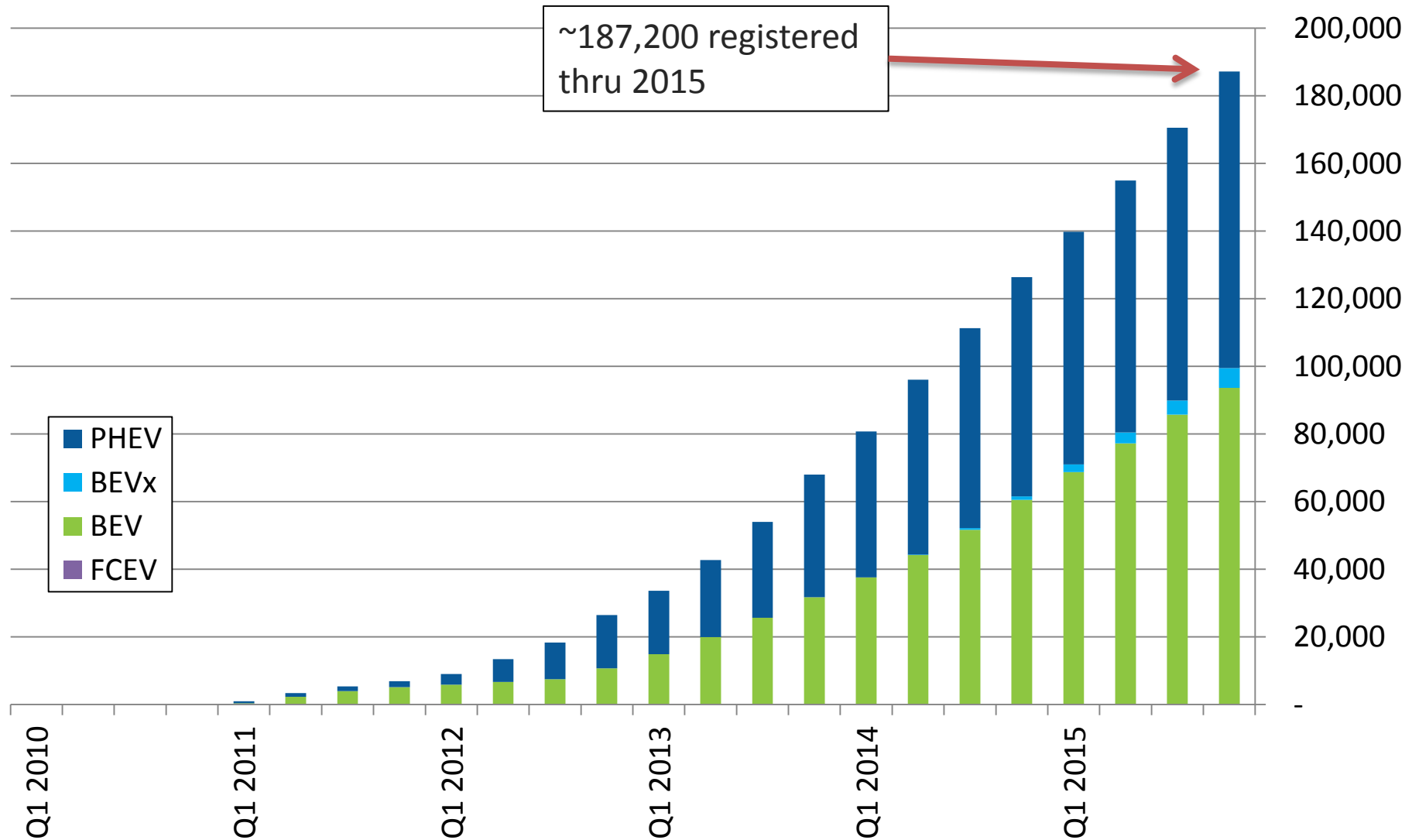


What are we seeing so far?

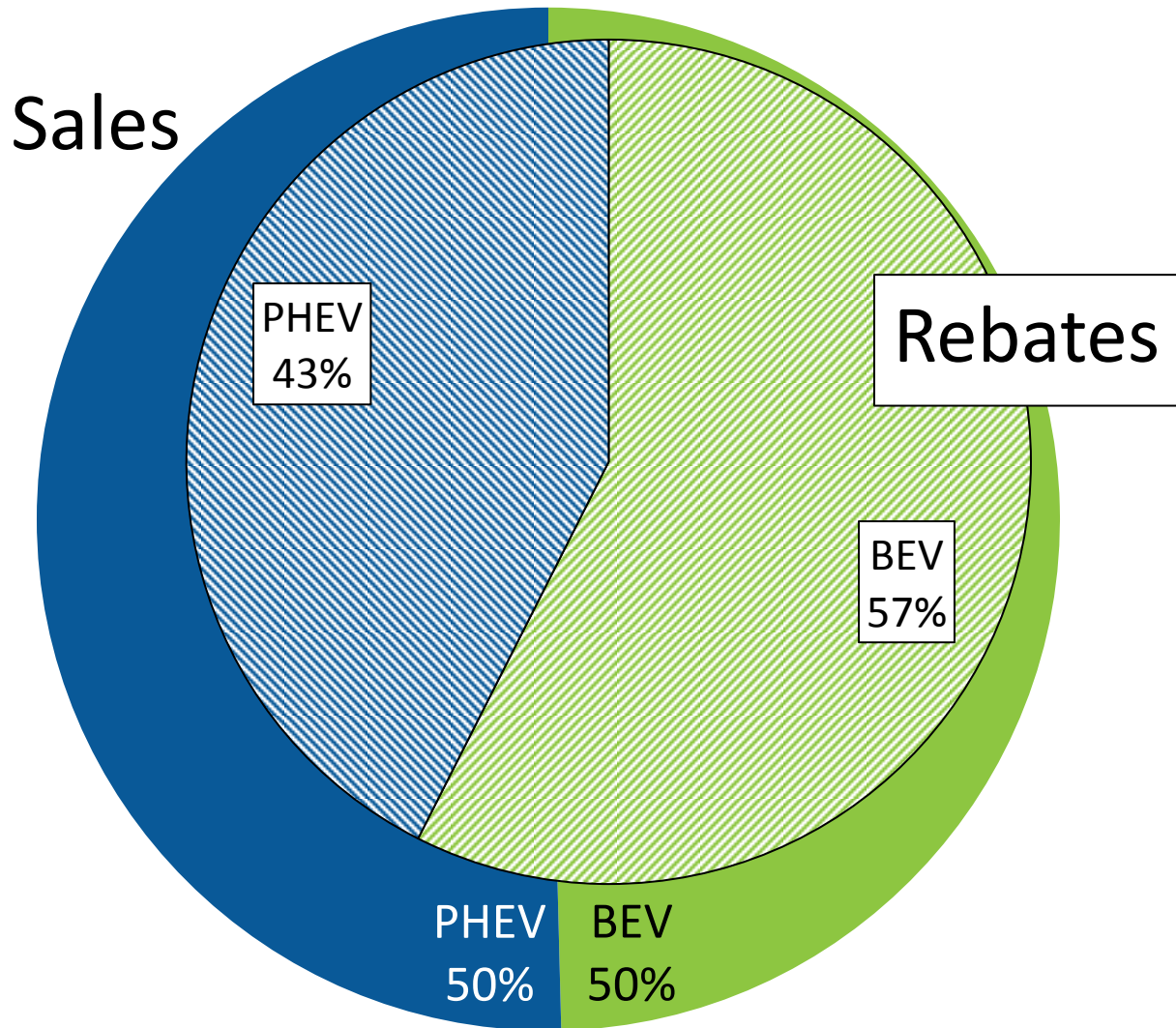
Rebated vehicles



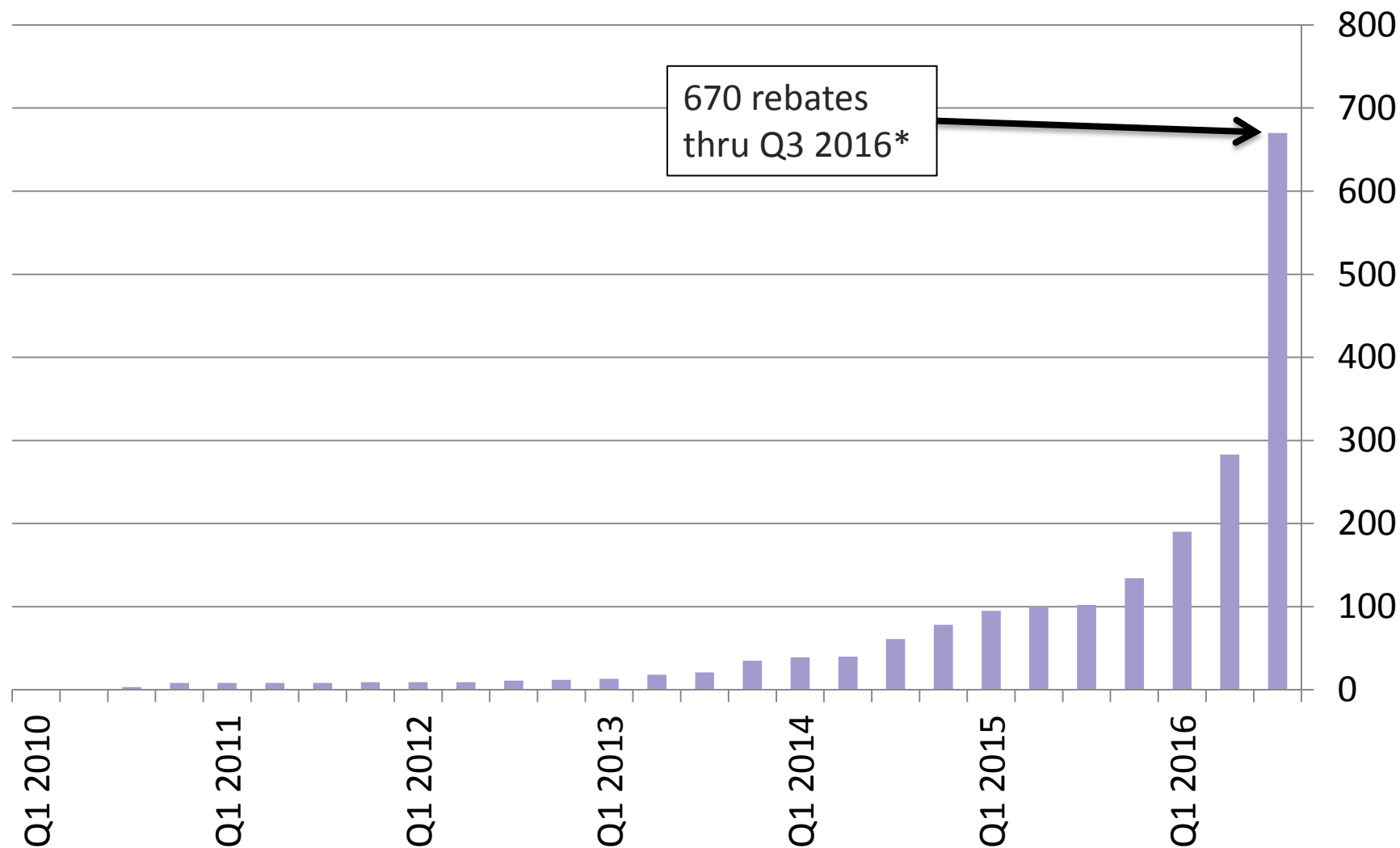
Cumulative California EV Sales (New Registrations)



Technology Share: CA Sales and Rebates

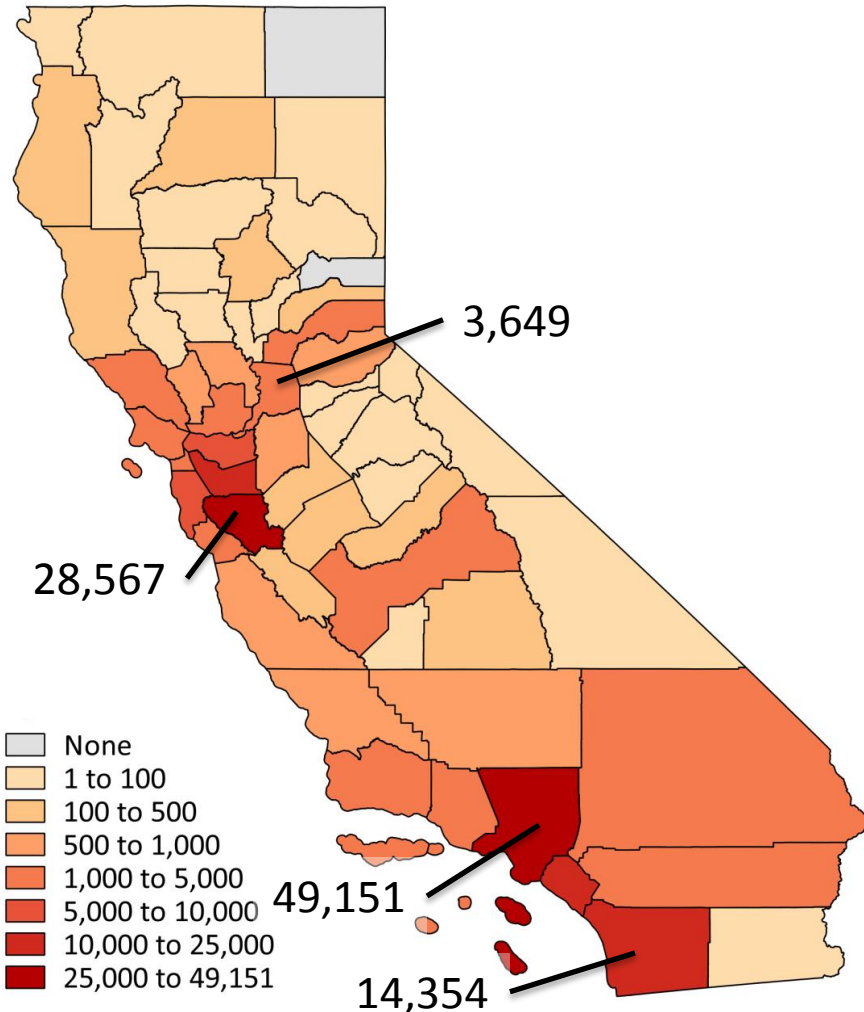


Cumulative California FCEV Rebates

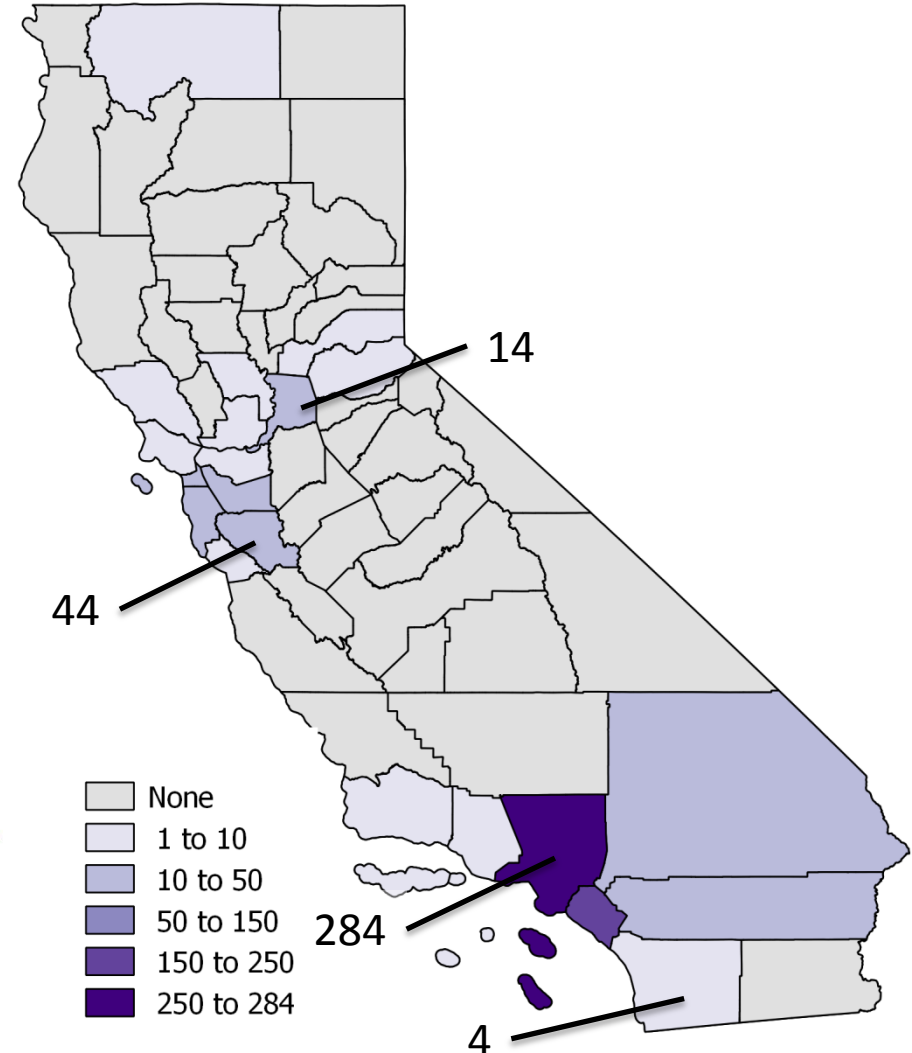


By County: New Clean Vehicle Registrations (thru Dec 2015) & FCEV Rebates (thru Sep 2016*)

Plug-in EV registrations



Fuel-cell EV rebates



Vehicle Replacement (vs. Additional Vehicle)

	Percent that Replaced a Previous Vehicle
Plug-in hybrid EVs	83%
All-battery EVs (non-Tesla)	66%
Fuel-cell EVs	79%



What are we seeing so far?

Rebated consumers

Weighted EV Consumer Survey

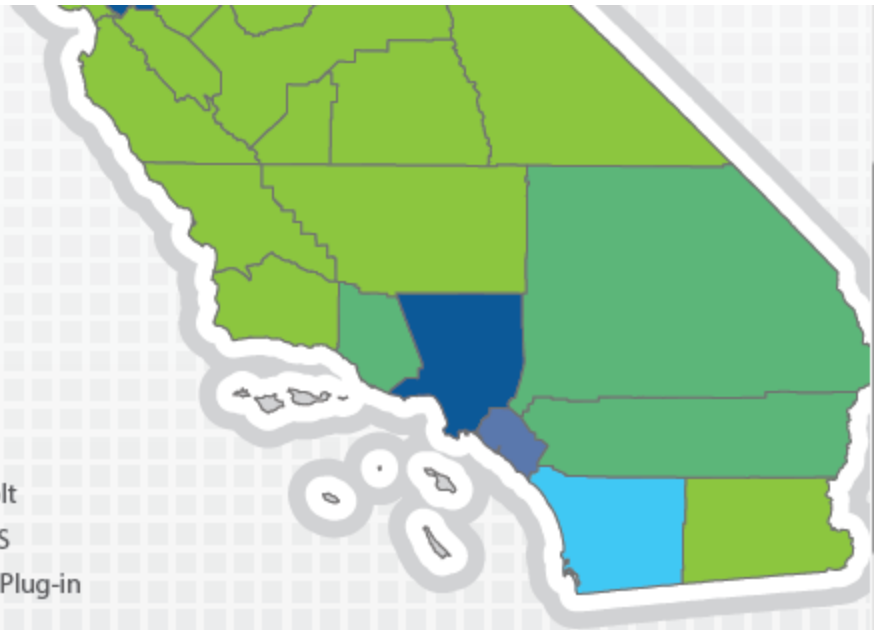
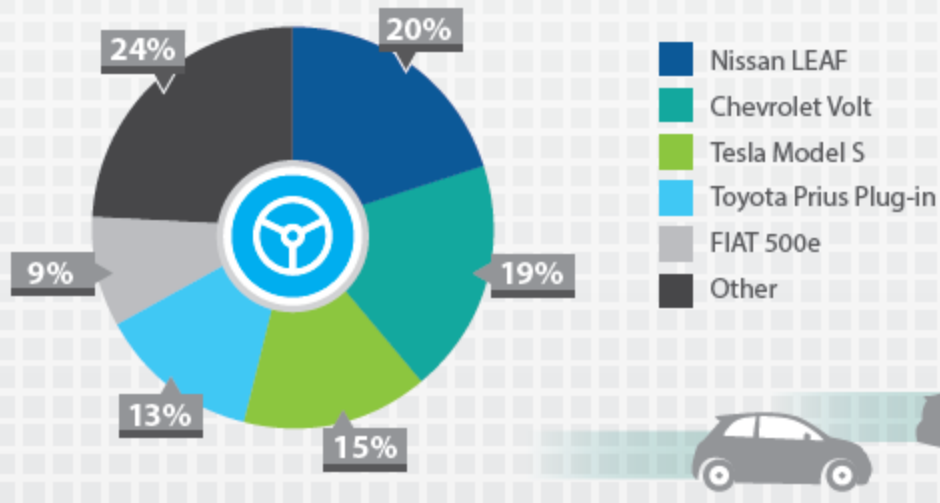
(CVRP vehicles acquired Sep 2012 thru May 2015)

Survey sample

19,460

individuals responded to the survey**

Vehicles driven by respondents



* Through May 2015, 150,287 new PEVs were adopted in California, 75,748 PHEVs and 74,539 BEVs.

** Results have been weighted to be representative of the entire program with respect to county, vehicle model and whether the vehicle was purchased or leased.

Data Summary

	CVRP “EV Consumer Survey”	FCEV responses to CVRP “CV Consumer Survey”
Responses	19,460	47
Purchase/lease dates	Sept 2012 – May 2015	March 2016- Sept 2016
Weighted	to represent 91,085 program participants by model, county, and buy vs. lease	Not yet
		Caveat emptor! (for now)

Majority Characteristics of CVRP Consumers

CVRP-All (EV Consumer Survey 2014)	
40–59 years old	55%
≥ Bachelor's	82%
Postgraduate	49%
Male	74%
White/Caucasian	63%
Detached homes	80%
\$50–200k/y household income	62%

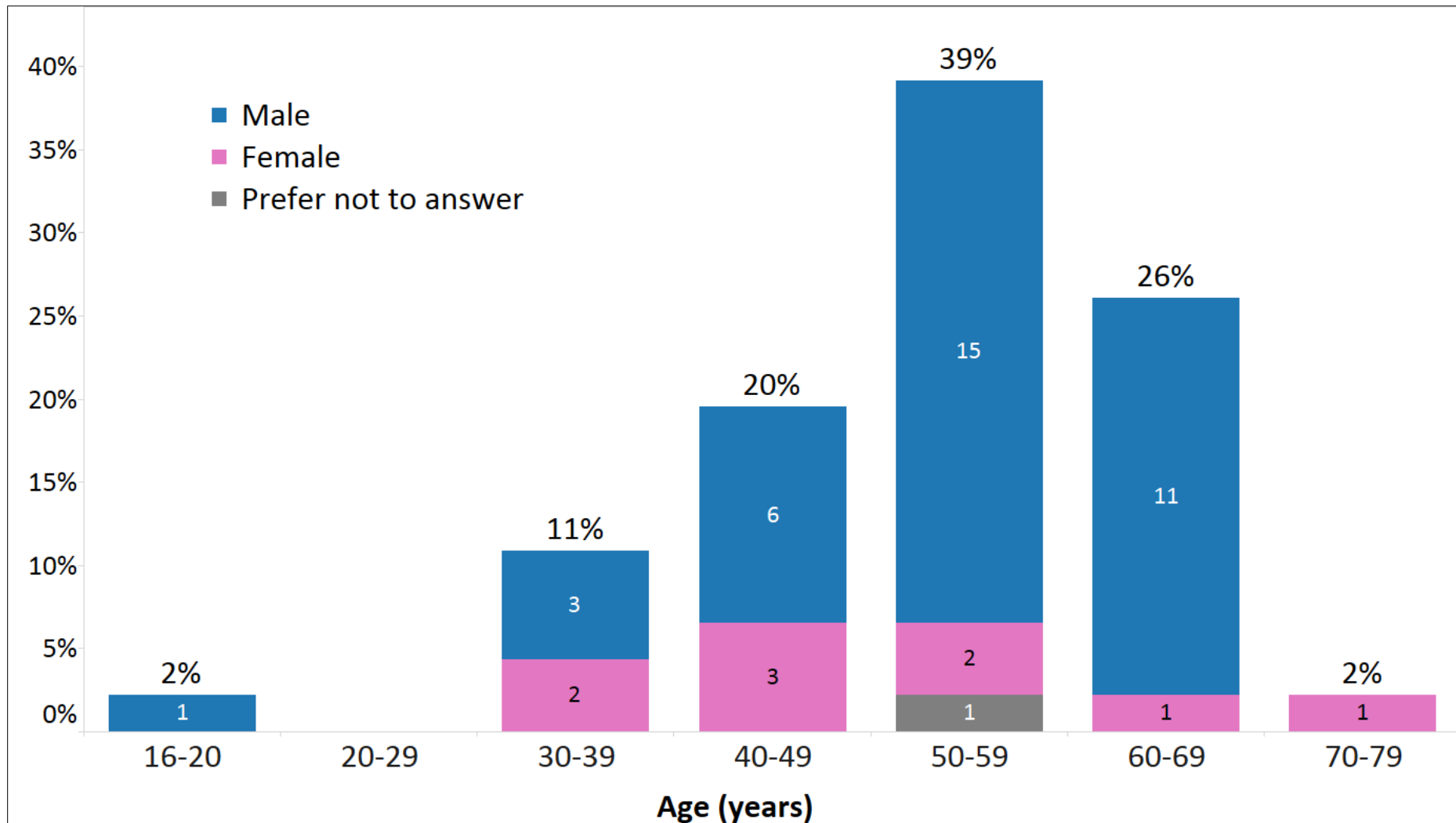
Majority Characteristics of CVRP Consumers

	CVRP-All (EV Consumer Survey 2014)	New-vehicle “intenders” (CHTS 2012)
40–59 years old	55%	52%
≥ Bachelor’s	82%	66%
Postgraduate	49%	34%
Male	74%	49%
White/Caucasian	63%	76%
Detached homes	80%	75%
\$50–200k/y household income	62%	58%

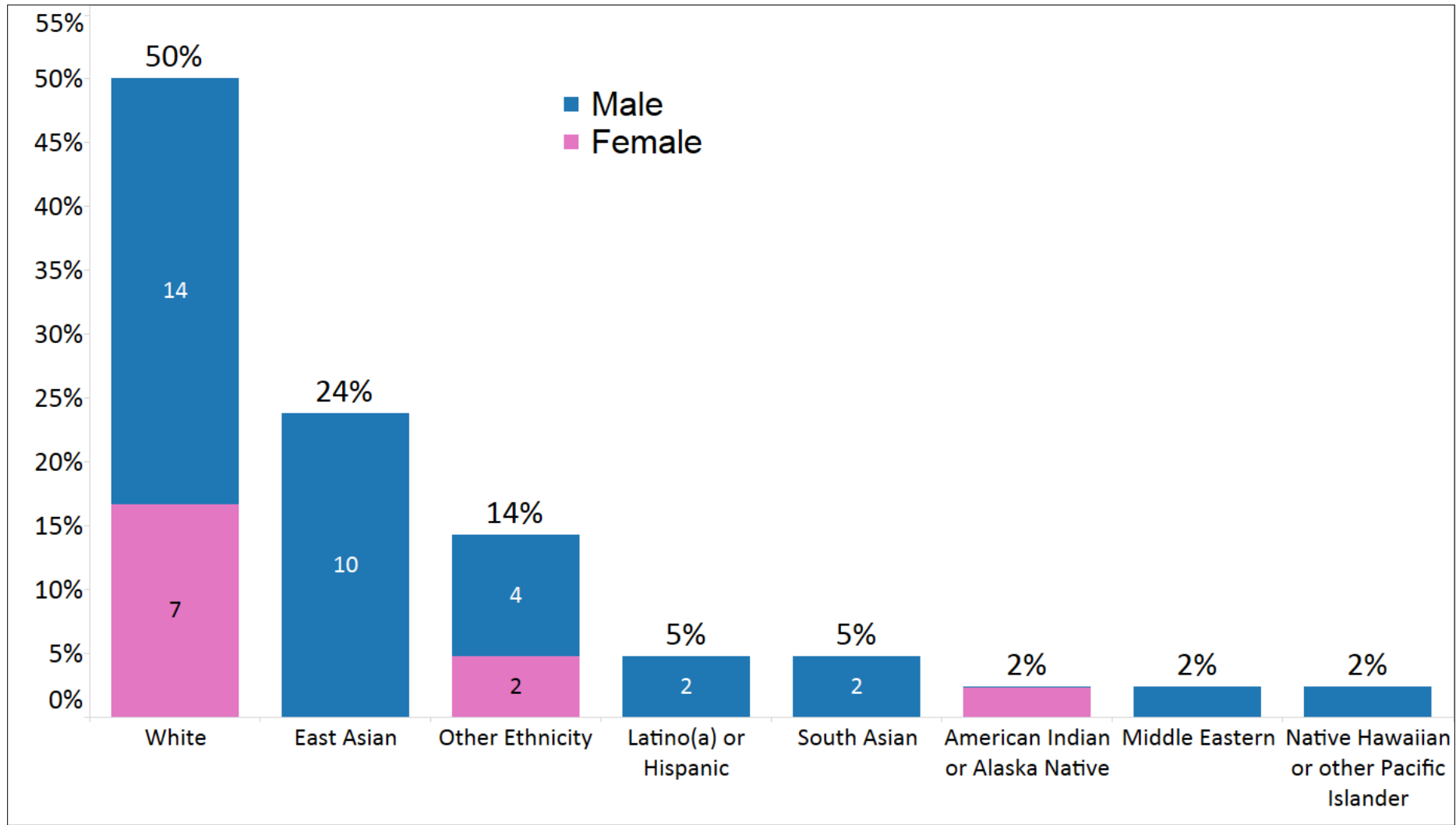
Majority Characteristics of CVRP Consumers

	CVRP-All (EV Consumer Survey 2014)	New-vehicle “intenders” (CHTS 2012)	CVRP-FCEV (Clean Vehicle Consumer Survey 2016)
40–59 years old	55%	52%	59%
≥ Bachelor’s	82%	66%	83%
Postgraduate	49%	34%	40%
Male	74%	49%	80%
White/Caucasian	63%	76%	50%
Detached homes	80%	75%	78%
\$50–200k/y household income	62%	58%	47%

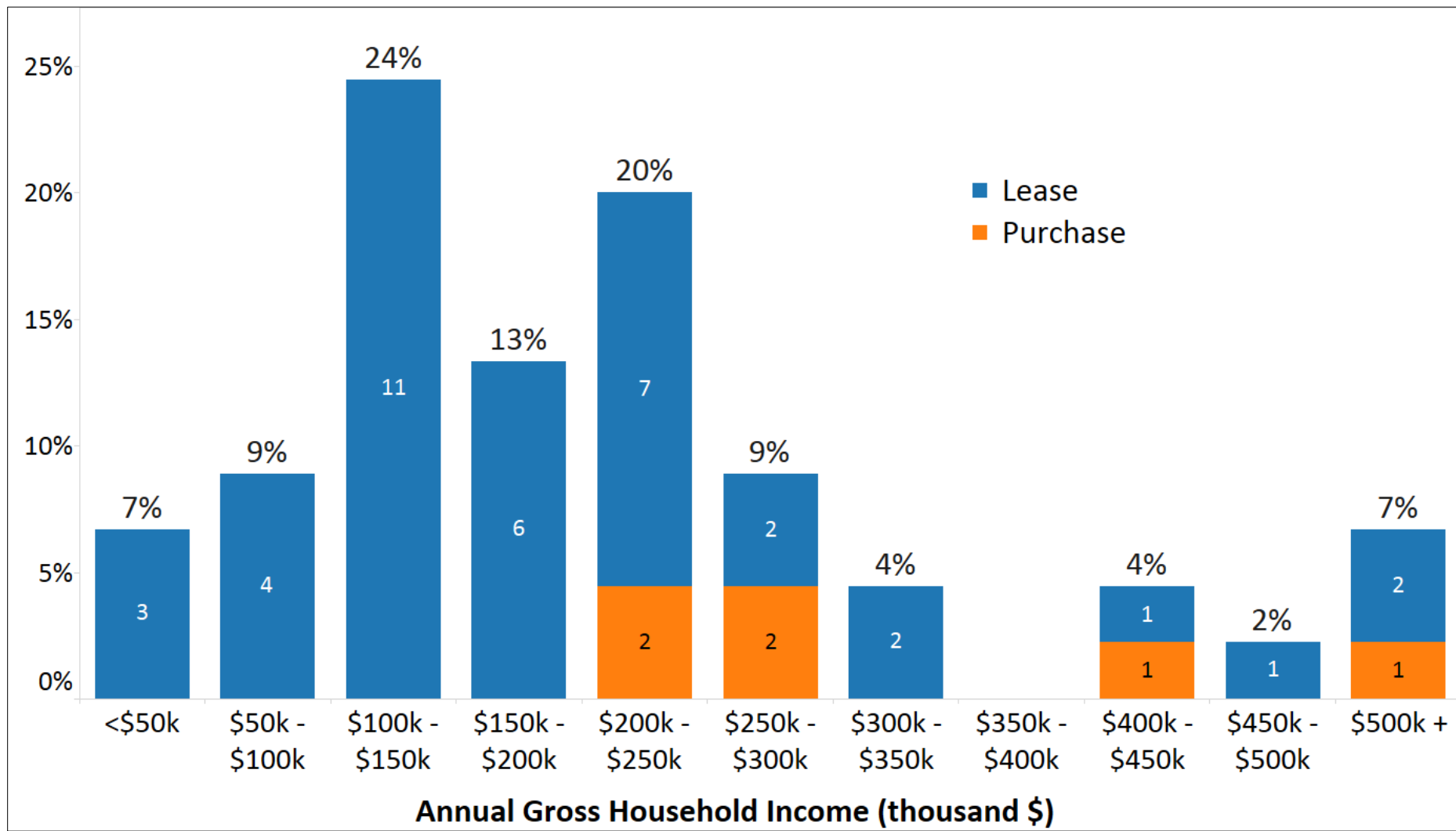
FCEV Consumers: Age



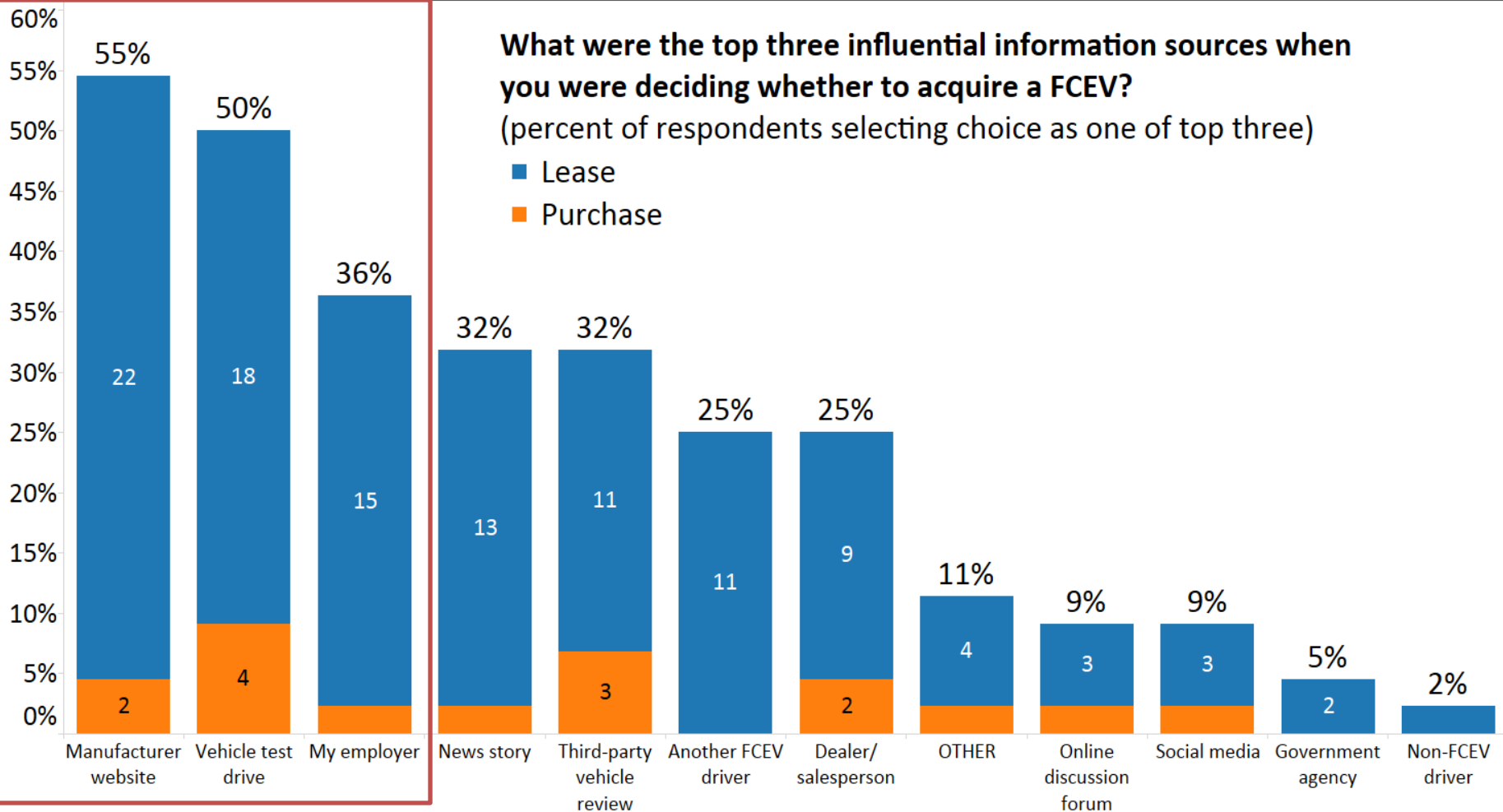
FCEV Consumers: Ethnicity



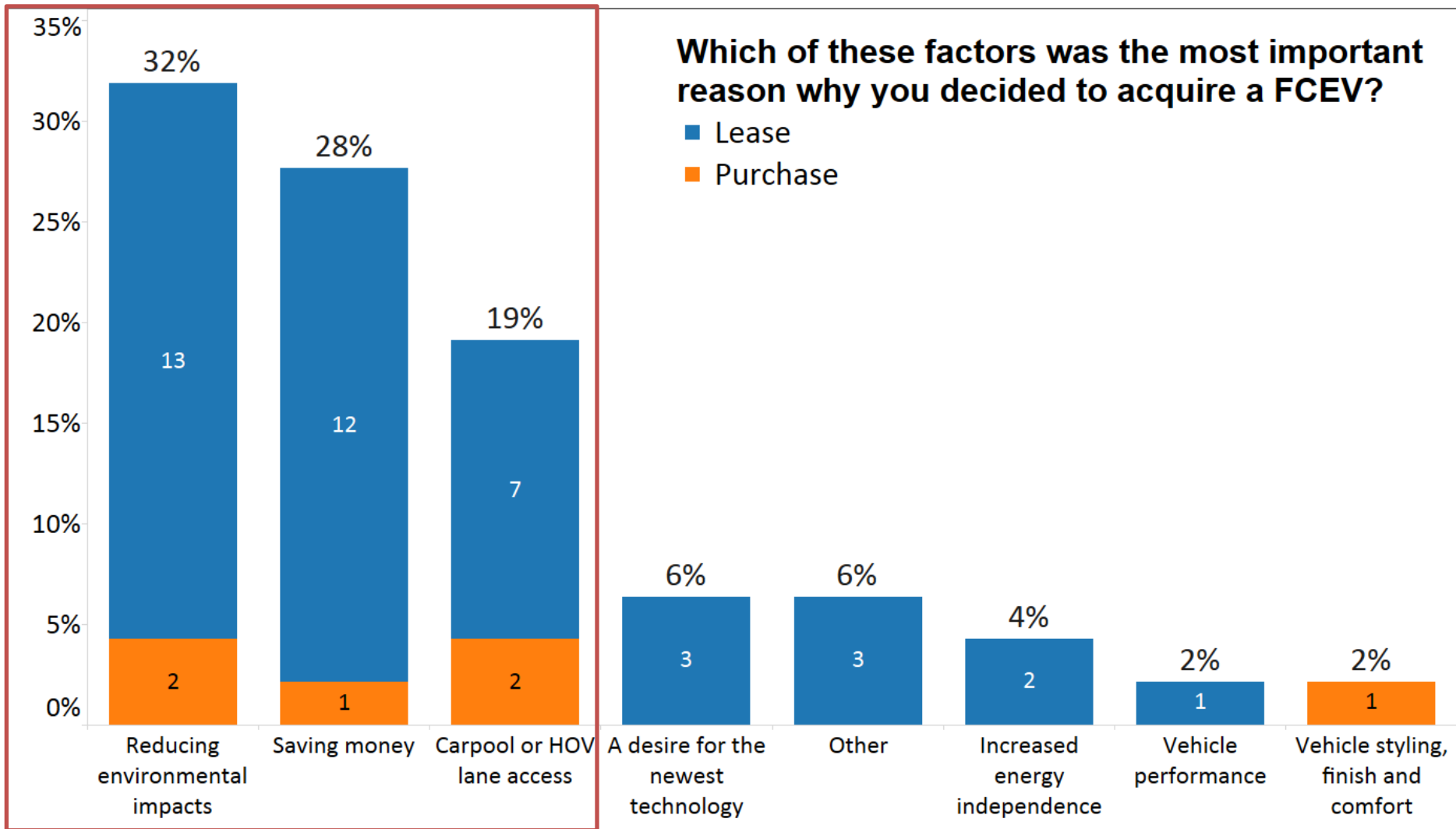
FCEV Consumers: Household Income



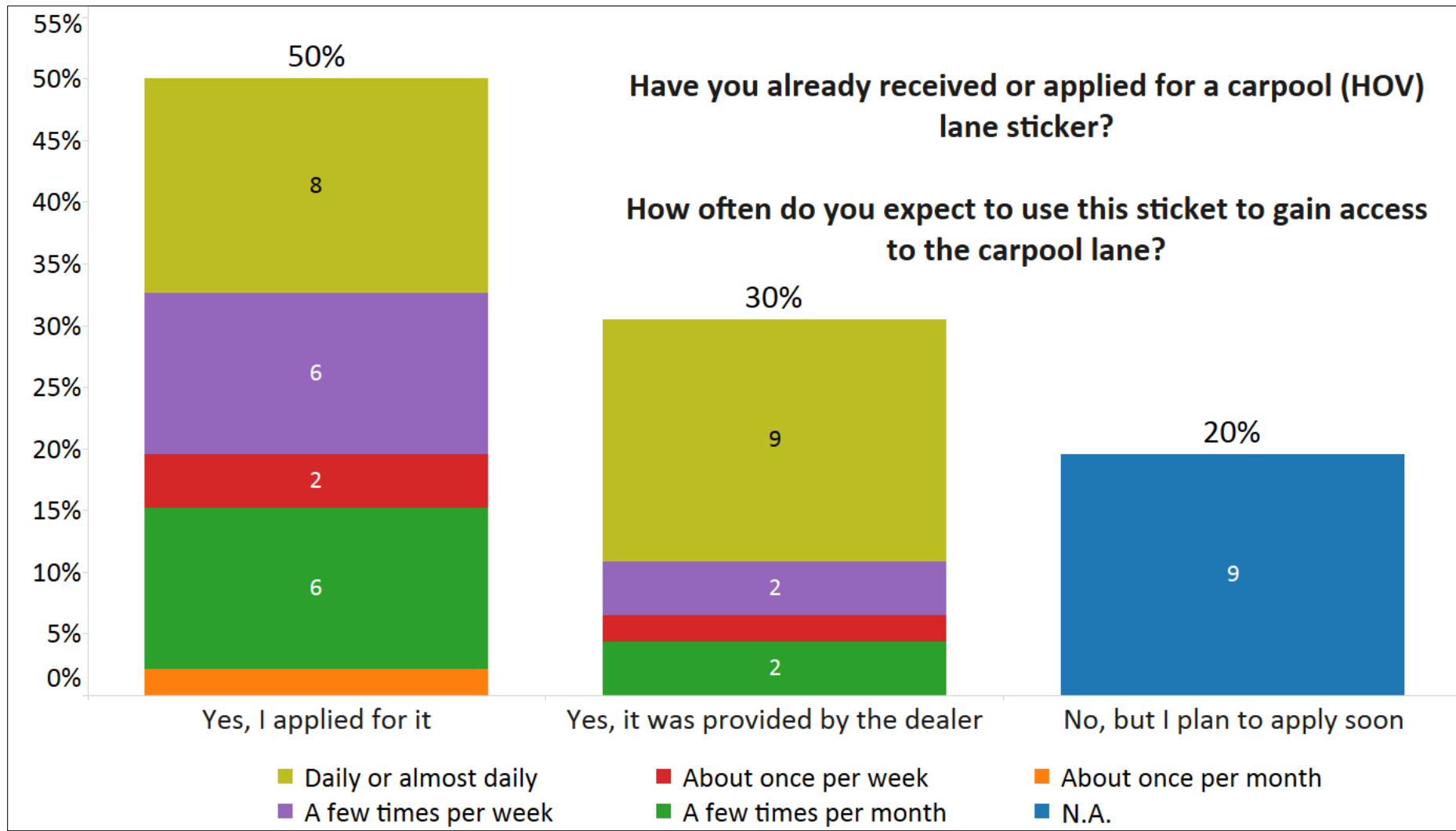
FCEV Consumers: Information Sources



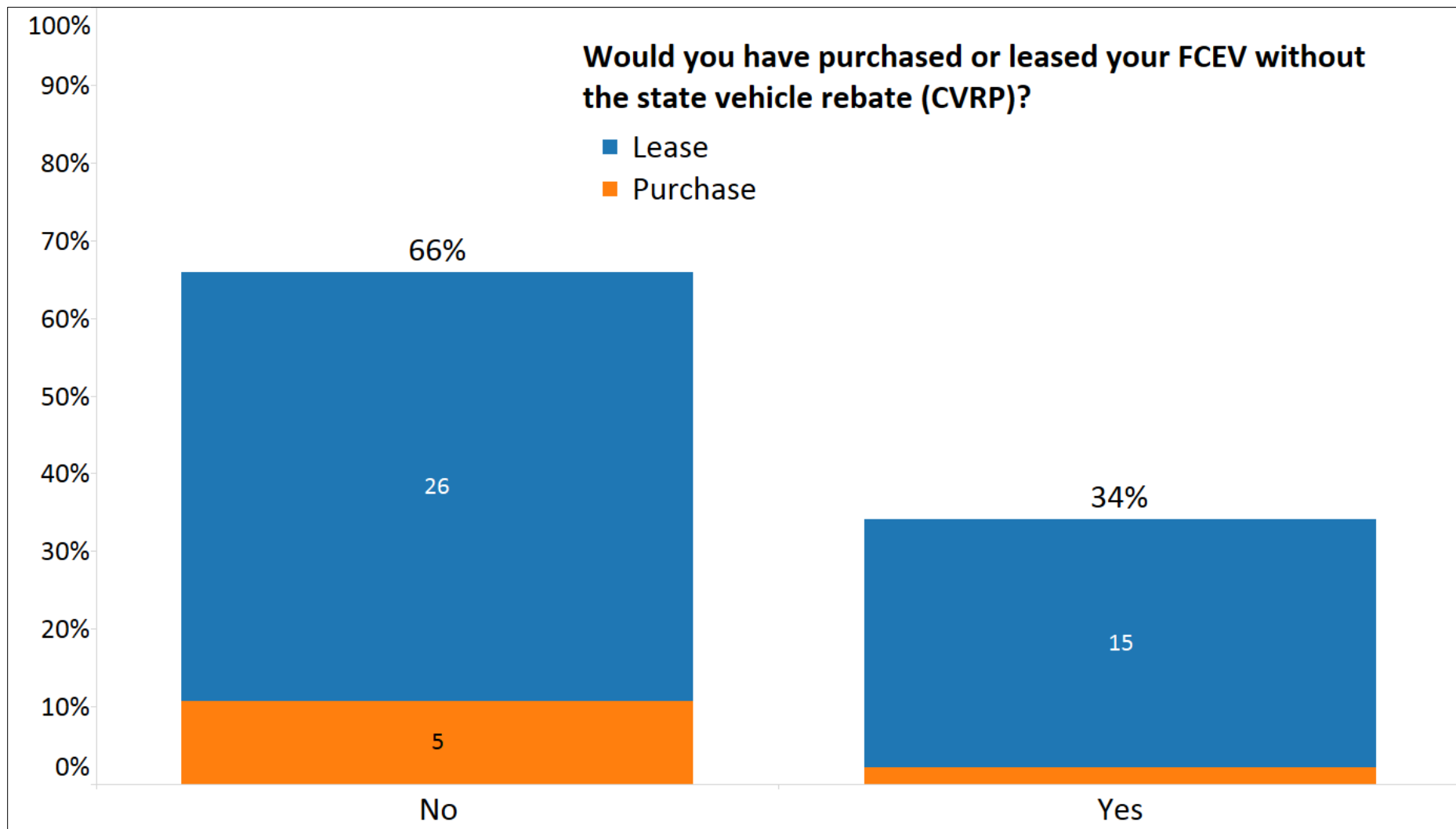
FCEV Consumers: Primary Motivation



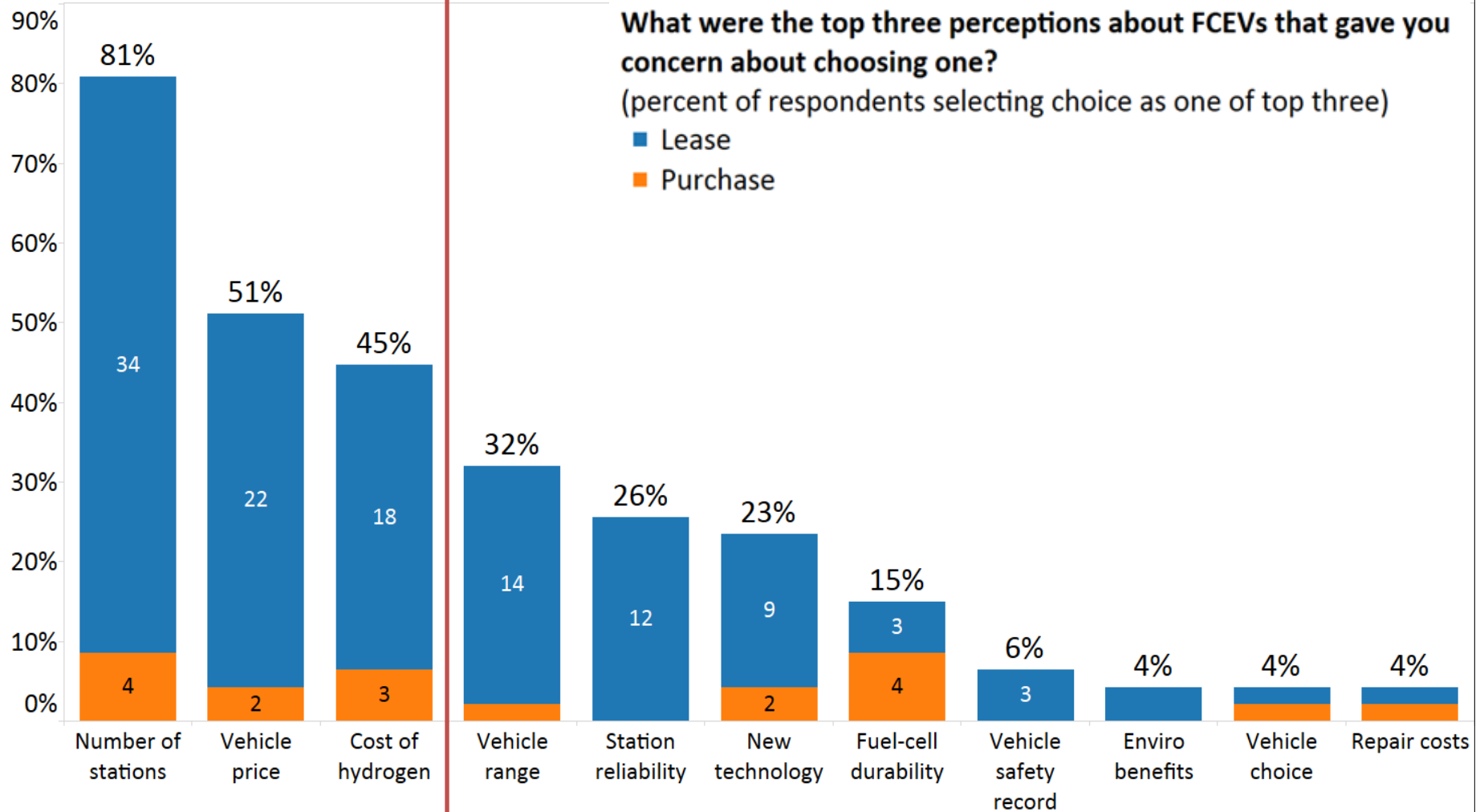
FCEV Consumers: HOV Sticker



FCEV Consumers: Rebate Influence

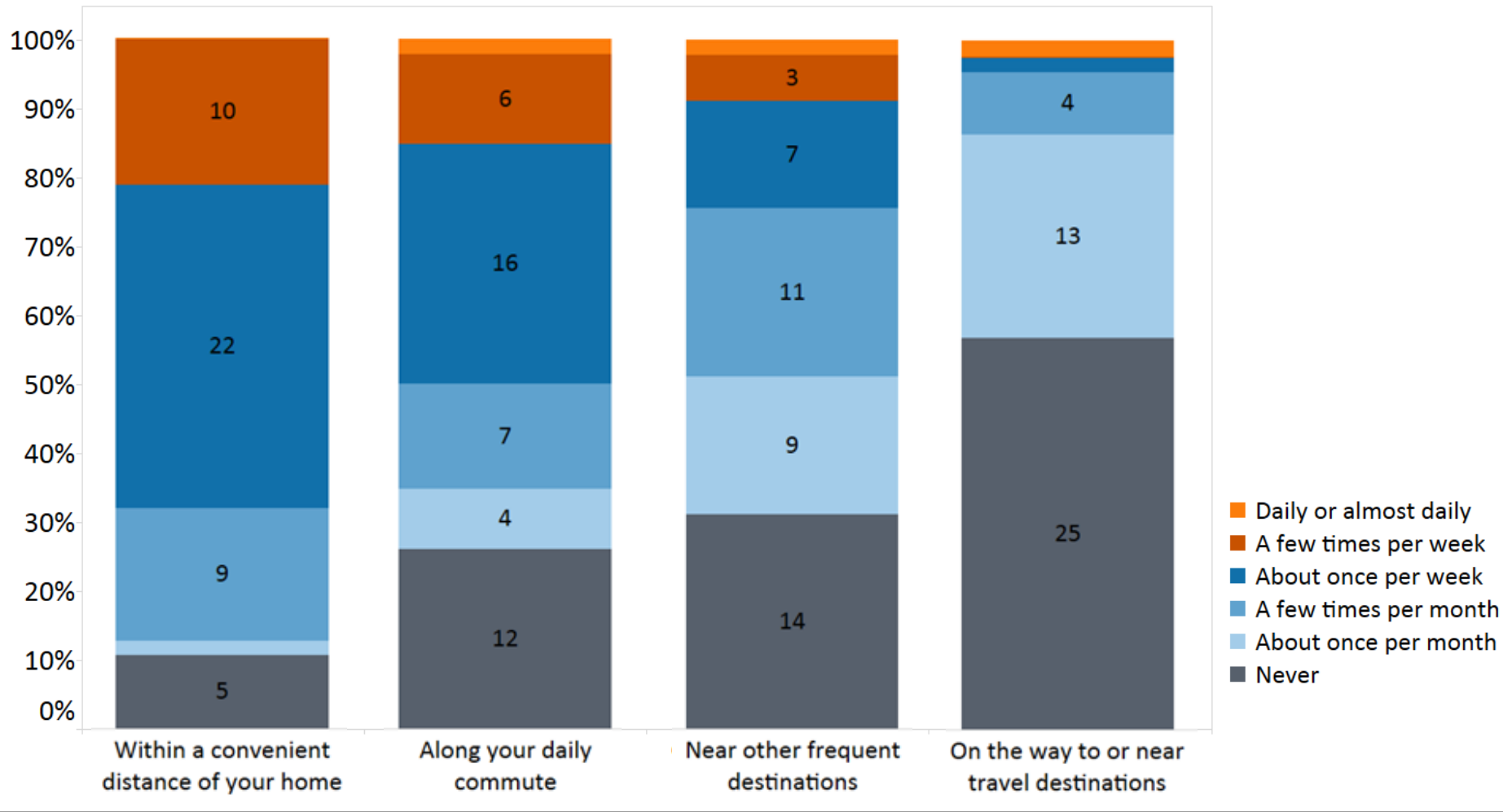


FCEV Consumers: Concerns about FCEVs

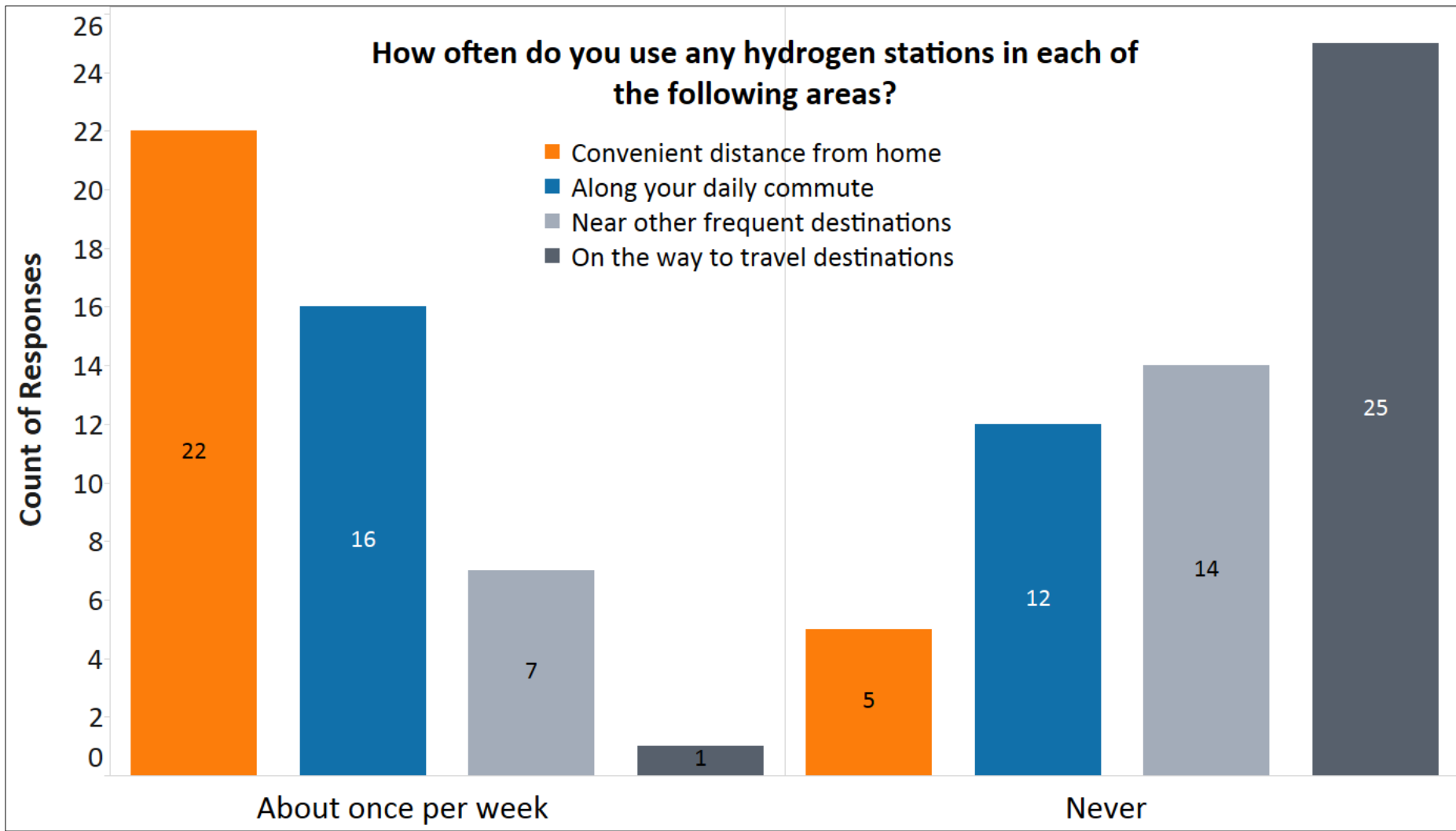


FCEV Consumers: Station Usage

How often do you use any hydrogen stations in each of the following areas?



FCEV Consumers: Station Usage





What else will we know over time?

Survey topics

- Demographics, attitudes, and housing characteristics
- Household fleet characteristics
- Motivations for adoption
- Fueling situation and preferences
- Vehicle perceptions and barriers to adoption
- Impact of incentives and benefits on adoption
- Experience at the dealership
- Experience while researching a new vehicle



What are we studying for PEVs?

(that we could study for FCEVs)

Consumer research and analysis

- **Target Consumer Segments: Converts, Rebate Essentials** (forthcoming Oct 2016 pres and Jan 2017 paper)
 - **Progress in Disadvantaged Communities** (forthcoming pres, Oct 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 (forthcoming, Oct 2016)
 - **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)
- Also:
- **Evaluation of the CT Dealer Incentive** (forthcoming pres, Oct 2016)



Wrap Up



Summary

- FCEVs are eligible for a \$5,000 rebate (\$7,000 for LMI households)
- A wide variety of 3-state program and market data is available online
- Q3 2016 saw more FCEV rebates generated than the entire history of the CVRP combined
- FCEV consumer survey data is now starting to accumulate, highlighting potential differences with plug-in vehicle adopters
 - Early indications, if they prove robust over time with more data, point to the importance of environmental motivations and incentives, as well as concerns about the number of stations and adoption costs
- Ongoing work segmenting and characterizing CVRP participants overall will increasingly shed light on FCEV markets

Thank You for Your Attention

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

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

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
- CVRP CV Consumer Survey (n=9,744)
 - EV purchase/lease dates 9/2012–3/2016
- CVRP CV Consumer Survey - FCEV (n=47)
 - EV purchase/lease dates 3/2016–9/2016
- CVRP [Rebate Applications](#) (n=164,934)
 - EV purchase/lease dates 3/2010–9/2016

Market:

- EV Registration Data (Polk, N=187,206)
 - EV registration dates 3/2010–12/2015