




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



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

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



Consumer & Dealer
Outreach



Fleet Assistance
& Clean Cities



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	<div>\$3,000 > 25 kWh</div> <div>\$1,500 20 to 25 kWh</div> <div>\$750 < 20 kWh</div>
	Plug-in Hybrid Electric Vehicles	<div>\$2,500 (i3 REx)</div> <div>\$1,500</div>	<div>\$2,500 (>10kWh)</div> <div>\$1,500</div>	<div>\$3,000 > 18 kWh</div> <div>\$1,500 10 to 18 kWh</div> <div>\$750 < 10 kWh</div>
	Neighborhood Electric Vehicles	\$900	<div>*MSRP > \$60k = \$1,000</div> <div>*MSRP < \$60k only</div>	
	Zero-Emission Motorcycles	\$900	\$750	<div>Dealer incentive: \$300</div>

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	<i>\$5,000</i>	<i>\$7,000</i>
	Battery Electric Vehicles (& i3 REx)	<i>\$2,500</i>	<i>\$4,500</i>
	Plug-in Hybrid Electric Vehicles	<i>\$1,500</i>	<i>\$3,500</i>
	Neighborhood Electric Vehicles	<i>\$900</i>	<i>\$900</i>
	Zero-Emission Motorcycles	<i>\$900</i>	<i>\$900</i>



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

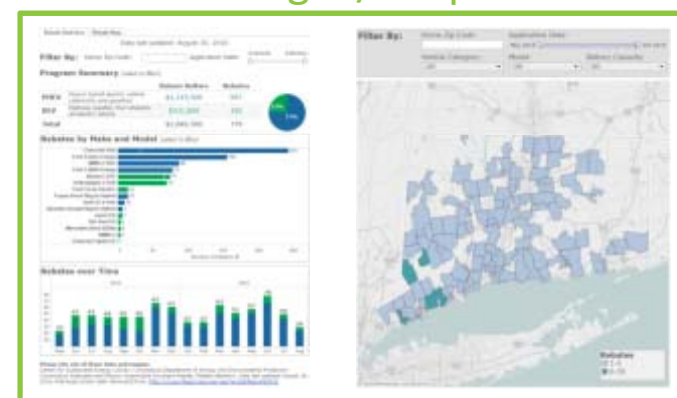
Also: zevfacts.com



cleanvehiclerebate.org



ct.gov/deep



mor-ev.org



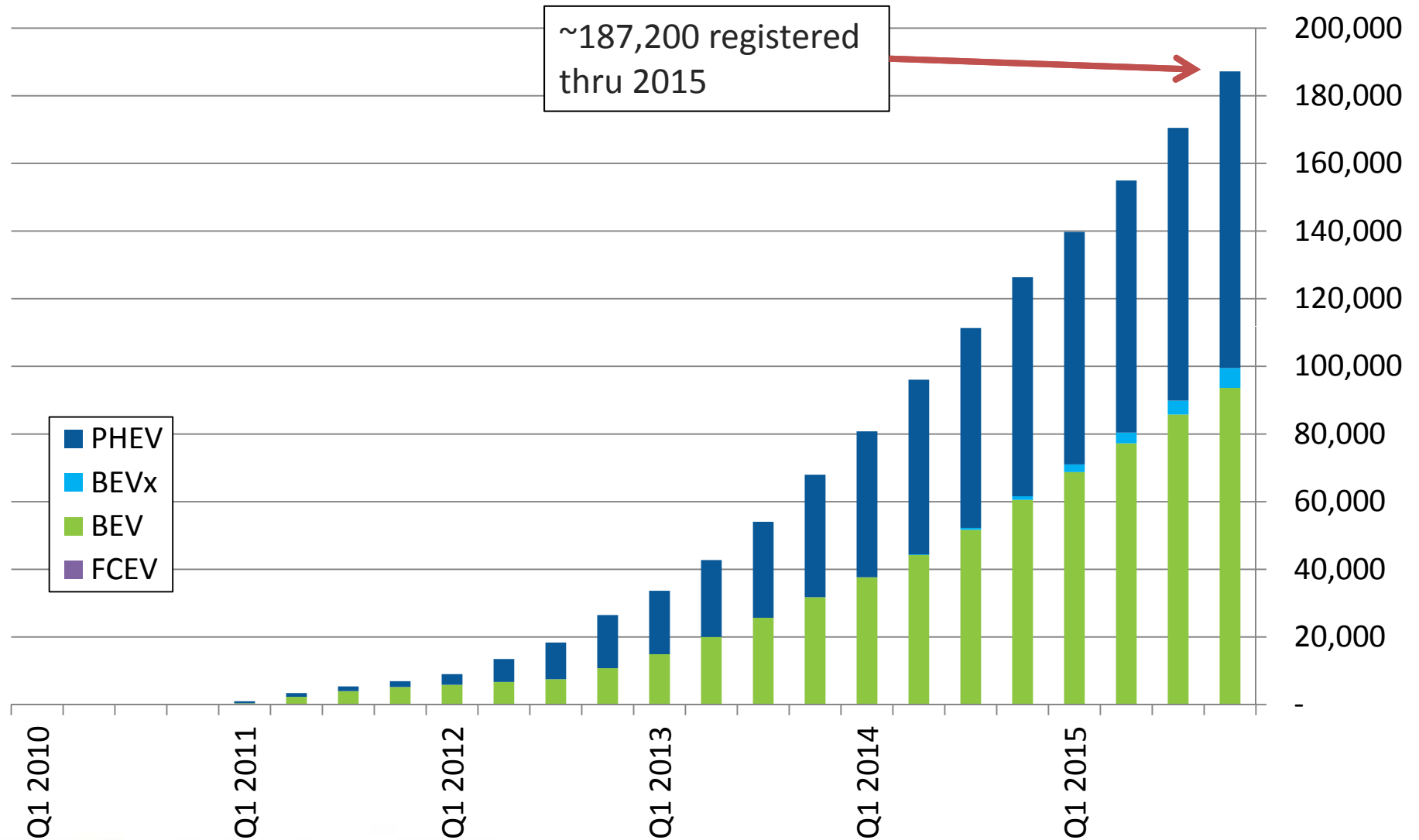


What are we seeing so far?

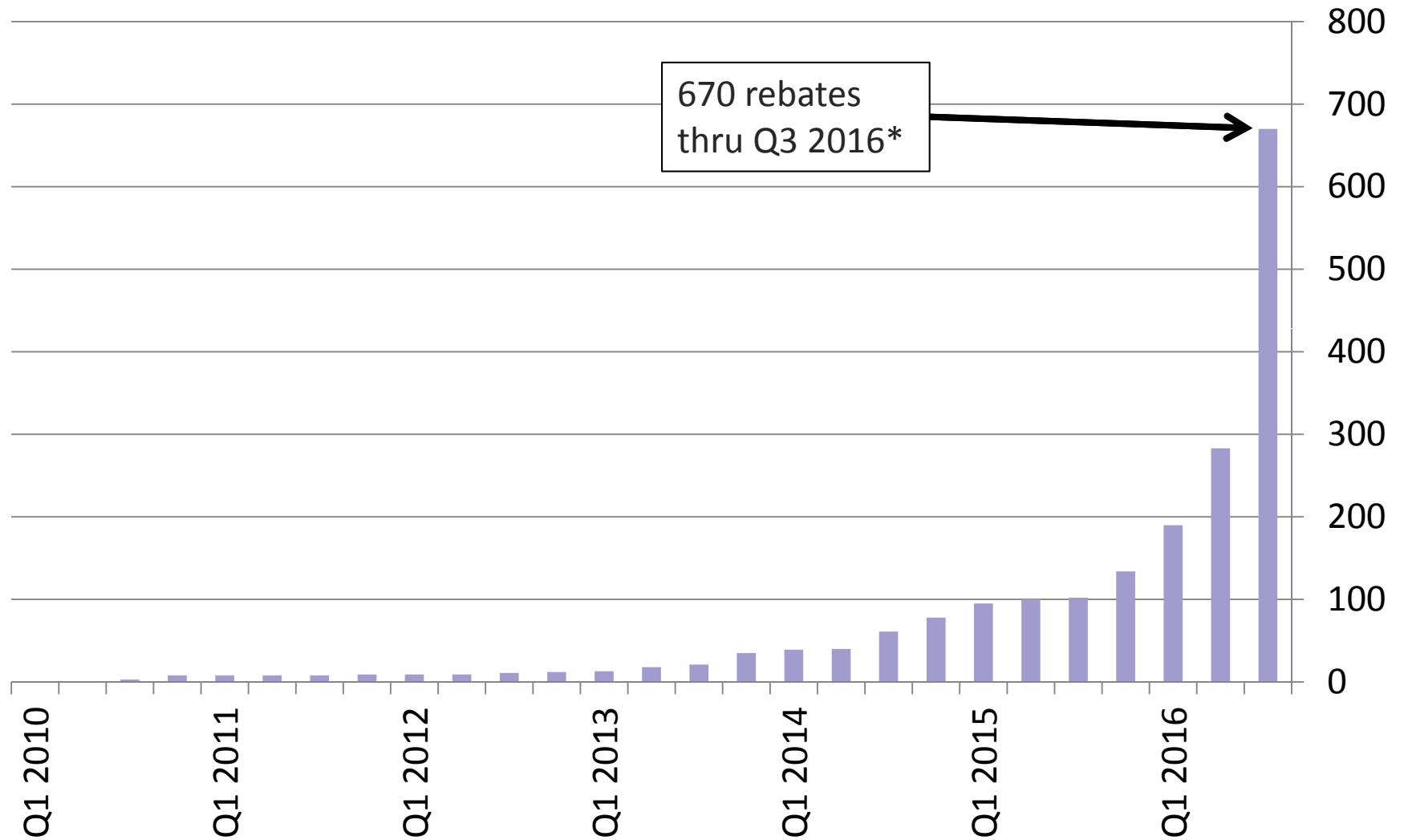
Rebated vehicles



Cumulative California EV Sales (New Registrations)

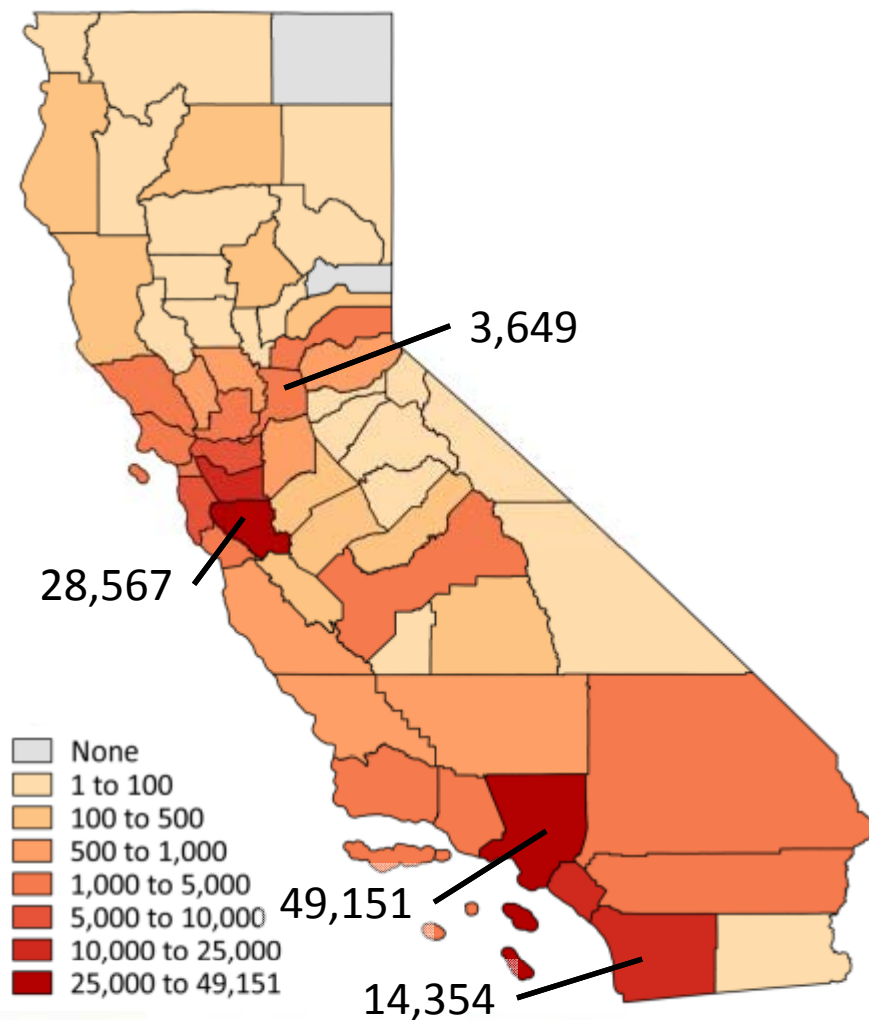


Cumulative California FCEV Rebates

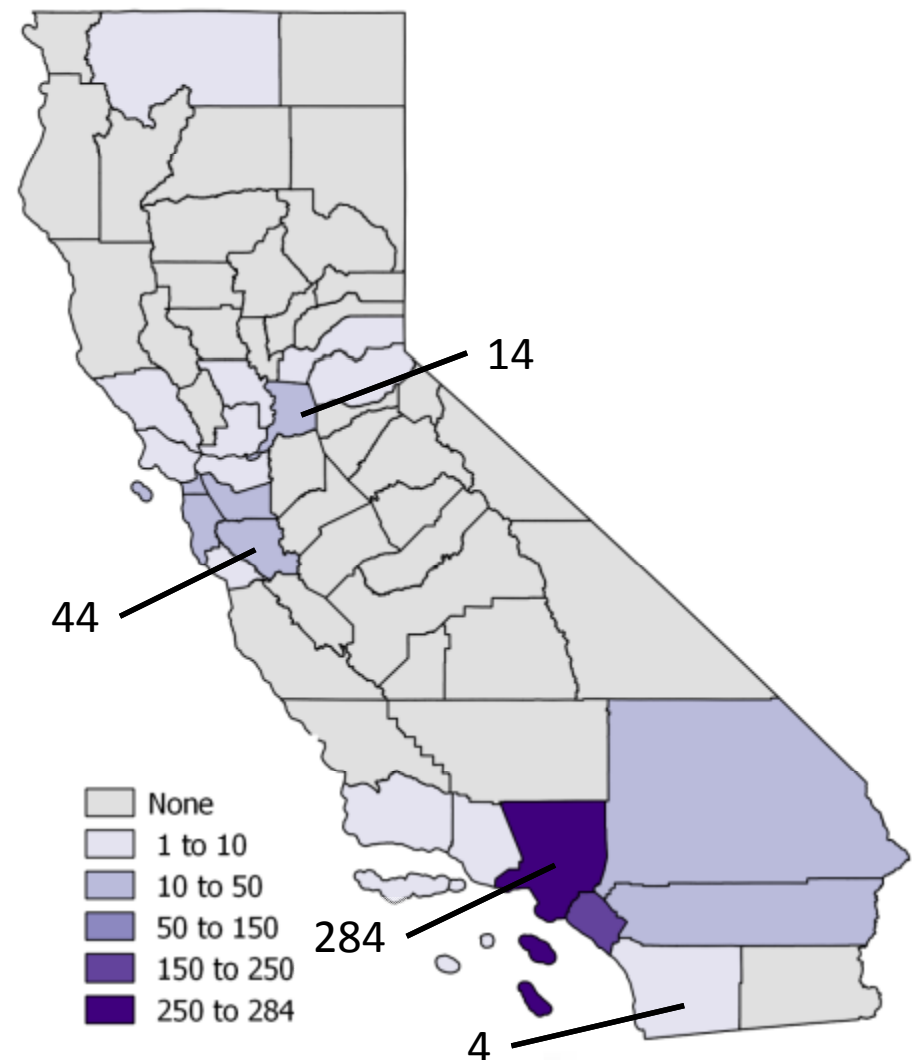


By County: New Clean Vehicle Registrations (thru Dec 2015) & FCEV Rebates (thru Sep 2016*)

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%

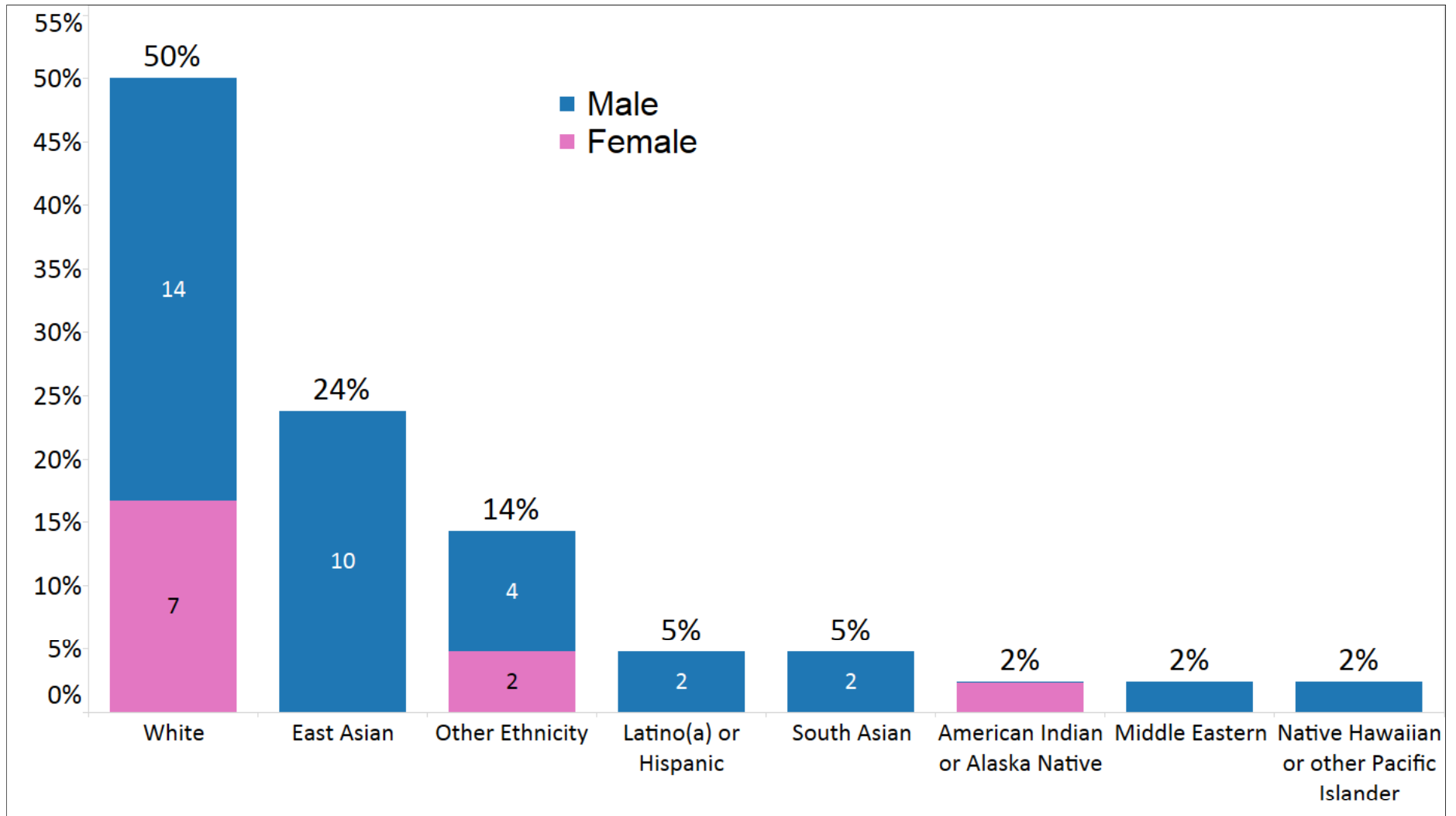
Majority Characteristics of CVRP Consumers

	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%

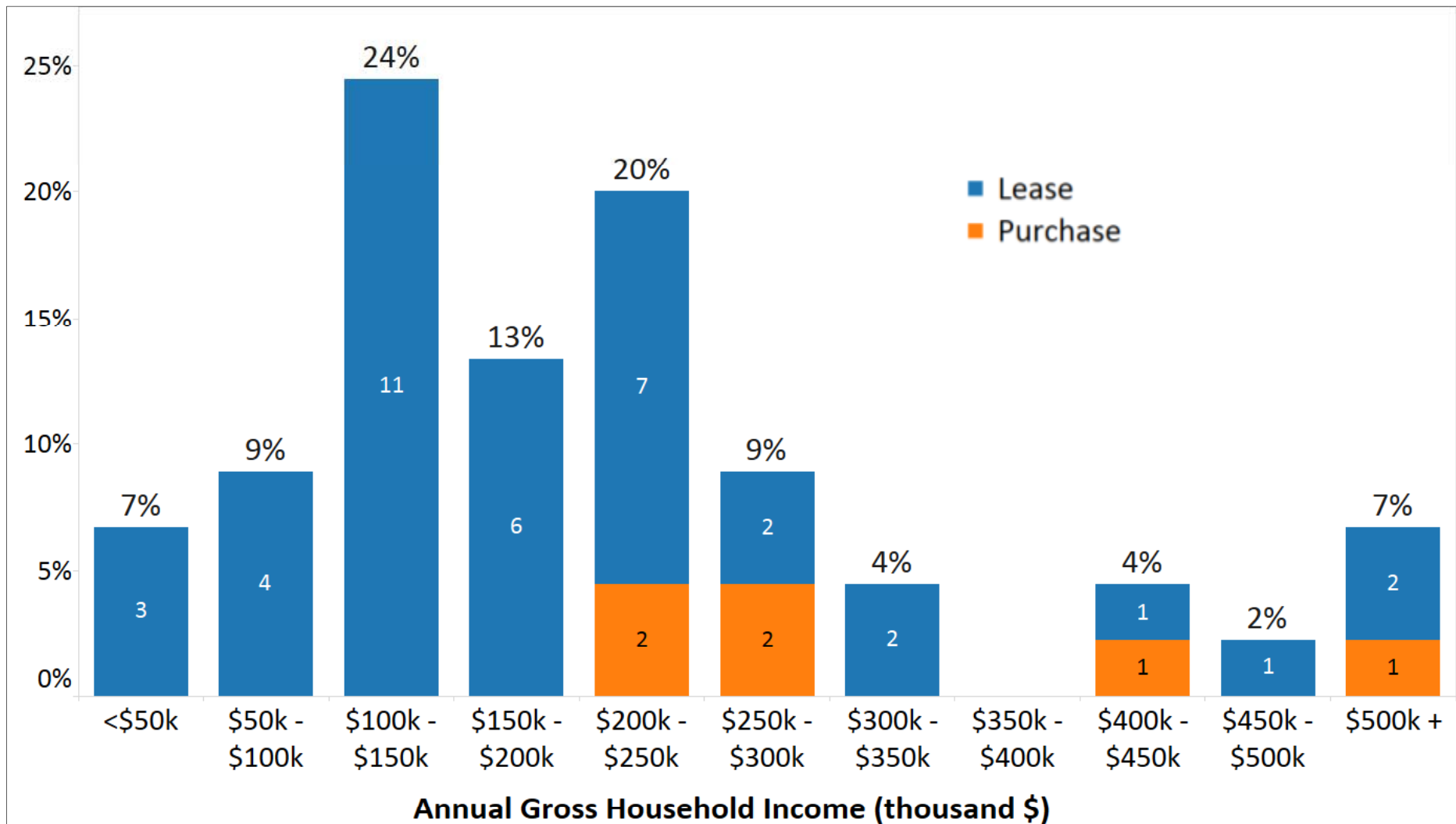
Majority Characteristics of CVRP Consumers

	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%

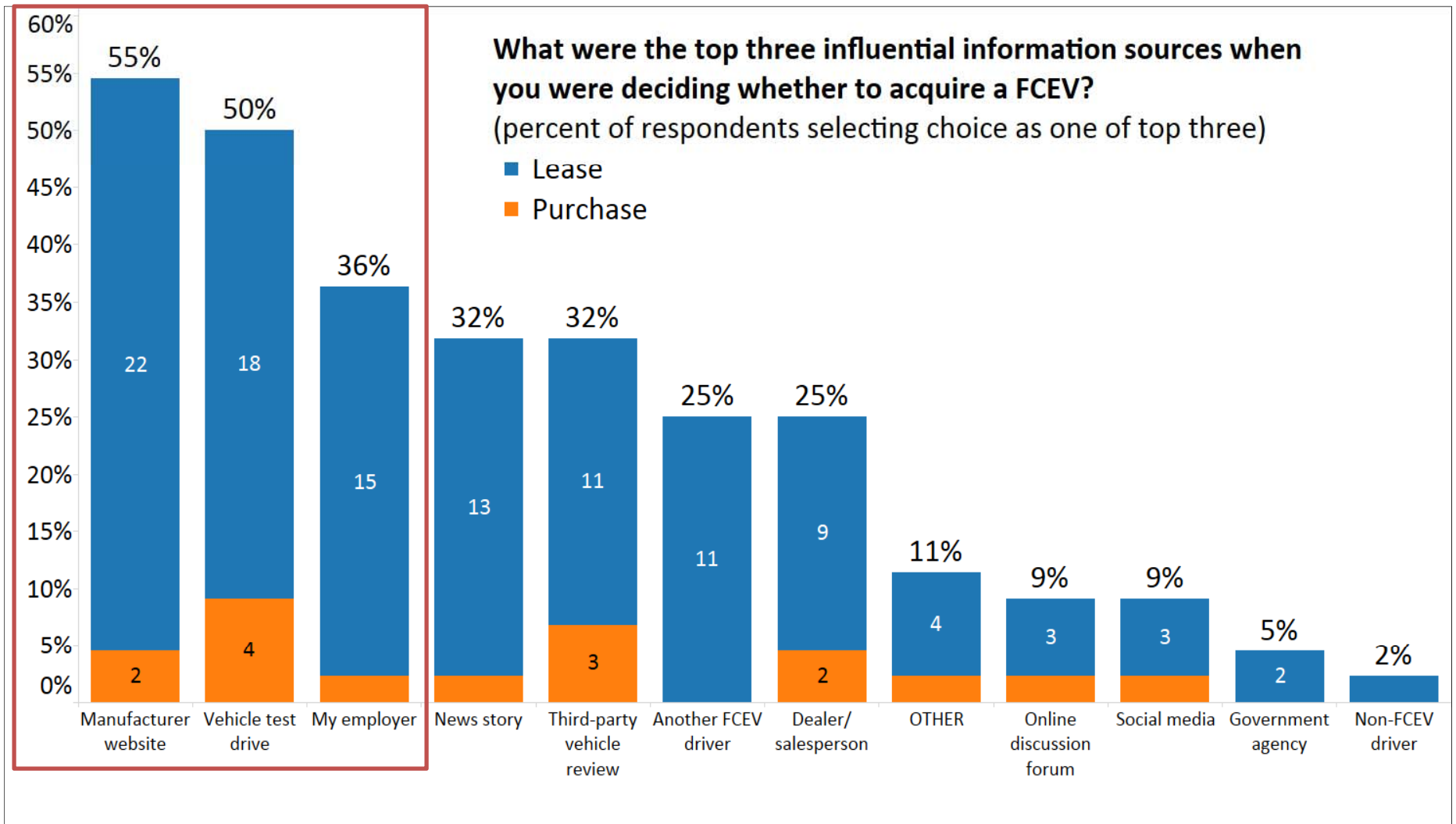
FCEV Consumers: Ethnicity



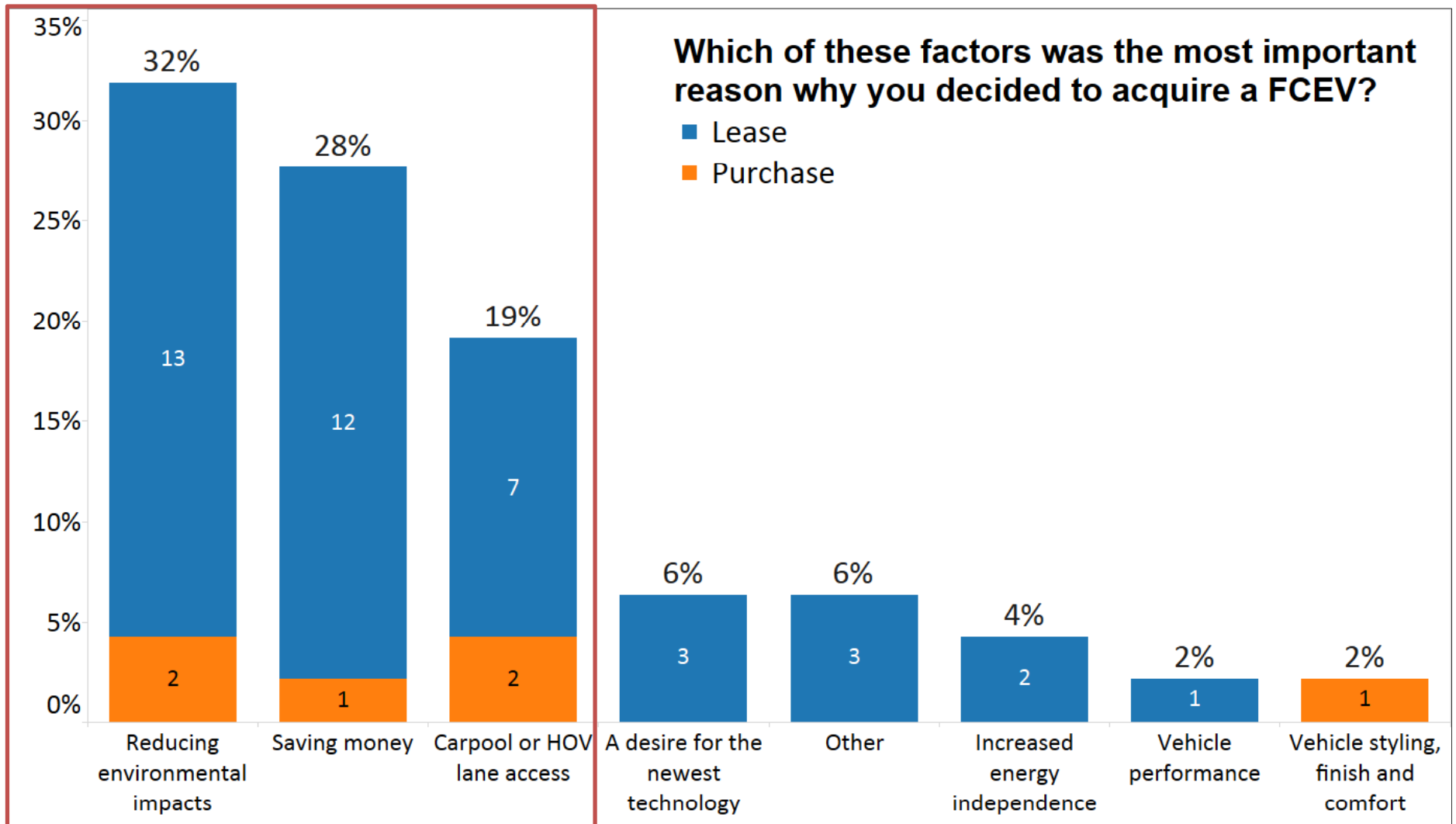
FCEV Consumers: Household Income



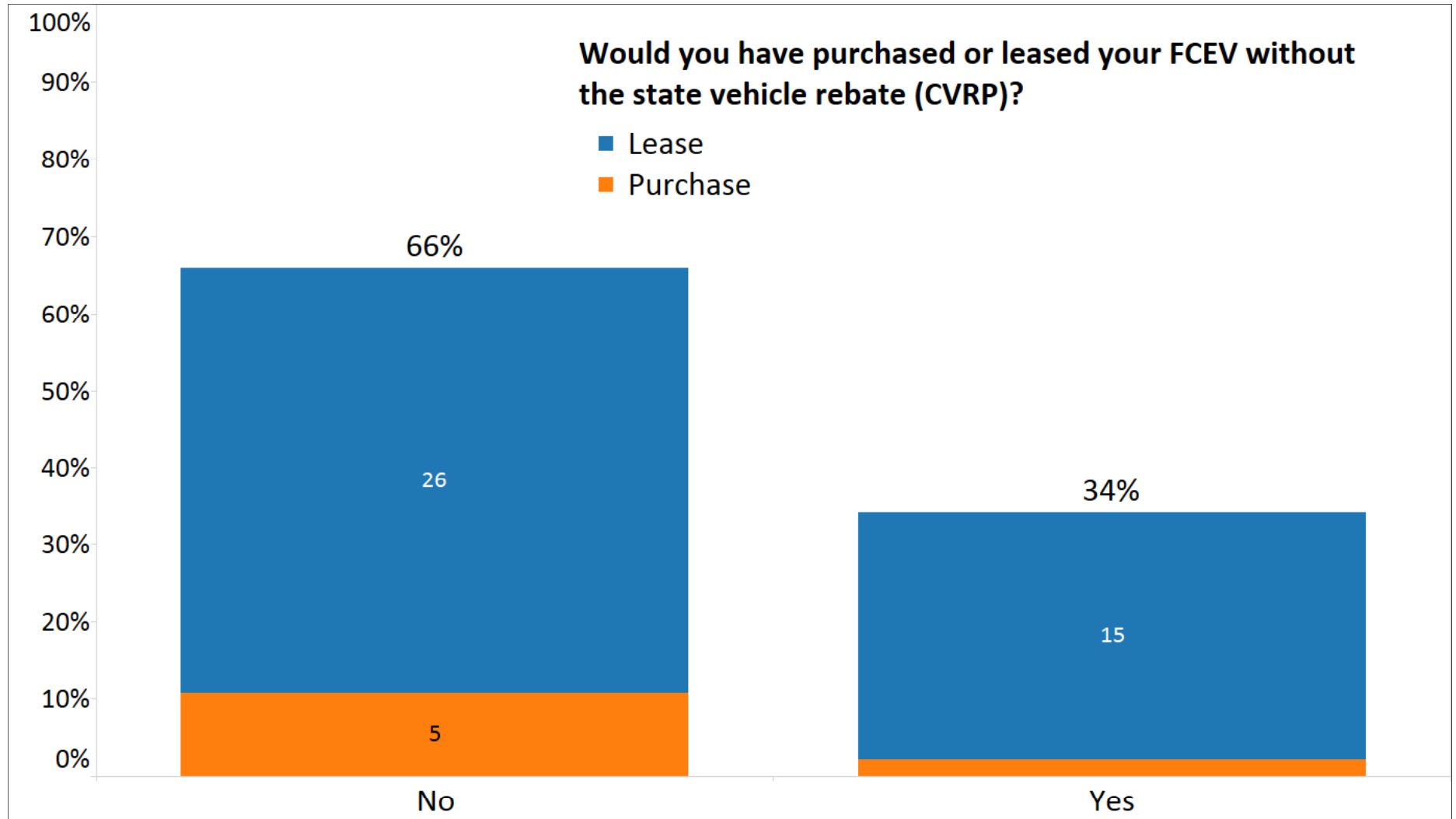
FCEV Consumers: Information Sources



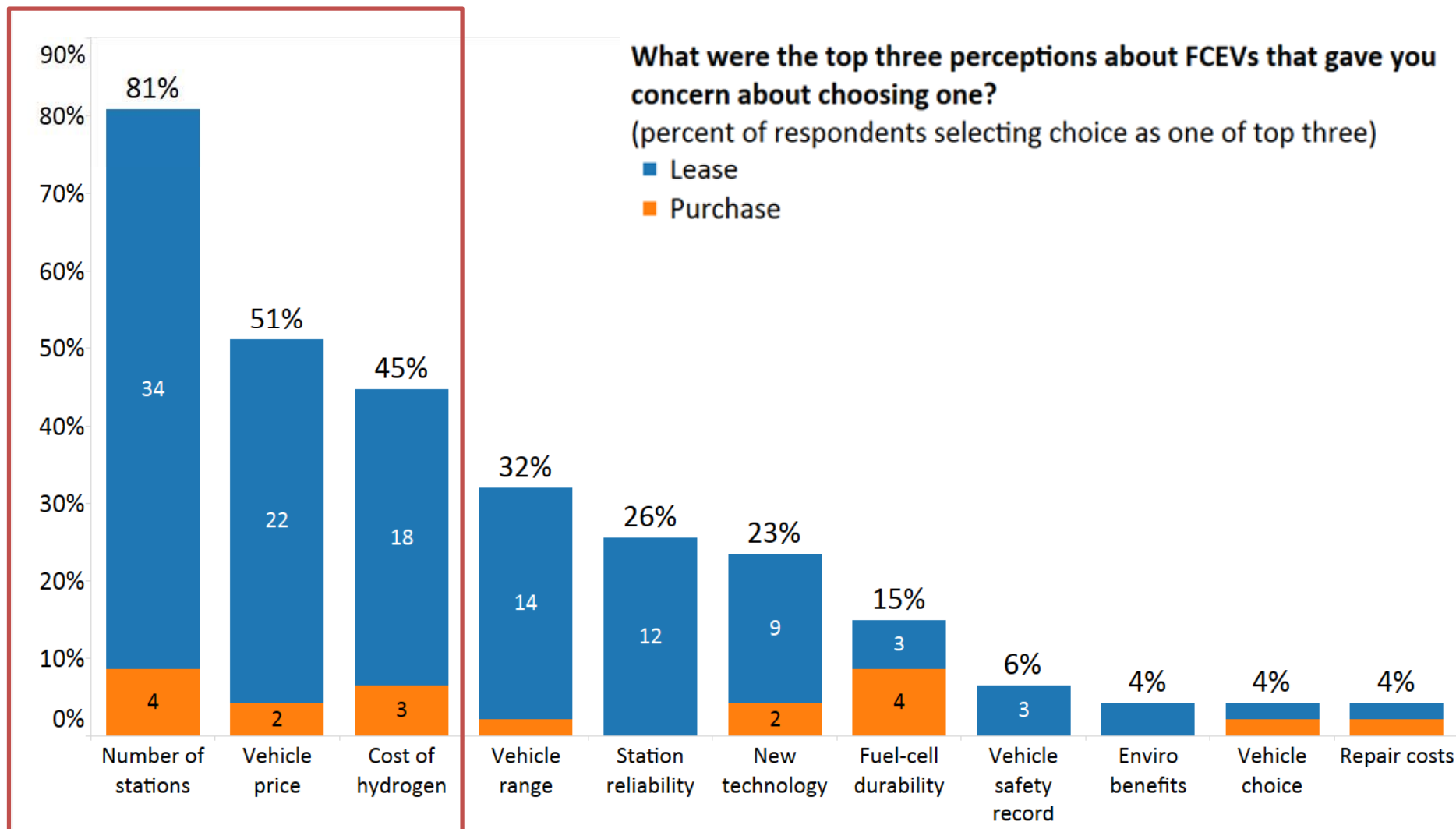
FCEV Consumers: Primary Motivation



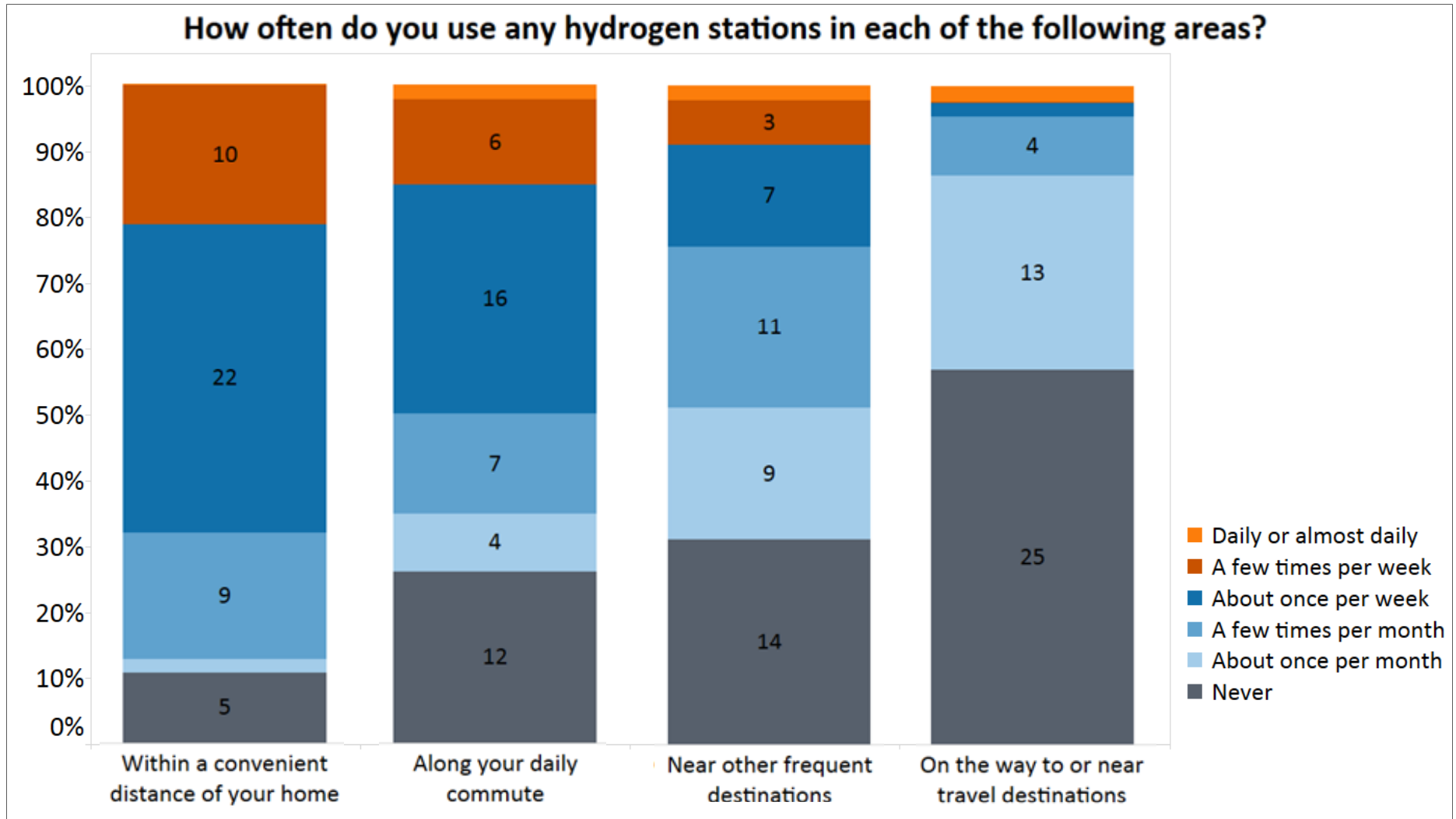
FCEV Consumers: Rebate Influence



FCEV Consumers: Concerns about FCEVs



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 with more data, reinforce:
 - The importance of environmental motivations and incentives and
 - 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?

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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