

From Awareness to Valuation: Car Buyers Respond to Plug-in and Fuel Cell Electric Vehicles, with an Emphasis on Incentives

ARB Workshop
8 December 2015

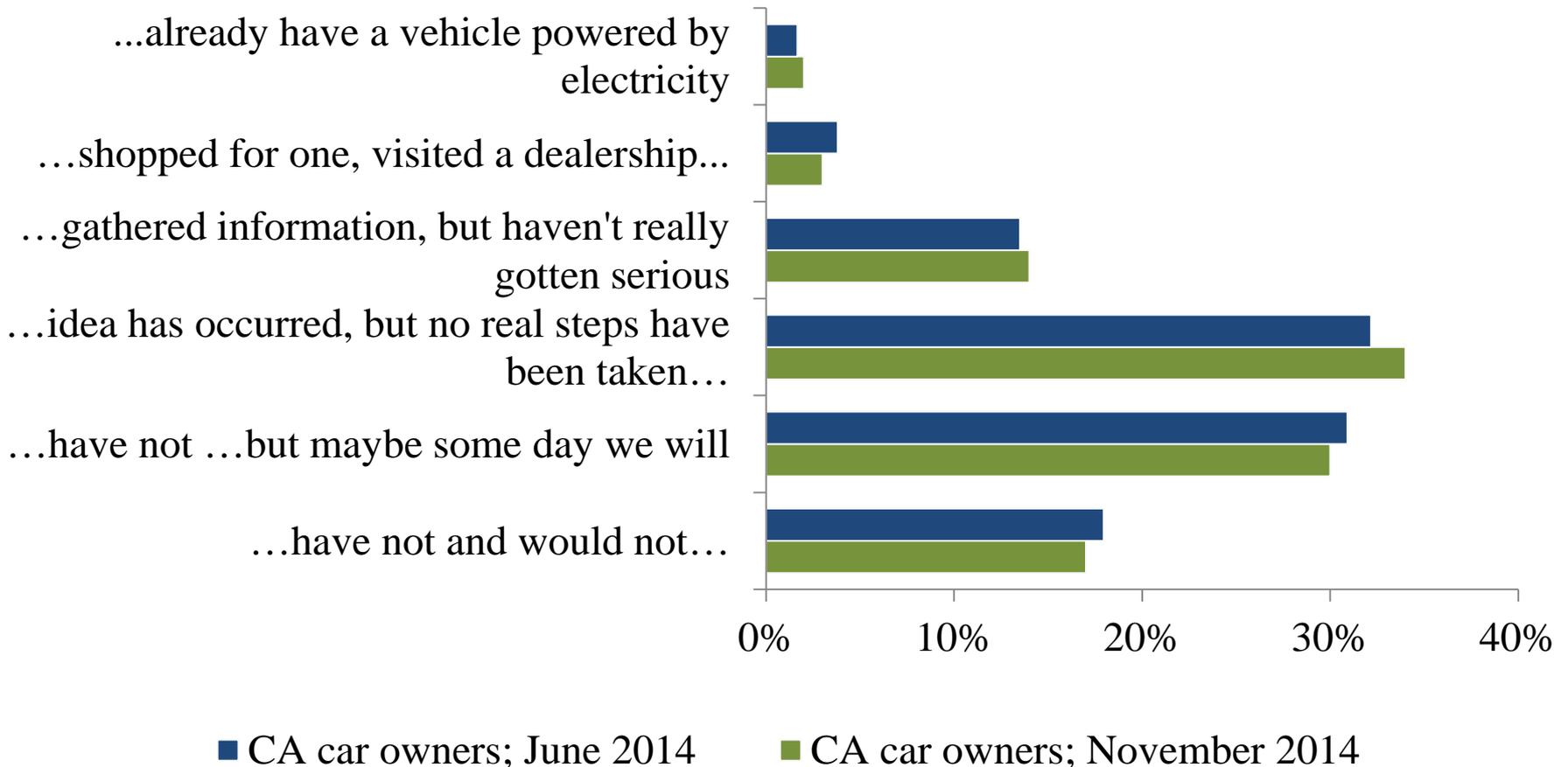
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Studies reviewed

- Study 1
 - CA Car owning households; two on-line surveys
 - June 2014; n = 1,681
 - Nov. 2014; n = 1,730
- Study 2
 - New car buyers; on-line survey
 - December 2014 to January 2015
 - Multi-state sample; n = 5,654
 - Results today from California; n = 1,671

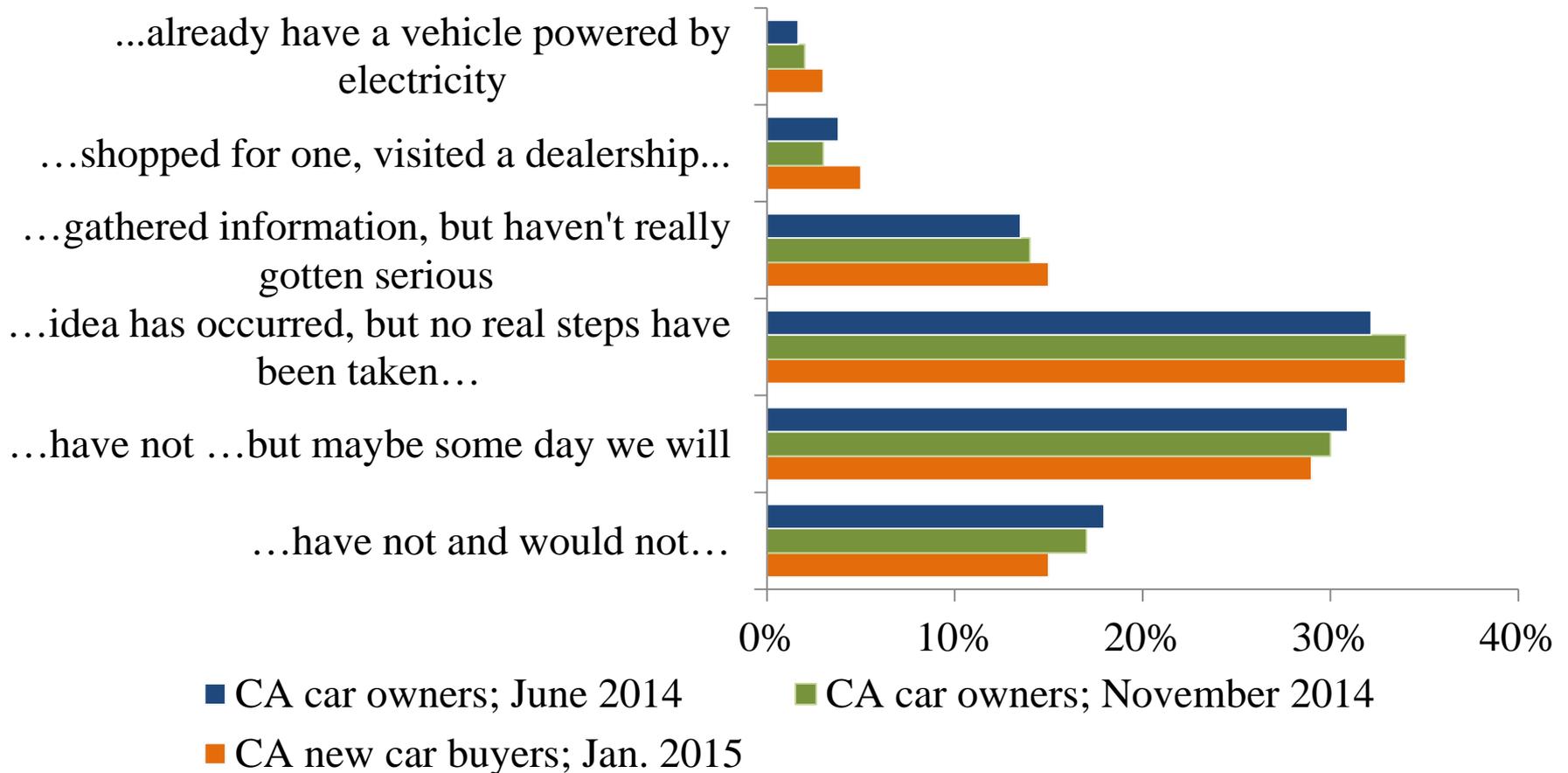
Are people considering PEVs?

Have you considered buying a vehicle that runs on electricity for your household?



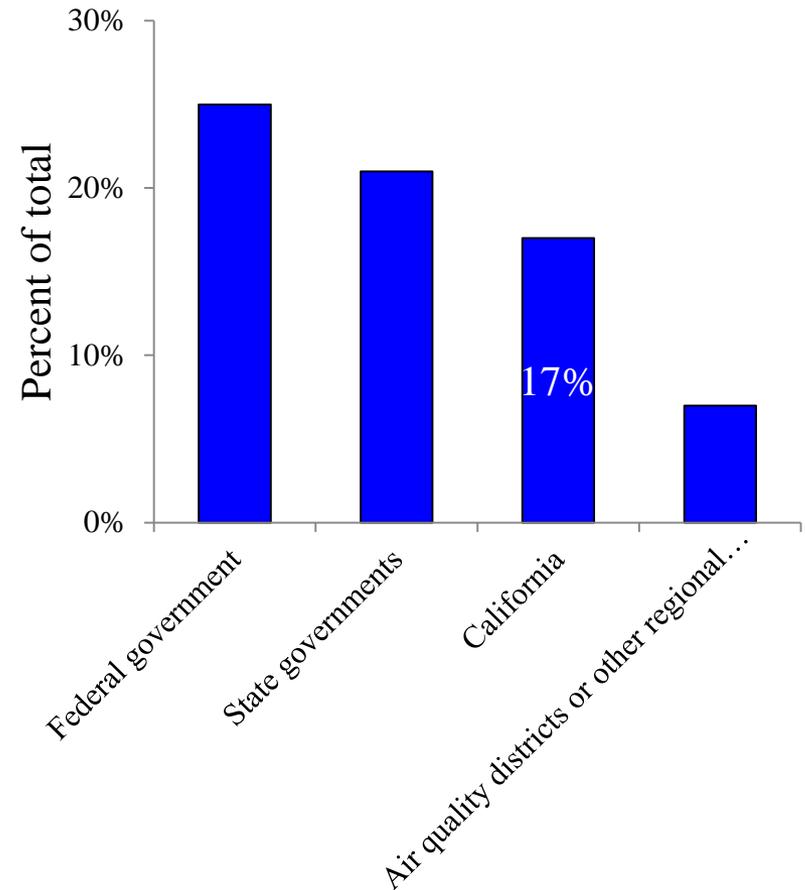
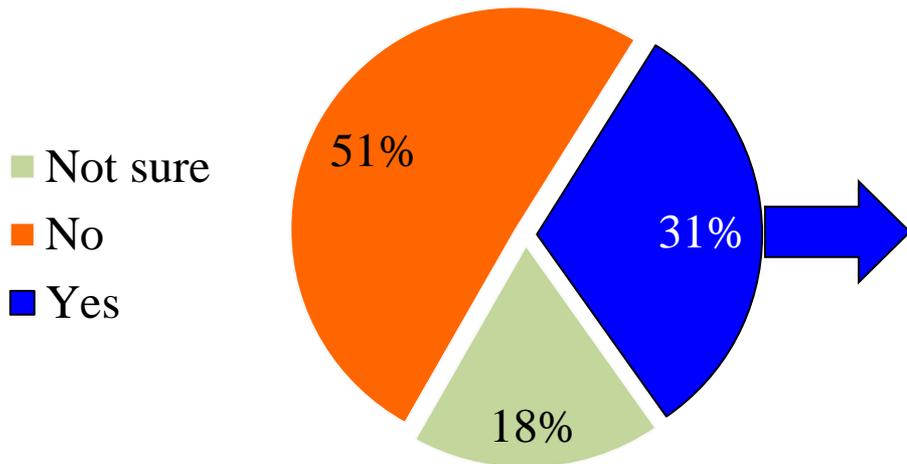
Are more new car-buyers considering PEVs?

Have you considered buying a vehicle that runs on electricity for your household?



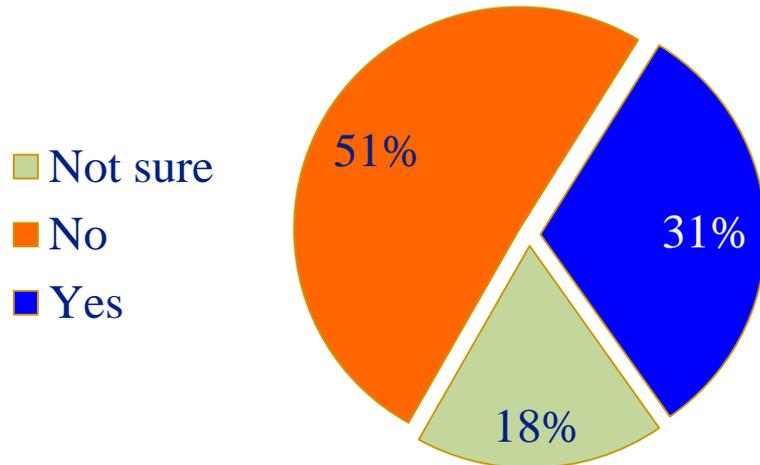
Have consumers heard incentives are being offered to buy vehicles that don't run on gasoline or diesel?

Of those who say “Yes,” how many have heard of incentives from each of these sources?



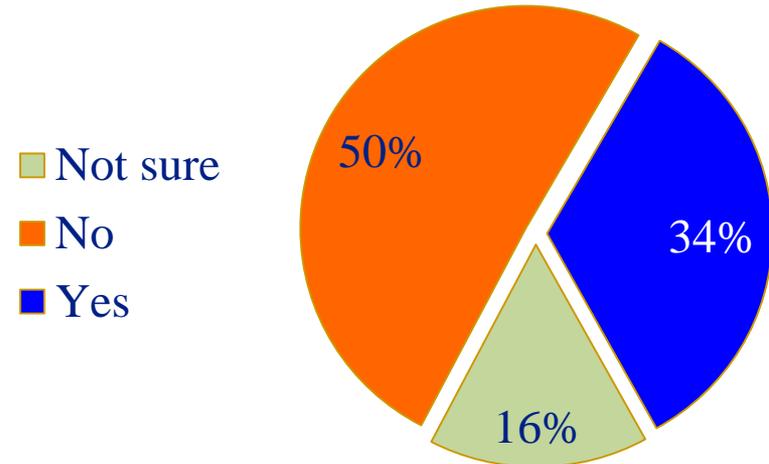
Awareness of incentives did not increase June to Nov., 2014

June 2014



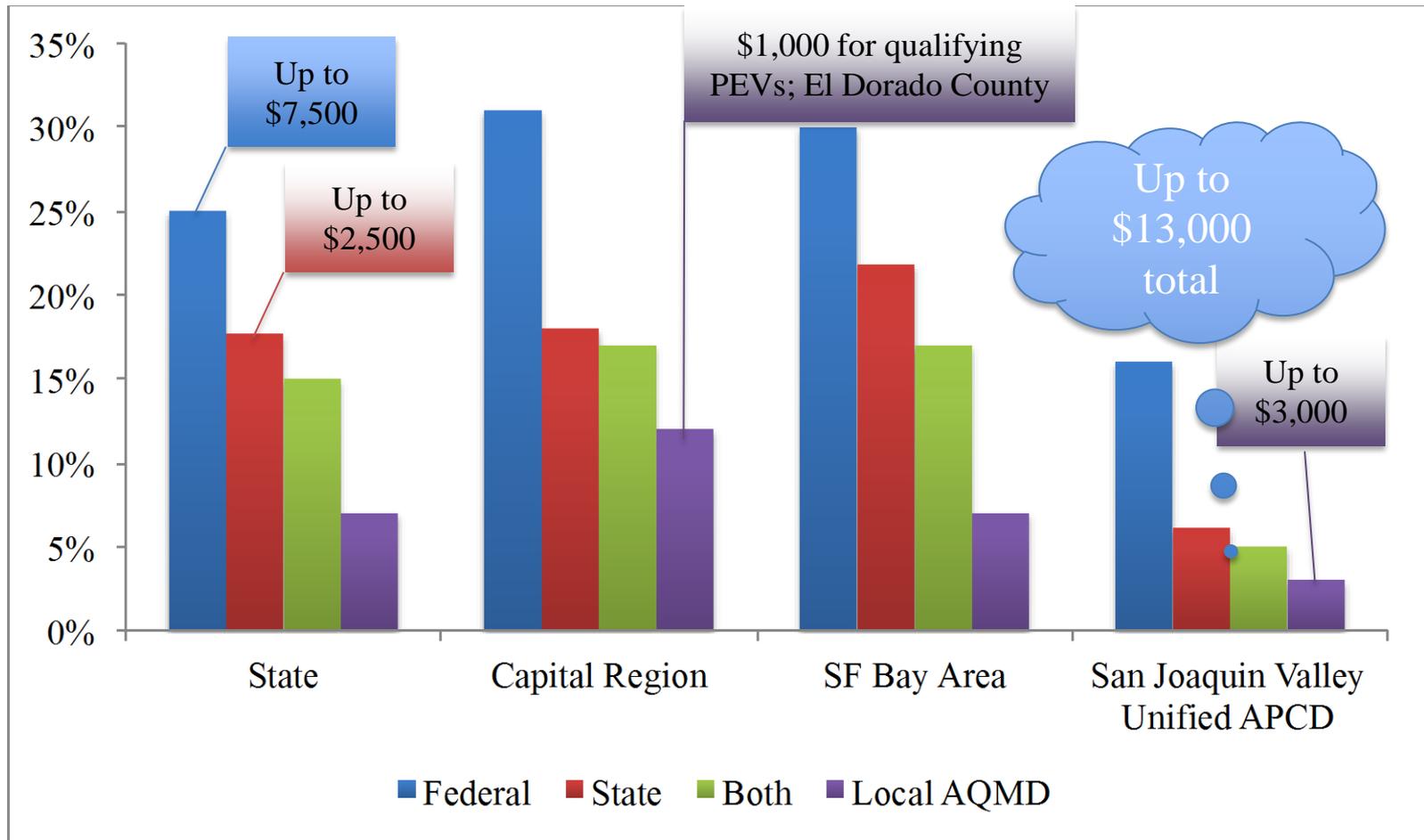
17% of total sample has heard CA is offering incentives

November 2014



18% of total sample has heard CA is offering incentives

Do higher incentives create higher awareness of incentives?



California, all-car owning households. June 2014

Valuation: Do people design their next new vehicle to be a ZEV?

- CA New car buyers (Jan. 2015)
 - Design games
 - Why PEVs and FCEVs? Why not?

Design Parameters

- Drivetrain
 - ICEV, HEV, PHEV, BEV, FCEV
- HEV
 - Fuel economy increment and purchase price based on initial vehicle
- PHEV
 - CS fuel economy equivalent to HEV version
 - CD mode: assist or all-electric
 - CD range: 10, 20, 40, 80 miles
 - Home charging duration, hours: customized based on CD design parameters (battery size) and 1.1, 6.6, and 9.9 kW charging
 - Quick charging capability
- BEV
 - Range: 50, 75, 100, 125, 150, 200, 300 miles
 - Home charging duration hours
 - Customized based on battery size (vehicle size and range) and three levels of charging
 - Quick charging capability
- FCEV
 - Range: 150, 250, 350 miles
 - Home hydrogen fueling

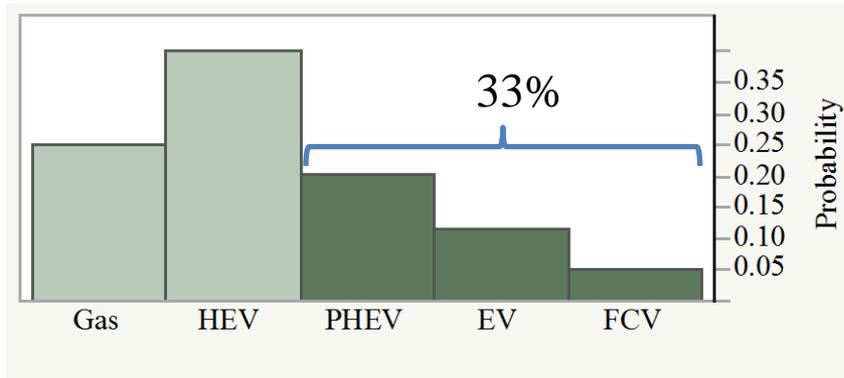
Incentives

- All PHEVs, BEVs, and FCEVs eligible for federal tax credit
 - Amounts equal to federal schedule at time of survey
- Plus their choice of **one** of the following incentives
 - State vehicle incentive equal to CA's schedule at time of survey
 - State home charger/H2 fueling incentive equal to State vehicle incentive
 - Single occupant HOV access (until Jan. 2019)
 - Reduced bridge and road tolls (until Jan. 2019)
 - If workplace charging isn't available to them, imagine it is (workplace fueling not offered for FCEVs)

Drivetrain designs

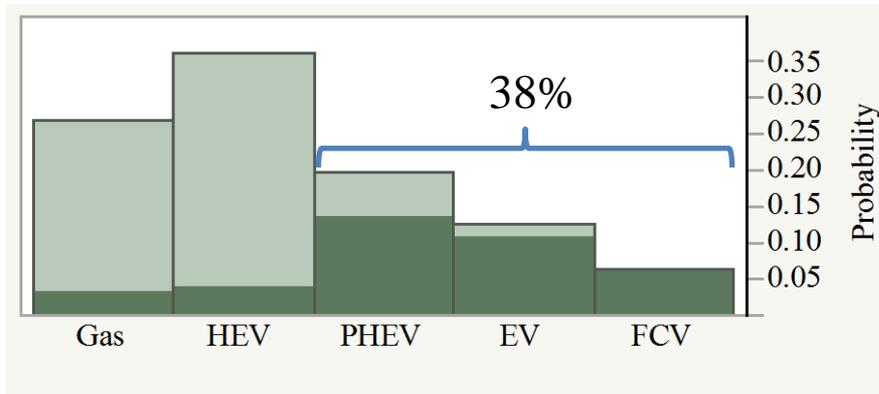
Game 1:

All vehicles allowed in any drivetrain



Game 3:

No full-size, battery-powered all-electric drive; add incentives

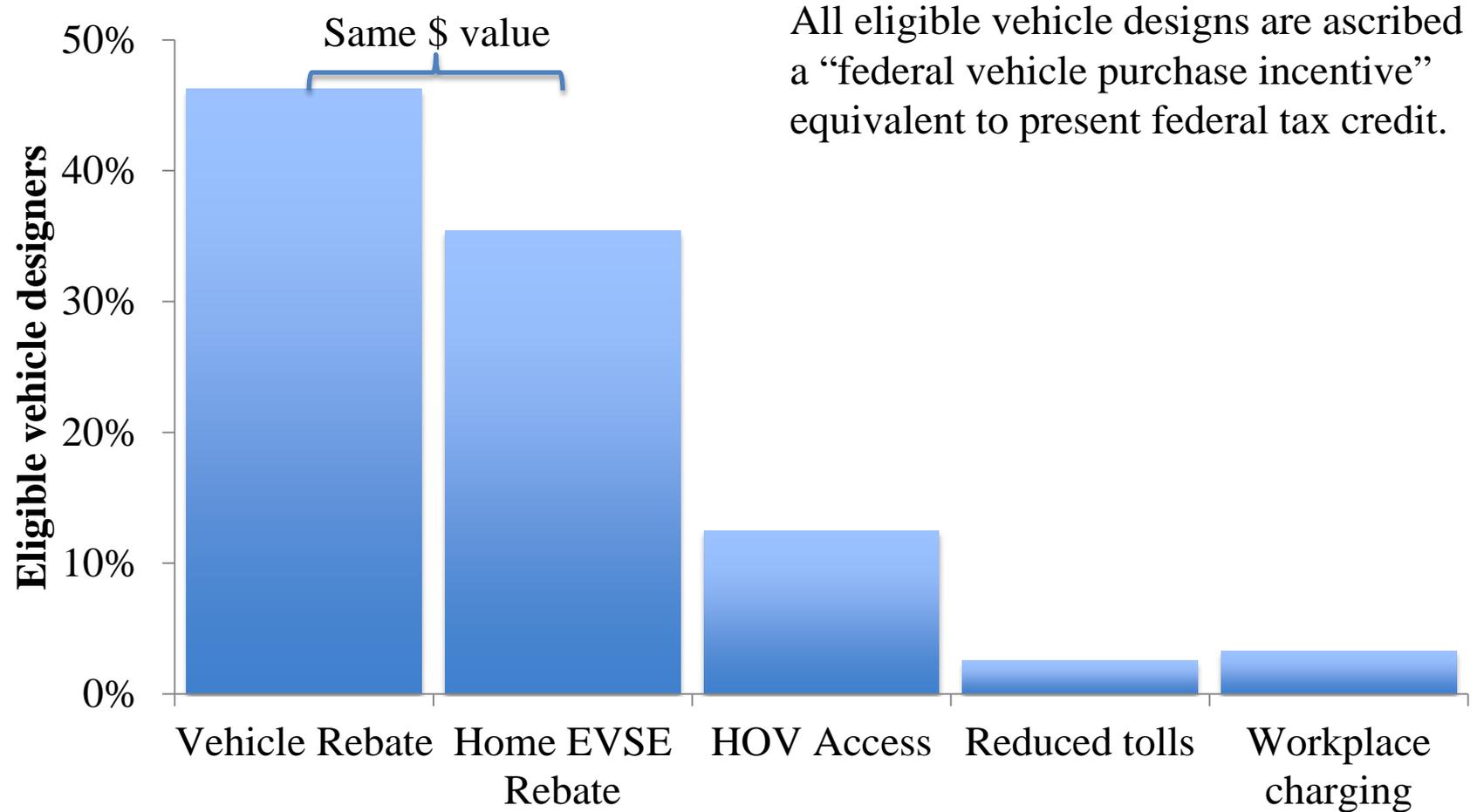


Effect of incentives

Raw: +12%

Adjusted: +16%

Additional incentive selected in Game 3

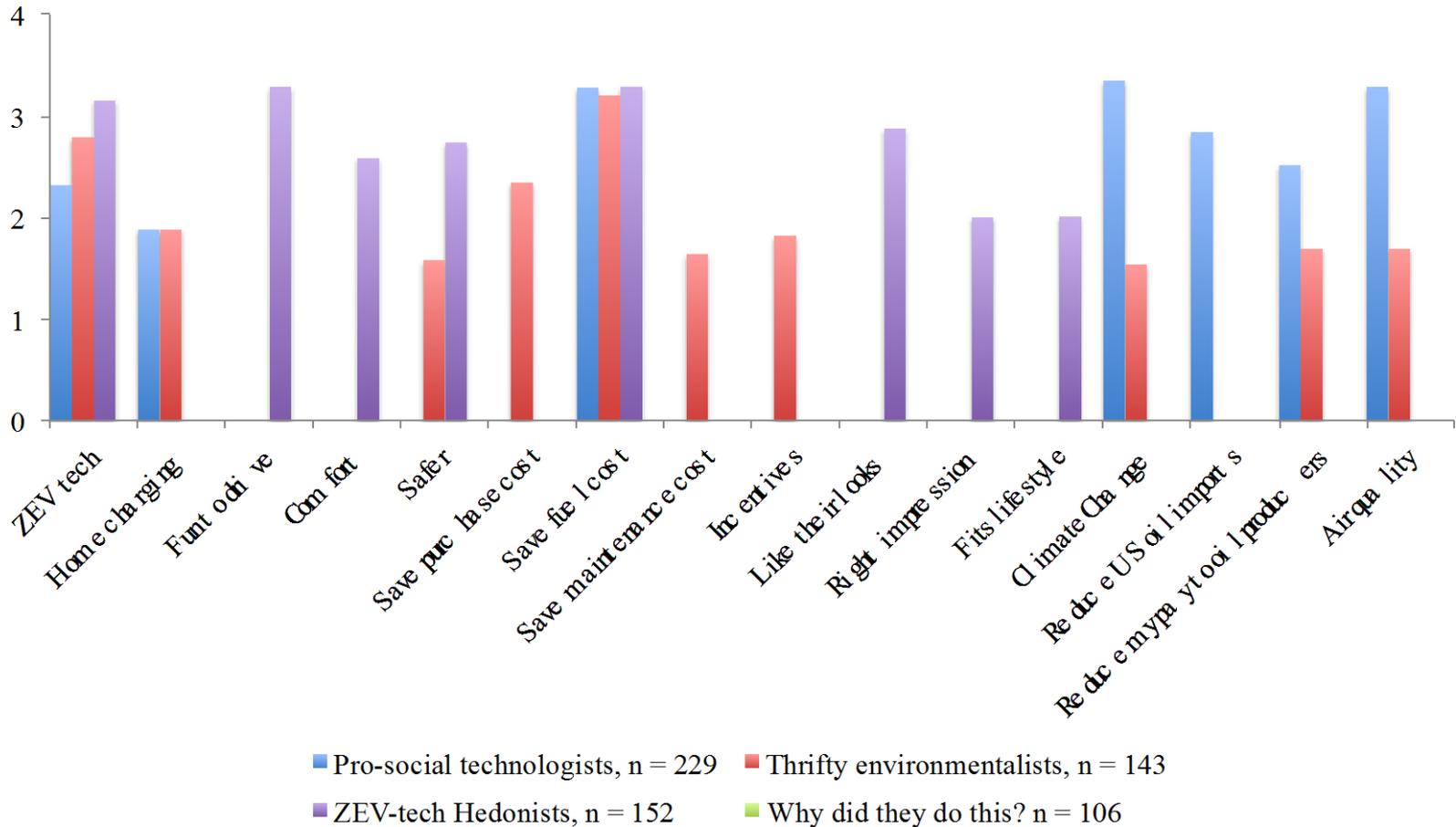


Why do people design their next new vehicle to be a PHEV, BEV, or FCEV?

What were your reasons for designing your next new vehicle to be a plug-in hybrid, electric, or fuel cell vehicle?...Assign from zero to five points to any reason. Zero means the reason was not important; more points means it was more important to you. You can assign up to a total 30 points; you don't have to spend all 30 points.

Pro-ZEV motivations	mean	% = 5
To save money on gasoline or diesel fuel	2.92	41.0
I'm interested in the new technology	2.40	29.8
It will reduce the effect on climate change of my driving	1.87	23.0
It will reduce the effect on air quality of my driving	1.84	20.5
It will reduce the amount of oil that is imported to the United States	1.54	16.7
I'll pay less money I pay to oil companies or foreign oil producing nations	1.52	17.0
It will be fun to drive	1.49	14.6
It will be safer than gasoline or diesel vehicles	1.46	15.6
Mean number of points per item	1.38	
The incentives made it too attractive to pass up	0.93	8.7

Why do people design PHEVs, EVs, or FCEVs? A four cluster solution.



All motivations have a mean score greater than zero. Only mean scores higher than total mean of 1.38 are plotted.

Why *don't* people design their next new vehicle to be a PHEV, BEV, or FCEV?

Motivations against designing a PHEV, BEV, or FCEV	mean	% = 5
Limited number of places to charge or fuel away from home	2.52	37.0
Cost of vehicle purchase	2.08	30.2
Distance on a battery charge or tank of hydrogen is too limited	1.82	24.9
I'm unfamiliar with the vehicle technologies	1.73	23.0
Concern about unreliable electricity, e.g. blackouts and overall supply	1.48	17.8
I can't charge vehicle with electricity or fuel one with natural gas at home	1.46	20.7
Concern about time needed to charge or fuel vehicle	1.39	16.3
Cost of maintenance and upkeep	1.23	15.0
Concerns about batteries	1.01	10.7
Cost to charge or fuel	0.99	10.4
I'm waiting for technology to become more reliable	0.97	10.4
Mean points per item	0.96	
I was tempted; higher incentives would have convinced me.	0.47	4.2

Preliminary take-away messages

- Awareness and consideration of PEVs and incentives are low in recent samples of all car-owning and new car-buying households.
- Financial incentives alone are insufficient to prompt a high incidence of positive valuation of PEVs
 - Financial incentives don't answer the litany of questions most households have
 - Incentives don't pull many full-size vehicle designers away from large vehicles
 - Required to choose between a full-size vehicle or electric drive, 82% stay with full-size
 - Financial incentives are not acknowledged as important by many of those who don't already design their next new vehicle to be a PEV or FCEV
 - And don't appear to have been very important to those few who do acknowledge incentives
 - Financial incentives are (still) an important part of the “account” of PEVs as smart consumer decision