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with thanks to Amy Lastuka, Keir Havel, and others at CSE



Center for Sustainable Energy™

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# **Research Description**

### Purpose

- Identify and rank-order characteristics of consumers most highly enabled by the electric-vehicle (EV) federal tax cred (FTC) to adopt
- Improve understanding of past impacts of FTC & calibrate future expectations
- Optimize strategic targeting of FTC and other supportive public resources

### Approach

 Descriptive analysis, logistic regression, and dominance analysis

### Contributions

- First characterization of FTC Extremes
- Develops the initial consumer-segmentation methodolog considerably further
- More recent market data: 2017–2018 purchases/leases
  - previous consumer segmentations: 2013–2017

B.D.H. Williams, J.B. Anderson, A. Lastuka, <u>Characterizing Plug-in Hybrid Electric Vehicle Consumers Who Found the U.S. Federal Tax Credit</u> <u>Extremely Important in Enabling Their Purchase</u>, in: 33rd Electr. Veh. Symp., EDTA, EVS33, and Zenodo, Portland OR, 2020.



Data		
Purchase or Lease Dates	1 Nov. 2016 –31 Dec. 2018	
Program Participants	N = 137,715* • PHEVs = 48,166 (35%) • BEVs = 85,245 (62%) • FCEVs = 4,304 (3%)	
Survey Response Dates	15 November 2016 – 7 April 2019	
Responses in Dataset	n = 27,508* • PHEVs = 9,432 (34%) • BEVs = 17,048 (62%) • FCEVs = 1,028 (4%)	
Weighting Method	Iterative Proportional Fitting (raking)	
<b>Representative Dimensions</b>	Vehicle technology type, model, purchase vs. lease, residence county	
% of the EV Market	~49%**	



## Extreme Importance of Federal Tax Credit for Plug-in EVs Consumer Survey, 6/2017–12/2018





Weighted n = 17,101



## EV Federal Tax Credit Importance was *Increasing* Over Time, **Contradicting a Common Paradigm About Phasing Out Incentives**



CVRP Consumer Survey: 2013–15 edition weighted n = 18,967, 2015–16 edition weighted n = 10,724, 2016–17 edition weighted n = 8,278; 2017–18 edition weighted n = 17,101





## Percent Rating the Federal Tax Credit "Extremely Important" ("...in <u>making it possible</u>" to acquire plug-in EVs): CA, MA, CT, NY



Weighted n values are question-specific. Overall datasets: 80,557 total survey respondents weighted to represent 380,700 rebate recipients.





## Summary of FTC Extreme Characteristics (Weighted Descriptive Results)

### PHE

Purchases

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Selected only White/Caucasian

50+ years old

Bachelor's degree or more in HH

Own residence

 $\geq$  \$100k HH income

Selected male

"Prefer not to answer," "I don't know," and similar responses are excluded.

\* NHTS is weighted to represent the population, not the new-vehicle subset. New-vehicle buyers identified based on a within-100-mile match between odometer and miles driven while owned. NHTS data characterize individual educational attainment, whereas other data characterize highest household attainment.

^ Significant difference (p < 0.05) between PHEV FTC Extremes and PHEV consumers without extreme FTC importance.



V FTC Extremes	<b>CA New-Vehicle Buyers</b>		
s/Leases 11/16–12/18 veighted <i>n</i> =2,213)	Model Years 2016–17 (2017 NHTS, CA add-on*)		
51% ^	51%		
50% ^	46%		
82% ^	58%*		
81%	63%		
67% ^	56%		
70%	50%		



### Factors that Increase the Odds of Being a PHEV FTC Extreme, Rank-Ordered (Logistic Regression and Dominance Analysis)

Variable Description	Odds-Increasing Examples	Average of Pseudo-R <sup>2</sup> Average Contributions	Rank
Importance of saving money on fuel	Very or extremely important (vs. Not)	0.045	1
Importance of charging availability at work	Very or extremely important (vs. Not)	0.039	2
Importance of carpool/HOV lane access	More important	0.027	3
Importance of charging availability at/near destinations other than home and work	Very or extremely important (vs. Not)	0.027	4
FTC incentive amount (\$1,000s)	Larger amount	0.022	5
Importance of charging availability at home	Extremely important (vs. Not) Not important (vs. Slightly)	0.020	6
Vehicle make	Not Chevrolet nor Honda (vs. others)	0.011	7
Importance of increased energy independence	Extremely important	0.007	8
Purchase quarter	Later in year	0.006	9
Education	Higher educational attainment	0.005	10
Purchase price	Lower price	0.004	11
Tax filing status	Single (vs. Married filing separately)	0.003	12
Gender	Male	0.001	13





# Summary of Statistically Significant Findings: PHEVs

- The odds of being most highly influenced by the FTC to adopt increase with:
- 1. **Practical motivations:** Placing high importance on saving money on fuel; workplace, public, and home charging; carpool lane access, and energy independence
- 2. Larger benefit: Receiving a larger tax credit
- 3. **Transaction characteristics:** Purchasing later in the year (closer to realizing benefit), lower-priced vehicles, non-Chevy/non-Honda PHEVs
- 4. Demographics: High educational attainment, single tax filing, male
- Controlling factors / Notably not significant:
- Age, race/ethnicity, *income*, household size, number of vehicles or drivers, *previous EV ownership*, housing type or ownership, residential solar, region, *importance of environmental impacts*, convenience of charging, vehicle performance, or desire for new technology, *initial interest in an EV*





## cleanvehiclerebate.org/program-reports

Recommended citation:

B.D.H. Williams and J.B. Anderson, Presentation: "California Plug-in Hybrid Electric Vehicle Consumers Who Found the U.S. Federal Tax Credit Extremely Important in Enabling Their Purchase," Clean Vehicle Rebate Project, administered by the Center for Sustainable Energy on behalf of the California Air Resources Board, Sep. 2021.

Questions?: brett.williams@energycenter.org





CleanVehicleRebate.org



