Electric Vehicle Survey Methodology and Assumptions

Driving Habits, Vehicle Needs, and Attitudes toward Electric Vehicles in the Northeast and California

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Union of Concerned Scientists

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The Union of Concerned Scientists (UCS) and Consumers Union (CU) commissioned a survey to estimate the current suitability of plug-in electric vehicles (EVs) for personal transportation in California and 9 Northeast states (CT, ME, MA, NH, RI, VT NJ, NY, PA). The survey also identified public attitudes toward and understanding of EVs and EV policy.

Summary

Our analysis examined consumer perceptions and attitudes toward EVs and EV policy, in order to better understand perceived barriers to EV ownership and identify what sort of public policies would consumers find most likely to help them choose an EV for their next vehicle. We found that 35 percent of Northeast drivers are likely to consider an electric vehicle (EV) for their next vehicle purchase or lease, and 55 percent have some interest in EV technology. In addition, the survey found more than 54 percent of California drivers are likely to consider an electric vehicle (EV) in their next vehicle purchase or lease, and more than 65 percent are interested in electric vehicles generally.

Our study also indicates that 44 percent of households in California and 43 percent in the Northeast states could potentially use the types of EVs on the market today. The analysis used self-reported driving and parking behavior questions and did not attempt to assess the economic feasibility of EV purchase or use. However, these results are a useful estimate of the number of households that have vehicle parking with access to electricity and could utilize an EV without modifying current driving habits.

The margin of error is 4 percent at a 95 percent confidence level for questions asked of all respondents. The survey was conducted from April 1 to April 8, 2016.

Survey Methodology

To sample the population, The GfK Group (GfK) sampled households from its KnowledgePanel, a probability-based web panel designed to be representative of the United States. To qualify for the main survey, a panel member must have been: (a) 18 years or older (b) vehicle driver and (c) live in California or in one of the following NE states: CT, ME, MA, NH, RI, VT NJ, NY, PA. Of the 1,213 cases completing the main survey, all cases were determined to be valid cases to be included in the final analyses.

Documentation regarding KnowledgePanel sampling, data collection procedures, weighting, and IRB-bearing issues are available at the below online resources.

- http://www.knowledgenetworks.com/ganp/reviewer-info.html
- http://www.knowledgenetworks.com/knpanel/index.html
- http://www.knowledgenetworks.com/ganp/irbsupport/

Plug-In Electric Vehicle Criteria

To evaluate whether a respondent could utilize the technical capabilities of current plug-in EVs, we examined whether respondent's answers met three criteria designed to match the capabilities of current plug-in hybrid electric vehicles (PHEVs). Because PHEVs have the same range limitations as gasoline-only vehicles, these criteria are less stringent than those used for determining battery electric vehicle suitability. Only those who met all three of the following criteria were categorized as possible candidates for using a PHEV.

1. **Have off-street parking with access to an electrical outlet or plug-in electric vehicle charger at home.** The survey asked about the presence of electrical outlets without attempting to determine voltage or current limitations. We assume that having an electrical outlet indicates either existing capability or ability to upgrade to sufficient capacity for vehicle charging.

2. **Do not currently need a vehicle with hauling or towing capacity** (when asking about the vehicle respondent currently drives most frequently). Most current EVs do not have towing or significant hauling capacity. Future EVs will likely have this capability, but our analysis was limited to current availability.
3. **Do not need to carry more than four additional passengers (five total occupants) on a regular basis**. Most EVs have five seats, though the Chevrolet Volt has four and the Tesla Model S can be configured as a seven-passenger vehicle.

Survey Results[1]

HOUSEHOLD SUITABILITY FOR EVS

Q1 Which of the following best describes your current parking situation at home?
a. Private off-street parking, such as a garage or dedicated spot, with access to an electrical outlet.

NE	CA	All
52.37%	53.75%	53.06%

Q2 In a typical week what is the highest number of occupants, including yourself, you need to fit in the vehicle you drive most often?

5 or less – NE	5 or less – CA	5 or less - All
85.54%	86.75%	86.14%

Q3 For the vehicle you drive most often, does it need to have hauling or towing capacity?

No – NE	No- CA	No - All
73.42%	74.82%	74.12%

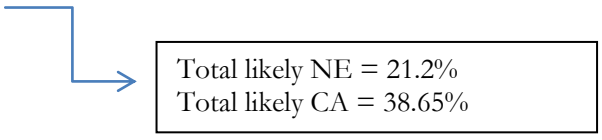
Respondents that met all criteria above:

PHEV Ready – NE	PHEV Ready – CA	PHEV Ready – All
43.33%	43.99%	43.66%

CONSUMER INTEREST

Q4 Looking ahead to your next vehicle purchase or lease, how likely are you to consider a **pure battery electric vehicle** plug-in vehicle – runs on ONLY an electric engine and doesn't use gasoline (e.g. Tesla Model S or Nissan LEAF)

	NE	CA
Very likely	8.15%	15.66%
Somewhat likely	13.05%	22.99%
Somewhat unlikely	14.41%	18.32%
Very unlikely	45.23%	28.61%
Don't know	17.78%	12.96%



[1] Refused/No Answer responses not shown, therefore percentages do not total to 100%

Q5 Looking ahead to your next vehicle purchase or lease, how likely are you to consider a plug-in hybrid electric vehicle – runs on BOTH an electric and gasoline engine (e.g. Chevy Volt)

	NE	CA
Very likely	11.96%	18.81%
Somewhat likely	19.70%	31.15%
Somewhat unlikely	21.75%	16.90%
Very unlikely	27.91%	20.30%
Don't know	17.09%	11.53%

Total likely NE = 31.66%
Total likely CA = 49.96%

Q6 Aggregated likelihood of considering an electric vehicle (PHEV or BEV) for next vehicle purchase / lease.

NE	**CA**
34.86%	54.63%

Q7 Which statement below BEST describes your interest in plug-in electric vehicles?

	NE	**CA**
I own a plug-in electric vehicle	0.54%	1.35%
I am very interested in plug-in electric vehicles and *will definitely* consider one when purchasing my next vehicle	6.18%	8.80%
I have some interest in plug-in electric vehicles and *would* consider one when purchasing my next vehicle	8.65%	15.75%
I have some interest in plug-in electric vehicles, and hope to own one someday	15.06%	19.76%
I have some interest in electric vehicles, but today's electric vehicles don't meet my driving needs	24.14%	21.13%
I have no interest in plug-in electric vehicles	42.87%	28.58%
I don't know what a plug-in electric vehicle is	1.67%	3.44%

Sum of interest NE= 54.03%

Sum of interest CA = 65.44%

ATTITUDES TOWARD EVS AND EV POLICY

Q8 From the list below, please indicate which are the top 3 attributes that would make you **more likely** to consider purchasing or leasing a plug-in electric vehicle:

	NE				**CA**		
	1	**2**	**3**		**1**	**2**	**3**
Lower purchase price	34.19%	15.64%	11.64%		34.15%	17.40%	13.16%
Greater selection of plug-in vehicle models	9.81%	12.16%	11.01%		6.23%	12.45%	13.12%
Being able to drive 200 miles on a fully charged battery	19.87%	20.20%	14.64%		24.65%	20.51%	14.15%
Having access to plug-in vehicle charging stations at my workplace	3.06%	5.62%	9.12%		5.02%	6.00%	8.48%
Seeing more plug-in vehicle charging stations in parking lots and shopping destinations.	6.40%	14.72%	18.21%		6.95%	15.22%	18.11%

Begin able to pay less for electricity when charging a plug-in vehicle during certain times	6.72%	11.51%	13.04%		6.71%	11.87%	14.38%

Q9 Which of the following are your BIGGEST concerns toward owning a plug-in electric vehicle?

	NE	**CA**
There are too few, if any, public charging stations where I travel	14.45%	14.91%
I don't know enough about plug-in electric vehicles to have concerns	13.68%	8.82%
Plug-in electric vehicles are too expensive	12.31%	12.94%
Plug-in electric vehicles can't travel far enough on a full charge	11.49%	17.47%
Repair and/or maintenance costs for a plug-in electric vehicle could be higher than a gasoline car	9.65%	10.37%
I am unable to charge a plug-in electric vehicle at my home or workplace	8.10%	9.57%
I think plug-in electric vehicles perform poorly in cold or snowy conditions	6.23%	1.11%
I don't have any concerns about owning a plug-in electric vehicle	6.08%	5.46%
The style of type of vehicle I prefer isn't available as a plug-in vehicle	5.17%	6.08%
Plug-in electric vehicle technology is too new to risk buying one	5.12%	5.54%
Plug-in electric vehicles wouldn't save me money	3.78%	3.54%
Plug-in electric vehicles have poor resale value	2.29%	3.19%

Q10 Plug-in electric vehicles are a realistic choice for many American drivers today.

	NE	**CA**
Strongly Agree & Somewhat Agree	37.33%	47.08%
Strongly Disagree & Somewhat Disagree	39.86%	31.78%
Don't Know	22.81%	21.14%

Q11 Automakers should make a variety of vehicle types (like SUVs, minivans, or sedans, for example) available as plug-in electric models.

	NE	**CA**
Strongly Agree & Somewhat Agree	64.69%	65.35%
Strongly Disagree & Somewhat Disagree	14.95%	15.95%
Don't Know	20.36%	18.70%

Q12 Government policies should make it easier to own plug-in vehicles

	NE	**CA**
Strongly Agree & Somewhat Agree	55.07%	60.32%
Strongly Disagree & Somewhat Disagree	20.14%	19.79%
Don't Know	24.80%	19.89%

Q13 Every automaker should offer a plug-in electric model for sale

	NE	CA
Strongly Agree & Somewhat Agree	52.08%	56.11%
Strongly Disagree & Somewhat Disagree	24.76%	23.62%
Don't Know	23.16%	20.27%

Q14 Electricity providers should offer special rates to make it cheaper to charge a plug-in vehicle during certain times

	NE	CA
Strongly Agree & Somewhat Agree	63.34%	66.20%
Strongly Disagree & Somewhat Disagree	15.65%	14.81%
Don't Know	19.66%	17.61%

Q15 From the list below, please indicate what you think are the top 3 public policies that would make it easier to own a plug-in electric vehicle.

	NE		CA
	Choice in Top 3		**Choice in Top 3**
Provide a tax credit or rebate for part of the vehicle purchase price	57.01%		58.00%
Grant plug-in vehicle drivers access to high occupancy (HOV) lanes	11.28%		26.42%
Reduce or eliminate tolls on roads, bridges, and tunnels for plug-in vehicle drivers	24.27%		22.21%
Provide preferential parking sports for plug-in vehicle drivers in highly trafficked areas like sports arenas or universities	14.27%		18.38%
Make it easier to install plug-in vehicle charging stations in apartment buildings or other multifamily housing units	30.78%		34.36%
Provide incentives for businesses and workplaces to install plug-in vehicle charging stations	37.50%		38.63%
Provide more information about plug-in vehicles	30.73%		17.58%
Encourage automakers to make some of their cars available as a plug-in model	24.88%		25.95%

KNOWLEDGE OF EVS AND EV POLICY

Q16 Plug-in electric vehicles reduce oil use

	NE	CA
Agree	55.31%	55.85%
Disagree	8.72%	11.16%
Don't Know	34.38%	32.12%

Q17 Plug-in electric vehicles are often cheaper to operate than gasoline vehicles

	NE	CA
Agree	35.15%	40.86%
Disagree	18.70%	19.94%
Don't Know	44.83%	38.42%

Q18 Plug-in electric vehicles can be recharged from a regular home outlet

	NE	CA
Agree	46.66%	49.97%
Disagree	17.67%	20.19%
Don't Know	34.36%	28.98%

Q19 Plug-in electric vehicles reduce climate emissions compared to an average gasoline-powered vehicle

	NE	CA
Agree	72.18%	72.62%
Disagree	5.93%	7.07%
Don't Know	20.58%	19.52%

Q20 Many major automakers (e.g. Ford, GM, Nissan) offer at least one plug-in electric vehicle model for sale

	NE	CA
Agree	45.64%	53.01%
Disagree	10.72%	11.58%
Don't Know	42.44%	34.44%

Q21 It is difficult to find credible sources of information about plug-in electric vehicles

	NE	CA
Strongly Agree & Somewhat Agree	31.19%	33.66%
Strongly Disagree & Somewhat Disagree	31.99%	36.14%
Don't Know	36.81%	30.20%

Q22 I am aware of plug-in electric vehicle incentives (such as tax credit/rebate, high occupancy lane access, reduced tolls, lower vehicle registration rates, or discounted electricity rates) offered by:

	NE			CA	
	Yes	**No**		**Yes**	**No**
The federal government	17.46%	82.54%		21.89%	78.11%
My state government	15.68%	84.32%		23.75%	76.25%
My local community	2.56%	97.44%		4.50%	95.50%
My electricity provider	2.77%	97.23%		4.51%	95.49%
My employer	0.12%	99.88%		1.55%	98.45%
None of the above	74.89%	25.11%		56.47%	43.53%

Q23 Would you buy a vehicle without test-driving it?

	NE	CA
Yes	6.87%	7.46%
No	88.86%	86.10%

Vehicle availability

Inventory data for EVs was gathered from Edmunds.com twice per week from January 1, 2016 to May 5, 2016. For each model and city, an inventory search was completed using a 50 radius from a ZIP code in the city center. For each vehicle, the VIN (unique Vehicle Identification Number) and vehicle location was collected. While the number of EVs found is not necessarily equal to the total number of EVs in the area, it does show the number of options shown to a prospective car buyer on a popular automotive website and therefore is a metric of perceived vehicle availability.

Parent	Brand	Electric Model
BMW	BMW	i3
BMW	BMW	X5 xDrive40e
Daimler	Mercedes	B-Class Electric Drive
Daimler	smart	fortwo EV
FCA	Fiat	500e
Ford	Ford	C-Max Energi
Ford	Ford	Focus EV
Ford	Ford	Fusion Energi
GM	Chevrolet	Spark EV
GM	Chevrolet	Volt
Honda	Honda	Accord Plug-In Hybrid
Hyundai/Kia	Hyundai	Sonata Plug-In Hybrid
Hyundai/Kia	Kia	Soul EV
Nissan	Nissan	Leaf
Toyota	Toyota	Prius Plug-in
Volvo	Volvo	XC90 Hybrid
VW	Audi	A3 Sportback e-tron
VW	Volkswagen	e-Golf