CALIFORNIA PERSPECTIVE

CHARGING SURVEYS: WHAT DO PEOPLE WANT? CHARGING MODELS: WHAT DO WE THINK THEY WANT?

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of the Institute of Transportation Studies



PH&EV Center Focuses on Consumer Reaction to and Acceptance of PEVs



PEV Market USA





What People Say They Want

UC Davis Surveyed PEV drivers in CA in 2012, 2013

- EV project in San Diego (Ecotality)
- State rebate program (CCSE)
- Data collected February-March 2012
- New data collected May-June 2013

Survey Total	Leaf	Volt	Tesla
1201 (2012)	1151	25	25
~3000 (Now)	?	?	?



Respondent Locations



Where do People Want Chargers?



Where do People Want Chargers?



All Else Equal People Prefer QC

Count of desired chargers by charger type and response number (n=1140 survey respondents; up to 5 desired chargers each)



Desired Charger Choice # (1 - 5)











Given Only 5 Choices, Priority is Home Area



Quick Charges Per Day on Long Tours



Workplace Charging



Charging for Charging Work









Survey Results (What do people want?)

- More than 1000 Leaf household responses
- Charging is wanted
 - 72% of chargers suggested were quick chargers
 - 65% of people suggested charger locations
 - Median distance home-QC was 44 miles (71 km)
- 1-2 quick charges per day is the limit of normal usage
- Workplace Charging
 - Majority of workplace charging is free
 - People don't want to pay for charging
 - Low power charging is unacceptable to 30% of users

Modeling

What people should want

Modeling - Our Data Set: Caltrans Travel Survey 2001. 31,898 Persons. Can Gasoline Travel be Done in an EV?



130 Mile Tour



130 Mile Tour



130 Mile Tour



Timing and Demand for QC



Point of Diminishing Returns Reached at 200 Locations (246 chargers @ 30,000 veh)



DC Charging Peaks at 4-6 PM, L2 Reduces the DC Peak



More Charger Estimations: 1,000,000 Vehicles 1 charger every 250-500 cars



What Return do we Get for Infrastructure Investment? (Vehicle Miles Traveled/GHG)

Home Charging VMT

□ 60 Mile Veh. = 59%

□ 80 Mile Veh. = 71%

□ 100 Mile Veh. = 79%





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- L1 Work Charging is sufficient for $\sim 5\%$
- L2 Work Charging is needed for ~2%



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- QC accommodates up to 10% additional



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□ 60 Mile Veh. = 59%

- L1 Work Charging is sufficient for ~5%
- L2 Work Charging is needed for ~2%
- QC accommodates up to an additional 10% EV miles



Benefit of Workplace Charging for PHEVs



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We Can Look at Grid Impacts vs Charging Speed For PHEVs (UC Davis Model)





Charging Behavior. Price Matters!



Modeling Results

- 200 quick charging locations for beginning (246 chargers, growing to 1 charger for every 250-500 vehicles)
- For BEV, workplace charging is sufficient for 7% additional travel
- For BEV, QC is sufficient for 12% additional travel (130km BEV) after maximum level 2
- For PHEV, workplace charging is sufficient for 10% additional EV travel for 20 mi (32km)
- Free workplace charging causes a shift from home to workplace charging