

Background: PHEVs

Plug-In Hybrid Electric Vehicle (PHEV): can be powered by an internal combustion engine or an electric motor. The electric battery can be plugged in to an electric outlet to be recharged.



Research Questions

- How many U.S. drivers can plug-in?
- When and where will they plug-in?
- What kind of PHEV do they want?
 - All electric or blended?
 - Range (10, 20 or 40 miles)?
 - Non-electric fuel efficiency?

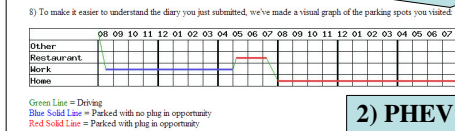


Method:

Sample: 2,373 U.S. Car Buyers

Design: Internet Survey – Three Exercises

1) 1-Day (24 hour) “Plug Potential” Driving Diary



2) PHEV “Attribute Tradeoff” Game – Which attributes to improve?

Your Plug-In Hybrid SAAB 9-2X WAGON

Recharge Time: 8 Hours required to fully recharge vehicle.

Electric Mode: Not applicable. Vehicle can't be plugged in.

Gasoline Mode: 31 MPG Gasoline Only. Used: Recharged.

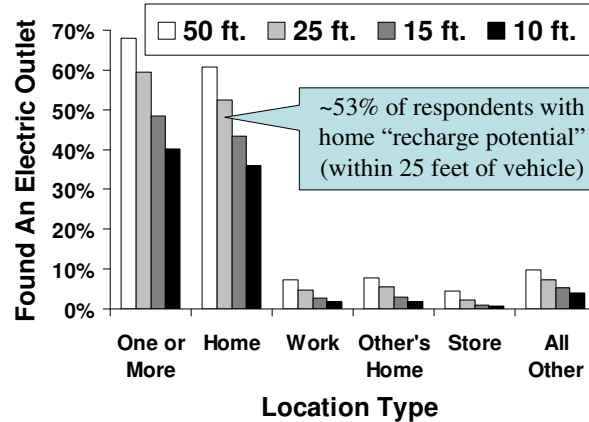
Upgrades: Time to Fully Recharge: 8 Hours (1 pt), 4 Hours (2 pts), 1 Hours (3 pts). Total Points: 4 pts. Points Used: 0 pts. Points Left: 4 pts.

Electric Capability: Type #1: Electric Assist (75 MPG), Type #2: Electric Assist (100 MPG) (1 pt), Type #3: Electric Assist (125 MPG) (2 pts), Type #4: All Electric (4 pts).

Distance With Electric Capability: First 10 Miles (1 pt), First 20 Miles (2 pts), First 40 Miles (3 pts).

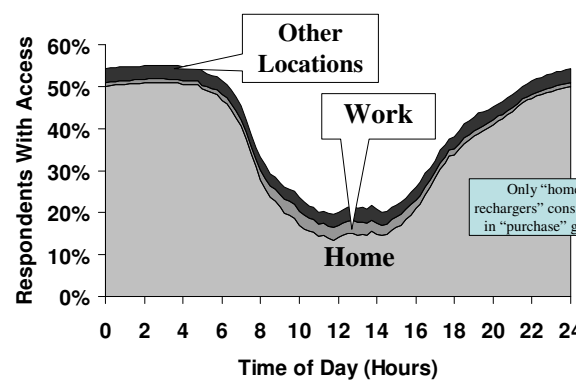
Price Scenario #3: Which Would You Buy? SAAB 9-2X WAGON (Price: \$23,000) vs. Plug-In Hybrid SAAB 9-2X WAGON (Price: \$28,000).

Results: Who Can Plug-In?



- ~50% of respondents have home charging, ~5% at work, ~14% in “other” locations
- Home charging: mostly in detached houses (~88%)
- Estimates sensitive to outlet distance (10-50 ft.)

Results: When Can They Plug-In?



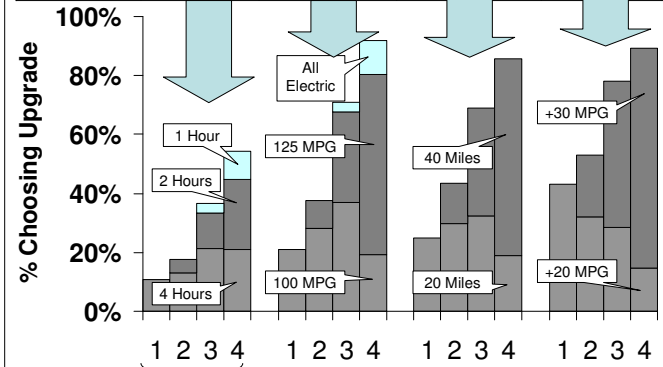
- Potential for recharging varies from ~55% (12am-6am) to ~20% (midday) of respondents
- Most recharging likely to start in evening (from 4-7pm)
- Potential for “smart” charging systems to shift PHEV recharge load away from peak (e.g. towards 12am-6am period)

Results: What Kind of PHEV?

PHEV “Attribute Tradeoff” Game – 4 Upgrade Categories

- All respondents allocate “points” towards PHEV upgrades

	Recharge Time	Electric Drive	Electric Range	Regular MPG
“Base” Level	8 hours	75 MPG	10 Miles	Current +10 MPG
Upgrade 1	4 hours (1 pt)	100 MPG (1 pt)	20 Miles (1 pt)	+20 MPG (1 pt)
Upgrade 2	2 hours (2 pt)	125 MPG (2 pt)	40 Miles (2 pt)	+30 MPG (2 pt)
Upgrade 3	1 hours (3 pt)	All Electric (4pt)		



Game Iteration: “Round 1” = 1pt, “Round 2” = 2pts, “Round 3” = 4pts, “Round 4” = 6pts

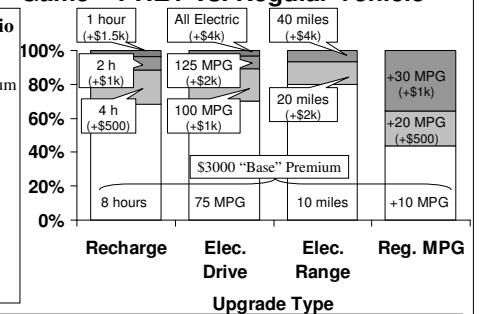
Summary:

- More people chose to improve *regular* (non-electric) MPG (+20, +30)
- Fewer people chose to reduce recharge time (from 8 hours)
- Little interest in *all-electric* operation capabilities (~11% max.)

PHEV “Purchase” Game – PHEV vs. Regular Vehicle

“Moderate” Price Scenario (“home recharges” only)

- “Base” PHEV=\$3,000 premium (Full upgrades = \$13,500)
- PHEV chosen by ~75% of respondents with “home recharging” (~40% of total)
- On average, PHEV “buyers” chose \$4700 package (\$3000 + \$1700 in upgrades)
- ~33% of “buyers” chose zero upgrades



Summary:

- ~55-86 % of respondent with “home recharging” chose PHEV option (depending on price scenario—“high”, “moderate” or “low” cost)
- Variety of upgrade packages selected—some with zero upgrades
- Most popular upgrade was to improve regular (non-electric) MPG
- Little interest in upgrades to all-electric operation (~3%)

3) PHEV “Purchase” Game -- Pay extra for a PHEV version of your next vehicle?