California Air Resources Board

2006 ZEV Technology Review

Sacramento, CA
September 27, 2006

Comments by Felix Kramer, Founder
The California Cars Initiative
Prius PHEV Pioneers

Felix Kramer (right), CalCars Founder, in ’06, world’s first non-engineer consumer PHEV owner

Ron Gremban, CalCars Tech Lead, owner/driver of world’s first PHEV Prius in ’04
What Does “100+MPG (+ Electricity)” Mean?

50.8 miles @124.1MPG = $1.13 gasoline + $0.71 electricity. Total: $1.84 or 3.6 cents/mile, compared to $2.79 or 5.5 cents/mile for Prius, $4.00-$12.00 or 8-20 cents/mile for 35-12 MPG non-hybrids. We get 566 mi@130MPG with most driving boosted and some all-electric trips.

SMUD assumptions: $2.75/gallon, $0.102/kWh, 50 MPG Prius. When roll in "electric miles" to gasoline, 76 MPG equivalent; at Felix’s $3.00 & $.086, 83 MPG equivalent
Multiple and Evolving Reasons to Plug In

1. Saving money
2. Lower CO2
3. Energy independence
4. Silent driving
5. Avoid the pump
6. High-MPG "coolness“ (not a joke)
Charging Calculus (after 9 Inconvenient Seconds)

- PG&E off-peak $0.086/kwh = 2.2 cents/electric mile
- Summer on-peak $0.293/kwh = 7.6c/e-mile
- Prius: 5.5 cents/mile
- "Opportunistic Charging“ calls for rate-price signals at least for critical peaks
Evolving to V2H (Vehicle-to-Home)

Phase 1: Standard grid-connected system (car charges from grid)

Phase 2: Islanded off-grid system ties in PHEV for extended outages; battery + engine = emergency power

Benefits:
- Cleaner/cheaper than emergency generator
- PHEV enables use & storage of renewable energy
Growing Support and Optimistic Future Trends

2004: What's a PHEV?
2005: Prove demand & pricing
2006: How/when can I get one?
2007: Incentives; 3rd parties manage battery costs and risks
2008: Volume production extending existing lines
2009: Optimized PHEVs
2010: Movement toward PHEVs as default vehicle drivetrain

Recent praise for PHEVs from: George Bush, Alan Greenspan, James Hansen, Senators Brownback/Clinton/Obama, Bill Ford, Bill Press, John Doerr
California Air Resources Board

2006 ZEV Technology Review

Sacramento, CA  September 27, 2006

For more information:
The California Cars Initiative
www.calcars.org
info@calcars.org