Speaker Topics

- **Green Vehicle Overview**:
  - Mr. Cliff Nakayama, UCGEC, Mostwell International LLC
- **Enabling Battery & System Technologies**:
  - Professor Andrew A Frank, Efficient Drivetrains Incorporated
- **Electric Recharging Infrastructure & Business Models**:
  - Mr. Saul Zambrano, PG&E
- **Market for Electric Vehicles in China**:
  - Dr. Peng Zhou, Electric Vehicle Technologist
-
  - Mr. Matthew Crosby, California Public Utilities Commission

Policies, Incentives & Regulations:
Preparing for and supporting plug-in vehicle market growth in California

UCGEC Transportation Seminar Series

Matthew Crosby

Analyst / Vehicle electrification / Market-based climate strategies

California Public Utilities Commission

June 22, 2009

Why focus on California?

- Population growth: ~500,000 / year
- California fuel economy standards pushed amended Federal CAFÉ
- California represented 24.2% of the nation's hybrid market in 2008 – R.L. Polk

Economic Costs and Barriers to Entry:

Battery / vehicle cost a key barrier

- Low production volume (<10,000) average additional initial capital cost $10-$16K for some PHEVs, relative to a comparable CV
- Moore's law predicts increased scale economies will lower production costs, assuming supply chain has access to resources
- Operating costs significantly lower, however payback period within life of fuel efficient vehicle (~12.5 years) assumes high fuel costs ($4.00/gallon) and low electricity costs ($0.10/kWh),* absent purchase incentives

Other barriers to PEV commercialization

- Gasoline price volatility
- Energy storage to weight ratio
- Vehicle (profitability) availability / battery manufacturing capacity
- Charging infrastructure availability: chicken or egg?

- Behavioral change as “socio-technical” barrier: off-peak charging the assumption, but will data back this up?
- Initial capital cost and bounded rationality
- Principal-agent barrier at rental properties

Economic Costs and Barriers to Entry: Utility/Ratepayer Costs

- IOUs are expected to apply to recover the following costs in General Rate Cases and Cost of Service Proceedings due PEV load:
  - Total energy demand up to 11% of central generation procurement, 2020*
  - Potential peak load capacity increase/altered peak load shape
  - Distribution system upgrades (neighborhood transformers for clustered PEV adopters)
  - Transmission line upgrades, in support of increased Renewable sources for transportation
  - Public charging infrastructure*

- Costs “on the customer side of the meter”
  - Residential charging supply equipment, such as sub-meter or secondary meter device to communicate with AMI, charging box, wiring upgrades, service panel upgrades: typically $1,000-$2,500, depending on existing inf.

*high case, Southern California Edison 2/2009 study

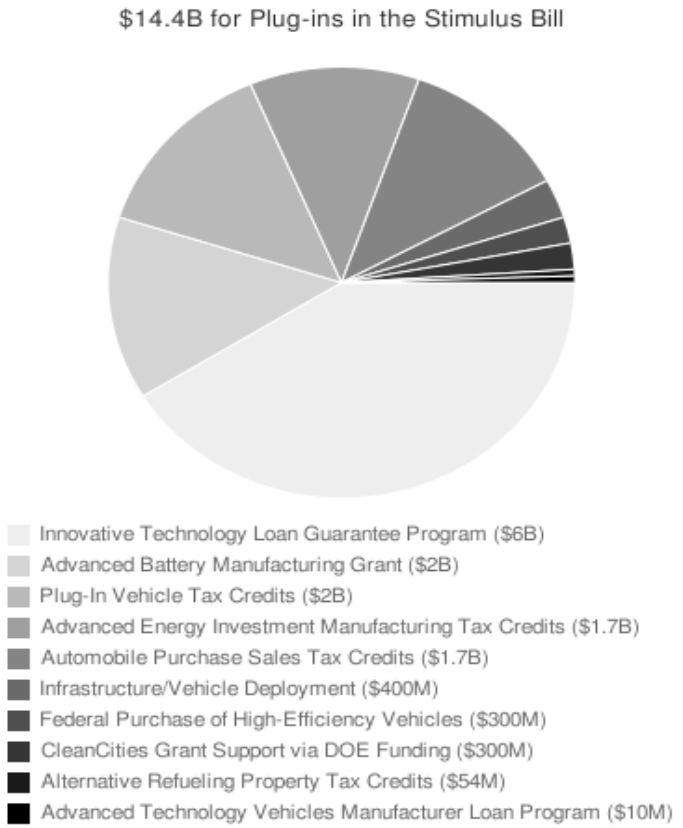
California policies that indirectly support PEV commercialization

Aggressive GHG Policies include:

- AB 32 Greenhouse gas Solutions Act (2006)
- Low Carbon Fuel Standard (2009)
- CARB Zero Emission Vehicle Mandate (2005, updated)

Existing/pending programs/policies that directly support PEV commercialization

- 2009 ARRA
- CEC ARFVTP (AB 118), CARB AQIP
- CPUC authorized LEV programs / TOU EV tariffs
- Waxman/Markey amends PURPA §111(d) directing utilities to develop inf. plan



Conclusion: Additional State Agency Options for Reducing PEV Barriers

- CARB: allowance allocation for increased electricity sector emissions
- CEC: coordinate research, funding, with IOUs
- Franchise Tax Board: Alt. fuel tax for transit?
- CPUC: New OIR to discuss:
  - -EV Tariff changes
  - -Complementary vehicle incentives
  - -Metering and Infrastructure cost recovery (SB 626)
  - -Options to streamline on-site capital installation permitting requirements
  - -Policies that encourage partnerships between regulated and unregulated electric vehicle service providers
  - -Integration of EV load with renewable resources (wind supply-following load, PV upsizing for EV load/ other DG

Thank you!

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