

# Plug-In Hybrid Electric Vehicle (PHEV) Value Proposition Study Workshop

Breakout Session # 3 Report  
Value Propositions with V2G

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# Key V2G Assumptions

- 220 volts
- We are assuming the time frame of 2020
- Sustainable volume exists (1-2 million vehicles)



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# Top Vote Getting Value Propositions for V2G

**Ancillary Services**

**Local Power Quality Benefits**

**Demand Response V2G**

**V2G Enabling Green Power Credits**

**Parking Lots and Garages**

**Federal Tax Credits for V2G Program Participation**

**Incentives to OEMs to Build V2G Ready Vehicles**



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# Ancillary Services

*Balancing authorities (i.e., ISO or Vertically Integrated Utility) pays vehicles owners (directly or through aggregators) for ancillary services (regulation, spinning reserves, VAR control)*

- **Preliminary range \$600-\$6,000/yr, value stream varies based on generation mix and geographic location, value depends on size and application of PHEV, incremental value goes down as penetration goes up**
- **Enablers include vehicle monitoring system with GPS and 2-way communication, accounting and settlement procedures, national standards and multi-jurisdiction capabilities**
- **Barriers include possibilities for theft and tampering, lack of accurate utility maps, lack of public awareness**
- **Analysis resources: market prices for ancillary services and historical data**



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# Local Power Quality Benefits

*Local power distributors pay PHEV owners and/or aggregators for V2G participation and contributions to local power quality (voltage and frequency) support*

- Provides voltage support to local congested feeders and capacity deferral values from local utilities to PHEV owners and aggregators
- Enablers include local VAR markets, utility-vehicle communications systems, accounting systems for performance measurement and settlement
- Barriers include lack of local data on electric system conditions, need for fast response and robust communications
- This is a State PUC issue and requires regulatory engagement at the local level
- Analysis resources are scarce, look for data from utilities with overloaded substations and feeders, DECC facility at ORNL



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# Demand Response V2G

*Balancing authorities and/or local utilities sponsor Demand Response Programs for PHEVs and pay owners/aggregators for peak demand reductions according to price signals*

- Provides location-specific congestion relief, capital savings from capacity deferrals, and grid stability
  - Payment structure and levels will differ for V2G DR than for traditional DR
- Enablers include 2-way communications infrastructure, vehicle charging status displays, transparent pricing, aggregators
- Barriers include owners not wanting to use up battery charge and possibilities for excessive “backfeed” in congested areas
- States and PUCs need to be engaged; generally support DR programs
- Analysis resources: existing DR literature, EIA studies/forecasts



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# V2G Enabling Green Power Credits

*Utilities and/or state agencies provide credits to PHEV owners/aggregators  
for V2G enabling green power installations*

- **Provides access to potential carbon/green power credits, enables more solar and wind energy, helps utilities meet RPS requirements, enables lower electricity costs when lower cost wind is available**
- **Enablers include national carbon policies, a comprehensive carbon accounting system, “carbon content” labeling of PHEVs (well-to-wheels)**
- **Barriers include uncertainties about reliability of V2G resources for utilities, amount of renewables that will actually be enabled, penetration rate of PHEVs**
- **Potential for oil displacement means possible energy security benefits**
- **Analysis resources: international cap and trade experiences, studies of carbon value (e.g., sequestration)**



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# V2G Parking Lots and Garages

*Balancing authorities sponsor program for parking lot and garage owners to install V2G equipment for customer use in exchange payments to defray installation costs and piece of ancillary or DR services revenue stream*

- Free parking for V2G connection, free charging, target congested urban areas
- Enablers include aggregators and metering and accounting systems, value sharing contracts/agreements
- Barriers include cars can be double counted by aggregator and garage owner, contractually complicated, cost of infrastructure, is monetary benefit to PHEV owners big enough?
- Ties in with ancillary services, backup power for local critical loads e.g., hospitals, train stations, fire and safety
- Analysis resources: Data on parking lot usage (trade association?, AAA) previous studies (INEL, NREL, American travel survey), DOT?



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# Federal Tax Credits for V2G Program Participation

*Federal income tax credits to vehicle owners (private and corporate) for V2G program participation*

- Tax break built on declining schedule, goes to vehicle owner, tied to participation, sunset provisions
- Enablers include methods to certify participation and verify program performance and V2G infrastructure
- Barriers include that benefits are local/regional but funding is national, lack of political consensus for new taxes, opportunities for “free ridership”
- Possible other incentives include use of federal gas taxes and tie to lower cost auto loans
- Analysis resources: lessons learned from similar auto tax credits, other tax credits, and other programs e.g., Energy Star



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# Incentives to OEMs to Build V2G Ready Vehicles

*Government agencies (and maybe utilities) provide incentives to OEMs to build “V2G-ready” vehicles*

- Provides for federal and/or state tax breaks, “CAFÉ” credits, utility commitments for PHEV fleet purchases
- Enablers include mechanisms for sharing utility-level benefits stream from V2G, standardized V2G packages for vehicles, government-utility-OEM large scale demonstrations
- Barriers include lack of strong initial market demand for PHEVs, state and Federal regulations differ and not stable over time, lack of customer awareness and acceptance, strategies to mitigate V2G impacts on batteries
- Opportunities to involve auto dealers and aggregators
- Analysis resources: studies of OEM experiences with cell phones, satellite radio, and ONSTAR; U of Mich consumer preference studies, experiences with “smart homes” (e.g., GridPoint)



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