SENTECH, INC.

Plug-In Hybrid Electric Vehicle Market Introduction Study

Summary of Workshop Results DRAFT

Report prepared by:

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INTRODUCTION

The Plug-In Hybrid Electric Vehicle (PHEV) Market Introduction Study Workshop was attended by approximately forty representatives from various stakeholder organizations. The event took place at the Hotel Helix in Washington, D.C. on December 1-2, 2008. The purpose of this workshop was to follow-up last year's PHEV Value Proposition Study, which showed that indeed, a viable and even thriving market for these vehicles can exist by the year 2030. This workshop aimed to identify immediate action items that need to be undertaken to achieve a successful market introduction and ensuing large market share of PHEVs in the U.S. automotive fleet.

PHEVs stand to potentially benefit the personal transportation sector and our society in many ways. The advantages that PHEVs hold over traditional methods of transportation (those that run on gasoline or diesel) include reduced petroleum consumption, reduced CO_2 emissions, and increased national security, among others. At a strong penetration rate, PHEVs offer the opportunity to drastically reduce oil consumption and focus on domestic clean energy production. This transition would lessen the nation's dependence on oil originating from unstable countries, and national security would likely strengthen as a direct result. Integrating enough PHEVs into the fleet to comprise a significant share is a long-term goal that we must strive for. However, many steps need to be taken to make PHEVs a sustainable transportation option: in the short term, supporting infrastructure needs to be developed; in the long term, development of a grid interface would further advance this technology and its benefits. In targeting action items to this end, one must first identify obstacles and barriers, or "pinch points" to a successful market introduction, and the essential steps in overcoming them, i.e. policies, incentives, and regulations.

This workshop, co-funded by the U.S. Department of Energy's (DOE) Office of Electricity Delivery and Energy Reliability and the Office of Energy Efficiency and Renewable Energy's (EERE) Vehicle Technologies Program, aimed to unite stakeholders knowledgeable in these fields, including automotive suppliers and manufacturers, utilities, national laboratories, universities, and government agencies. Select members of these organizations comprise the Guidance and Evaluation Committee, who were also in attendance. A complete list of this committee can be found in Appendix B. The final workshop agenda is listed in Appendix A, and complete participant lists for both groups are listed on Tables 1 and 8. Presentations and additional reference documents can be found at www.sentech.org/phev.

Welcoming remarks were given by Lee Slezak and Pat Davis, both representatives of DOE's Vehicle Technologies Program. Bob DeVault of Oak Ridge National Laboratory (ORNL) briefed the participants on the Value Proposition Study results, and Karen Genung of Sentech provided them with an overview of the task at hand. The participants were then divided into two parallel "breakout" groups, labeled "red" and "blue," for an intense brainstorming session. Day one of the workshop was spent identifying and analyzing the pinch points which covered a wide range of issues from supply constraints to consumer acceptance Day two was spent identifying the most effective policies, incentives, and regulations that could help overcome these pinch points; analyzing the findings; and summarizing the results of two days worth of brainstorming. Workshop participants reconvened in the afternoon to present the outcomes of each breakout group. A volunteer from each breakout session presented the summary of his group's brainstorming efforts, and Lee Slezak and Bob DeVault wrapped up the workshop with closing remarks on behalf of ORNL and DOE.

SUMMARY OF RESULTS

The brainstorming process consisted of participants from both groups voicing their top five pinch points of concern and top five policies, incentives and regulations to address these pinch points. The red group's focus was slightly broader, focusing on the market introduction of *all* plug-in electric vehicles (PEVs), whereas the blue group's focus was more specific to plug-in *hybrid* electric vehicles. That is an important distinction to make, considering that several significant differences exist between the two: PEV development places more emphasis on batteries with a longer all-electric range (AER); they use virtually no petroleum throughout their lifetime; and they have significantly larger infrastructure requirements.

On both days of the workshop, ideas were categorized, voted upon, and narrowed down to the ideas that received the most votes. Voting selections were based on the level of impact that the proposition would have on the PHEV (and PEV) industry. Every idea mentioned has been documented below in Tables 4 and 11, for red and blue, respectively, and under the most appropriate heading. Once the top priority topics were identified, each group divided into smaller teams to each discuss their assigned topic in detail. The criteria for discussion consisted of implementation and time frame, organizations involved, level of money and effort required (low, medium, or high), and immediate next steps.

After both groups had presented their findings, it was evident that several recurring themes existed. The most pervasive theme was that the PHEV market introduction must be viewed from a national energy policy perspective, not just a market development perspective. The introduction of PHEVs should be approached from a national security standpoint with high priority as opposed to single companies simply focusing on new product development. A historical example of such an event is the interstate highway system, initiated during the Eisenhower administration. Legislation was established for the National System of Interstate and Defense Highways to efficiently transport military equipment and personnel, even though civilians benefited greatly for personal transportation uses. Additionally, with the current economic crisis, the creation of "green" jobs would provide the economic boost that this country is desperate for. These jobs would be created through ramping up production of PEVs and PHEVs, retrofitting existing infrastructure with charging stations and the means for handling increased electric-load capacity, and training dealers and service technicians to service these vehicles.

Both groups agreed that the most imperative pinch point to address was the need for improved battery production and technology. At present production levels, batteries are simply not affordable for the average American. At the same time, scale-up for manufacturing of battery packs, power electronics, and other vehicle components could place stress on international commodity markets, and as a result prices for key raw materials could rise, and the domestic supplier base for various parts and components, particularly batteries, could undergo substantial growth. Also, manufacturing batteries to last the entire life-expectancy, without needing replaced, is of utmost importance. A warranty or guarantee should be provided to build consumer confidence and encourage investment.

Consumer acceptance and education proves a sizeable issue as well. To achieve wide adoption across the board, it must be easy to use PHEV and PEV charging equipment. Also, it must be addressed that the majority of consumers have little to no prior knowledge or experience with this

type of vehicle and must be educated on such issues as driving behavior, grid connections, and expectations of performance. Participants of the workshop agreed that implementation of international codes and standards for interoperability, grid interface, communications protocols, and components manufacturing would help address this. Such standardization would drastically accelerate market introduction, encourage commoditization, decrease production costs, while boosting consumer acceptance.

The massive amount of investment that original equipment manufacturers (OEMs) will require to retool their facilities for large-scale production is another obstacle. Capital investment must be not only attracted, but sustained to continue research and development, and also to mitigate scale-up risks. This high cost could prove to be a significant barrier to entry for some automakers, but ultimately would be worth the investment, as proven by the market success of several hybrid vehicles, such as the Toyota Prius, that currently comprise a noteworthy portion of the light-duty vehicle market.

Low fuel prices could negatively impact the acceptance of PHEVs in the marketplace. If consumers are not paying a premium for their conventional gasoline or diesel, the financial benefits associated with PHEVs may not be as evident. In addition, most consumers are not solely motivated by the knowledge that they are reducing their CO_2 emissions, or the nation's dependence on foreign oil. A policy discussed by both groups to address this pinch point was the implementation of a gasoline tax. This could be accomplished in one of two ways: placing a floor on the price of gasoline, or charging a set amount per gallon. Even taxing a gallon of gasoline one cent would generate one billion dollars a year! The money raised from either method could be used to in a variety of ways, from subsidizing battery production to funding a rebate/feebate program for the purchase of PEVs and PHEVs, to helping OEMs retool, or training service technicians. This program would likely be designed to be revenue neutral, rather than as an overall tax increase. Some other suggestions to remedy this situation were to limit the amount of imported oil, or to reduce tax breaks to oil. Although politically unpopular, both groups agreed that such a policy would be highly effective.

Other basic incentives considered to accelerate PEV and PHEV acceptance included exempting the first million sold from sales tax and tolls, and subsidizing the sticker price based on reduced greenhouse gas emissions. Also, investment tax credits for domestic battery production facilities was another incentive discussed, first on a pilot basis, and then expanding into full scale production. Also, providing financial incentives for charging infrastructure in residential, commercial, and public applications was agreed to be effective. This would entail giving tax credits to businesses that allow for customers or employees to charge while they work or shop in their establishments.

The general consensus was that implementation of PEV and PHEV technologies, policies, and market strategies would be instrumental in addressing important national issues, such as energy security, climate change, job creation, and electric system reliability. While some benefits are achievable during the market introduction phase on a smaller scale, the potential for PEVs to contribute to electric system planning and operations is a long term goal. Electric system contributions and functionality such as vehicle-to-building, vehicle-to-grid, rapid charging, and battery swapping will not be needed for market introduction to be successful but will be necessary to reach sustainability in the future marketplace.

To produce a fleet turnover of any significance, policy-makers, regulatory agencies, utilities, and the educational community will need to act together to initiate this monumental shift in the transportation sector. Getting the legislative and executive branch involved in such policy-making will not require much capital, but will require political commitment to defeat the status quo.

RESULTS OF INDIVIDUAL BREAKOUT SESSIONS

"RED GROUP" BREAKOUT SESSION RESULTS

The market introduction phase for PEVs in North America will be accomplished over the next 5-10 years and will involve the purchase of millions of vehicles from multiple auto manufacturers. This effort will be part of a global enterprise with many international challenges and opportunities. The stakeholder representatives from the Red Team are listed below that participated in the discussion on the solutions for overcoming these barriers.

TABLE 1. LIST OF PARTICIPANTS

Name	Organization
Mike Andrews	Johnson Controls – Saft
Britta Gross	General Motors
Joe Garcia	Oak Ridge National Laboratory
Ken Huber	PJM
Donald Karner	Electric Transportation Engineering Corp
Jim Kliesch	Union of Concerned Scientists
Eric Lightner	U.S. Department of Energy – OE
Phillip Misemer	California Energy Commission
Mitch Olszewski	Oak Ridge National Laboratory
Jim Saber	Next Energy
Scot Schramm	Chrysler
John Sullivan	University of Michigan
Dean Taylor, Group Spokesperson	Southern California Edison
Bob Thomas	Cornell University
Jacob Ward	U.S. Department of Energy - EERE
Robert Wimmer	Toyota
Dick Ziegler	Sentech
Stephen Zimmer	Sentech
Rich Scheer, Facilitator	Energetics Incorporated
Tenley Dalstrom, Note Taker	Energetics Incorporated

There are a number of significant pinch points that could interfere with successful market introduction of PEVs. Of major concern is making the vehicles affordable to consumers. The biggest pinch point in this regard concerns the battery pack and its cost, reliability, durability, and safety. Addressing battery costs involves other issues related to battery design and manufacturing scale-up. For example, there are currently a limited number of domestic battery manufacturers, and raw materials such as lithium are only available overseas and are subject to supply, demand, and price fluctuations often associated with international commodity markets.

Retooling by auto makers is another substantial pinch point that will have to be addressed as factories and manufacturing processes respond to changes in government policies and new business models during PEV scale-up. The lack of trained engineers, technicians, factory workers, sales, and maintenance personnel will be a substantial impediment to the retooling process.

Another consumer acceptance concern involves charging. PEV charging practices and equipment must be simple and seamless, with substantial access for consumers whether they are at home, at work, or traveling. Addressing the charging issue will involve the development of standards for interoperability, grid interface, communications protocols, and PEV components. Billing the customer also must be easy and seamlessly address peak load and location issues. For example, billing (and pricing) should discourage charging during peak periods and accommodate long distance trips no matter where the driver charges their vehicle, (e.g., as is done today with cell phone roaming charges or toll road "easy passes.")

TABLE 2. TOP PRIORITY PINCH POINTS

- Battery costs, reliability, durability, and safety
- Limited availability of domestic suppliers for battery cell raw materials and other critical PEV components
- Standards for interoperability, grid interface, communications protocols, and components
- Need for simple and seamless PEV charging equipment and practices for consumers
- Need for technical and engineering workforce to design, manufacture, and maintain PEVs
- Retooling OEMs for large scale manufacturing

There are a number of possible policies, incentives, and regulations that can be implemented by federal, state, and local government agencies to address the pinch points and otherwise help ensure a successful market introduction phase for PEVs. A potential source of funds for various PEV and infrastructure scale-up efforts involves federal taxes on gasoline. These could be increased with the specific purpose of funding PEV development, including retooling, vehicle/battery costs, and/or charging infrastructure. There could also be specific incentives or policies aimed at batteries, since these are such key components to the successful market introduction of PEVs. Warranties, resale guarantees, or guarantees for secondary markets could help boost financial attractiveness for battery packs, encourage alternative business models and secondary markets for batteries to develop, and aid with disposal issues.

TABLE 3. TOP PRIORITY POLICIES, INCENTIVES, AND REGULATIONS

- Phase in gas taxes to fund PEV development (e.g. 15 cents a gallon to pay for batteries)
- Investment tax credits for domestic battery production facilities
- Financial incentives for charging infrastructure at residential, commercial and public locations (e.g. tax credits to businesses for customers or employees)
- Subsidies to lower initial vehicle prices (e.g. tax credits tied to oil/ghg reductions)
- Exemption from tolls and sales taxes for first million PEVs sold
- Battery warranty/guarantee by non-OEMs

Tables 4 - 7 provide the details of the results of the breakout group discussions.

TABLE 4. LIST OF PINCH POINTS

(◆ Indicates votes received for top priority)

Battery Systems	Materials and Equipment Availability	Charging Infrastructure	Electric Power Industry	PEV Manufacturing
• Battery costs, reliability, safety, and durability ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ – Sufficient testing to ensure safety – Getting production volumes higher to overcome "valley of death" ▪ Focus on "niche" markets such as NEVs, CEV, busses, shuttles, DOD applications ▪ Focus on stationary applications • New (lower cost and more widely available) materials and materials research for "next generation" batteries ◆◆◆ • Battery life from deep cycle discharge effects ◆ • Battery production capacity limitations ◆ • Clear battery disposal/recycle guidelines – Secondary markets for used batteries • Battery performance at low and high temperatures	• Limited availability of domestic suppliers for battery cell materials and other key PEV components ◆◆◆◆◆◆◆◆◆ • Sustainability of lithium supplies ◆◆ • Cost and availability of electric motor permanent magnets ◆ • Cost and availability of other raw materials and commodities (e.g., copper) • Few (if any) suppliers of key pieces of cell manufacturing equipment	• Low cost, seamless charging systems, inspection, installation, permitting particularly for residences ◆◆◆◆◆◆ • Access to chargers including public installations and work locations ◆ • Infrastructure for quick charging	• Standards for interoperability, communications protocols, and grid interface ◆◆◆◆◆◆◆ – Multi-national markets need international standards – Cover competing charging technologies • Mechanisms to ensure off-peak charging ◆◆◆ • Special rates • Redesign of electric distribution feeders to accommodate large numbers of PEVs ◆ • Consistent market structure for bulk power across the country ◆ • Market aggregation of individual vehicles for V2G applications	• Retooling OEMs for large scale PEV production ◆◆◆◆◆◆ – Modular integration to minimize assembly facility retooling costs – Resource constraints for multiple PEV models • OEM RD&D funding ◆◆◆ • Attracting and sustaining capital investment and mitigation of scale-up risks ◆◆ • Training dealers and service technicians quickly

TABLE 4. LIST OF PINCH POINTS (CONTINUED)

(◆ Indicates votes received for top priority)

Education	Components	Vehicles
• Engineering and technical workforce to design, manufacture, and maintain large PEV fleets ◆◆◆◆◆◆ • Customer confusion ◆◆◆◆ – Many types (EV, HEV, PHEV, EREV) – Technical complexity	• Standardization of components for initial economies of scale ◆◆ – Balancing and consolidating emerging supply chain of key components • Manufacturing power electronics switches (e.g. IGBT) ◆ • Thermal management, subsystem complexity, volume/mass penalties, and cost issues	• Initial design for PHEV/ReEV system integration versus retrofit of existing products • Automakers may need much more HEV experience before scale-up of PHEV – However, EVs may be easier to make than PHEVs • Intergenerational technology migration without obsolescence • Development of durability and reliability criteria based on customer duty cycles

TABLE 5. ANALYSIS OF TOP PRIORITY PINCH POINTS

Pinch Point Topic	What needs to be done to eliminate the pinch point and during what time frame?	What organizations need to be involved?	How much money and effort will be needed? (low, medium or high)	What would be an immediate next step(s)?
Retooling OEMs for Large Scale Manufacturing	Federal funding to supplement OEM investment to accelerate implementation (2-6 months)	DOE, OMB, FFB, Congress, new administration	High	DOE award of EISA 07 authorized sec 136 adv tech VEH, MFG loan program funds
	State and local government tax incentives to modernize plants including jobs training programs (0-3 years)	State and local governments, economic development agencies, MFG equipment coalitions (NAM)	Medium	Prepare/submit tax proposals and state/local government (grassroots) campaign
	Tooling and manufacturing process and equipment advances (0-3 years)	DOE (ITP), DOD (MANTECH), OEMs – assembly line, equipment suppliers - USCAR	Medium	Convene national summit on PEV-related manufacturing technologies. Develop demonstration pilot plant.
Engineering and Technical Workforce to Design, Manufacture and Maintain PEVs	Retraining of existing automotive technical workforce (now)	OEM, Universities (such as gate), FEDs	Low – Medium	Fed and/or State funding to initiate program
	Continued support (increased support) for university programs and aggressive recruitment (now)	Feds, OEMs, Universities	Low – Medium	Expand current activities
	Target specialists in other industries (now)	OEM, suppliers	Low	Identify/target recruitment effort
	Sponsorship programs for those desiring training	Fed and State	Medium	Establish progress (Fed or State) now
Home Charging/Inspection Installation Costs	Prior to PHEV purchase buyer is informed about home based requirements. (next 2 years)	OEMs, dealers, municipalities, utilities, electrical contractors	Low to medium, incentivization would be helpful. Rebate? Local or State. If the dealers can handle it, the cost could be rolled into the purchase price of the car.	Quantify total cost to the consumer. Develop/recommend level of initiatives to accelerate infrastructure build out. • federal incentives • State incentives through RPS • Local?
	Ideally, all conversion actions	OEMs, dealers, municipalities,	Low to medium, incentivization	Quantify total cost to the

Pinch Point Topic	What needs to be done to eliminate the pinch point and during what time frame?	What organizations need to be involved?	How much money and effort will be needed? (low, medium or high)	What would be an immediate next step(s)?
	are bundled with a single cost. This could possibly be a dealer package. (next 2 years)	utilities, electrical contractors	would be helpful. Rebate? Local or State. If the dealers can handle it, the cost could be rolled into the purchase price of the car.	consumer. Develop/recommend level of initiatives to accelerate infrastructure build out. □ federal incentives □ State incentives through RPS □ Local?
	OEMs provide web based information on required actions. (next 2 years)	OEMs, dealers, municipalities, utilities, electrical contractors	Low to medium, incentivization would be helpful. Rebate? Local or State. If the dealers can handle it, the cost could be rolled into the purchase price of the car.	Quantify total cost to the consumer. Develop/recommend level of initiatives to accelerate infrastructure build out. □ federal incentives □ State incentives through RPS □ Local?
Interoperability Standards	Reach out to all appropriate standards organizations and stakeholders to agree on a common set of standards	NIST, EPRI, auto manufacturing, utilities, SAE, IEEE, Gridwise architecture, communications industry (invisible segment), IBM, National labs	Primary voluntary; need to fund the leadership and facilitation (low $5 million)	□ ID resources/funding to deliver □ Put someone in charge □ Learn and share leading efforts in U.S. and internationally
	Need a single agency to own the deliverable. NIST has been designated, they need to deliver.	NIST	Low cost → high impact	Must be resolved within 5 years Plug/physical standard first, communications second, and back office third
Supply Chain – Very Limited Ability of Domestic Suppliers for Cell Raw Materials and Key Components Why: □ reduce oil imports □ Improve national security □ Stimulate economy + create	Identify the key components and key raw materials that are not currently available domestically. (benchmark international competition) (3 months)	DOE study, OEMs labs, NAS (benchmarking)	Low	Gap analysis
	Identify potential U.S. development suppliers and manufacturing suppliers (3 months)	OEMs, DOE and labs, Department of Commerce, NAS	Low	Set supplier direction

Pinch Point Topic	What needs to be done to eliminate the pinch point and during what time frame?	What organizations need to be involved?	How much money and effort will be needed? (low, medium or high)	What would be an immediate next step(s)?
U.S. jobs for sustained health and wealth				
	Invest in RD&D to fill performance and cost gaps in materials and companies (protect IP!!!) (immediate, sustained and long term)	Congress, DOE, new administration, development suppliers, OEM (monitor development), venture capital	Medium	Line up sustained funding
	Invest in supply base/manufacturing capability (protect IP!!!) (immediate, sustained and long term)	Venture capital, Congress, DOE, new administration, States, cities, manufacturers, suppliers, OEMs (monitor)	High	Line up sustained funding
Battery Costs and Durability	Automotive grade new stationary application for batteries/cells	OEMs, battery makers, stationary users	High	Summit on first item, task forces to follow with deep dive
	Long term forward pricing	OEMs, battery makers, stationary users	High	
Third party warrantee feasible? Possible to mandate state gov, city, federal and utility fleets?)	Large scale production = guaranteed market or warranties, or global market	Government, DOE, Congress, IRS	High	
	Less than 10 Kwh products 3 "footprints" for batteries: cell, module and voltage level – helps in new, used and recycling	ISO	Low	Temper expectations <=10kwh
	Durability: • Oversize batteries e.g., 10-40% DoD • "Blended" engine mode more as vehicle gets older			Summit? Last item

TABLE 6. LIST OF POLICIES, INCENTIVES, AND REGULATIONS

(◆ Indicates votes received for top priority)

For Battery Cost Reductions	Federal and State Energy Policies	Vehicle Buyers	OEMs
• Investment tax credits for domestic battery manufacturing facilities ◆◆◆◆◆◆◆◆ • Regulations to require standard battery packs ◆◆◆◆ – Dimensions – Communications – Recyclability, including guaranteed disposal price • Policies to credit battery use for state-level renewable portfolio standards ◆ • "Blue Rhino" approach to battery packs ◆ – Battery management company owns batteries and provides utilities with V2G storage to reduce financial risks to car owners • Regulations allowing utilities to own and include battery packs in rate base • Guaranteed secondary markets for battery packs • Tax credits, grants, incentives go to both stationary and mobile battery packs	• Phase in increases in gasoline taxes to fund PEV development ◆◆◆◆◆◆◆◆◆ – e.g., add 15 cents to pay for battery development • Consumer education programs for PEVs modeled after "Ready Kilowatt" ◆◆ • Use fee bates ◆ – For vehicles and fuels • Large scale, multi-location demonstration programs ◆ • Establish minimum gasoline price of $5 gallon or higher ◆ • Modify CAFÉ standards to allow full advantage of PEVs and AFVs ◆ – Develop scalable CAFÉ regulations – Develop realistic method to quantify MPG equivalent for PEVs • Fully appropriate existing Federal programs in EISA 2007 and EPACT 2005 • Eliminate state restrictions on utility involvement with new Federal legislation and benchmark to other countries • Implement attractive federal (FERC) tariffs for PEV participation in power markets • Establish national targets for PEV production • Backstop to OEM PEV purchase requirements federal, state, municipal, and private fleets • Phase in zero to very low emissions requirements for vehicles in non-attainment areas • High level government officials advocate buying PEVs	• Financial incentives for building charging infrastructure ◆◆◆◆◆◆◆ – Residential, commercial, public locations – Greater access for on-street charging in urban areas – Tax credits to businesses that install charging stations for use by customers and employees • Subsidies to lower vehicle prices ◆◆◆◆◆◆ – Expand consumer tax credit eligibility – Tie tax credits to vehicle performance in reducing greenhouse gases or oil imports • Exempt 1st 1 million PEVs from tolls and sales taxes nationwide ◆◆◆◆◆ • Incentivize development of ubiquitous billing systems so recharging can be billed like cell phones or highway toll "easy passes" ◆◆◆ • Implement new car loans that are compelling and attractive to consumers ◆◆ • Support businesses (start up funding or other incentives) for viable niche applications of PEVs ◆ • Implement non-OEM guarantees for vehicle re-purchases • Finance interest rate breaks for PEV purchases • Guaranteed technical support, servicing, and maintenance	• Implement non-OEM battery warranties/guarantees ◆◆◆◆◆ • Create new legal consortium with all stakeholders to collaborate on PEV development ◆◆◆◆ – OEMs, utilities, equipment suppliers, federal and state agencies – Include anti-trust exemptions for automakers to work on PEV traction systems • Incentives to OEMs to fund the transition and minimize losses with each vehicle produced ◆◆◆ – Engineering and R&D tax credits from federal, state, and local government • Government financial incentives to increase domestic supplier content

TABLE 7. ANALYSIS OF TOP PRIORITY POLICIES, INCENTIVES, AND REGULATIONS

Policies, Incentives and Regulations Topic	What needs to be done to eliminate the pinch point and during what time frame?	What organizations need to be involved?	How much money and effort will be needed? (low, medium or high)	What would be an immediate next step(s)?
Incentive for Charge Infrastructure Development	Make it convenient for people to plug in Motivate people with feedback about cost savings (timing is now)	• Utilities, PUCs • Standards setting bodies (IEEE, NFPA, SAE) • OEMs, dealers (certify contractors) • Building code officials • DOE needs to pull the pieces together (many stakeholders involved, need to drive)	Effort: • low • legislation required • green jobs, electricians Cost: • low to the consumer • medium to society	Propose legislation
	Increase tax credit from the current 30% for installing charge infrastructure Should be federal because coordinating states would not be practical			
	Develop technical standards for communications, metering and billing that are requisite for getting the credit SmartGrid standards			
Domestic Battery Production	Define what qualifies as a domestic manufacturer (now)	Feds, Commerce, Energy, Defense, Treasury	Low	Establish team to prepare definition
	Understand the international playing field (now)	Feds, USABC, OEM, Battery Manufacturers	Low	Establish team to evaluate
	Establish tax credit for U.S. manufacturing equipment (1-3 years)	Treasury, DoD, DOE	Medium	Establish what the minimum tax credit is for the next three steps
	Establish tax credit for U.S. pilot scale production (2-4 years)	Treasury, DoD, DOE	Medium	Define dual use requirement to establish DoD purchase and market
	Tax credit for full scale production (3-5 years)	Treasury, DoD, DOE	High	Define dual use requirement to establish DoD purchase and market
Lower Initial Vehicle Price	Tax credits to consumer	Congress or legislature	Medium-High/High effort	Lift 250,000 cap extend

Policies, Incentives and Regulations Topic	What needs to be done to eliminate the pinch point and during what time frame?	What organizations need to be involved?	How much money and effort will be needed? (low, medium or high)	What would be an immediate next step(s)?
		finance committee		sunset
Who pays: Tax on users/gasoline and diesel or reduce tax breaks to oil	Grants to consumer, demonstration and deployment	Congress or legislature Energy committee Appropriations committee each year	Medium-High/High effort	Fund section 131 and 641 California 118 funds
	Low interest loans to OEMs	Congress or legislature Energy committee Appropriations committee each year	Low/High effort	Additional Fund section 136(a) modify existing metric
	Grants to OEMs	Congress or legislature Energy committee Appropriations committee each year	Medium /High effort	Fund section 136 (b) modify existing metric
	Low interest loans to consumers	Congress or legislature Energy committee Appropriations committee each year	Low/High effort	New legislation called AB118 funds
	Fleet requirement to buy (to get mass production)	Congress or legislature Executive order, Energy committee	Low/High effort	New legislation in Congress – expand California AB 236 executive order
	Stationary battery incentive to get mass production	Congress or legislature Executive order	Medium/High effort	New legislation, executive order, PUC action
Exempt first million PEVs from tolls and taxes	Federal government would need to fund states, local government, and private toll roads to reimburse for lost revenue	Federal, States, local, private (more than 100 organizations) Bureaucratic nightmare	Medium 1-10 billion all federal	• Funding authorization – Energy Act, congressional committee • Replace or addition to

Policies, Incentives and Regulations Topic	What needs to be done to eliminate the pinch point and during what time frame?	What organizations need to be involved?	How much money and effort will be needed? (low, medium or high)	What would be an immediate next step(s)?
	Actual amount per vehicle is too modest → $2,000 per vehicle Practicality is a challenge, benefit is minimal			income tax incentive
Battery Warrantee/Guarantee by non OEM	Establish federal fund to cover battery replacement costs, which will include liability coverage (10 yr warranty) (2 years)	EPA, DOE, Congress, EPACT, OEMs, underwriters	Medium $, low effort	New law
	Electricity utility owns and leases battery packs, secondary use must be established. (10 yr warranty) (5 year implementation)	Electric utilities, PUCs, OEMs, underwriters	Medium $, high effort	New law, new regulations, rate cases
	3rd party ownership, secondary use must be established, business case is high bar (10 year warranty) (5 years to implement)	OEMs, other corporate entities, financial institutions, underwriters	Medium $, high effort	Compelling business case. Possible new regulations. Also could be a 4th "hybrid" approach
Phase in an Increase in Gas Taxes	Identify legislative sponsor to draft preliminary bill language (position legislation – energy policy component, GHG, cap and trade, revenue bill)	OEMs, battery makers, legislative bodies, auto caucuses, EDTA, DoD, DOE, EPRI, State economic develop0ment coalitions (e.g. MEDC)	Low	Identify potential legislation sponsors (immediately)
	Develop Advocacy coalition (1-2 years) • create constituency • provision of education Craft bill language Submit to floor then committee/sub-committee with legislative authority			
	Develop appropriation/ allocation/disbursement stream (identify a lead agency to disburse)			Solicitations for grants or through existing entity

"BLUE GROUP" BREAKOUT SESSION RESULTS

The emerging PHEV industry is a multi-faceted marketplace comprised of a broad range of stakeholders that will need to begin collaborating. For the introduction of these vehicles to be successful, their inter-linkages must be conceptualized and their ideas for successful market introduction brought to fruition. Below is the list of participants that conducted the Blue Team's analysis of the major obstacles to PHEV market introduction, and what can be done to overcome these issues.

TABLE 8. LIST OF PARTICIPANTS

Name	Organization
Bob DeVault	Oak Ridge National Laboratory
Ben Echols	Georgia Power Company
Karen Genung	Sentech
Nancy Gioia	Ford
Tom Gross	Consultant
Steven Boyd	U.S. Department of Energy – EERE
Michael Kintner-Meyer	Pacific Northwest National Laboratory
Therese Langer	ACEEE
Larry Markel	Sentech
Walter McManus	University of Michigan
Mike Rowand	Duke Energy
Amy Lilly	Honda
Lee Slezak	U.S. Department of Energy – EERE
Tom Turrentine, Group Spokesperson	University of California Davis
Rajat Sen, Facilitator	Sentech
Adrienne Weber, Note Taker	Sentech

Several barriers to market currently exist that have the potential to hinder the successful introduction of PHEVs. These pinch points mostly exist in the supply chain, but may also create a barrier for providing consumers with vital information related to PHEVs. The primary pinch point to PHEVs appears to be battery production capacity, cost, and reliability. First, a sufficient supply of raw materials and components needed to scale up facilities to meet demand must be met. The rising worldwide demand for lithium will likely play a role in how quickly a battery manufacturer can expand production. Second, consumers need to be assured that the battery in their PHEV is reliable enough to last for its advertised lifetime.

Lack of consumer acceptance also creates a significant barrier to the introduction of PHEVs. Most consumers have never been exposed to such technology in regards to grid connection, energy use, or charging practices. Also, the customer base could be smaller than desired, due to a limited selection of models to choose from. Another significant pinch point in PHEV acceptance is the fact that gasoline prices are currently low. Although this price reduction is likely temporary, it will undoubtedly prevent many consumers from seeing the financial benefits of PHEVs right away.

During this workshop, a consensus was reached that in order to spur PHEV acceptance, certain policies, incentives, and regulations would be required. There must be a national standard to which charging station manufacturing and installation must adhere. An example of a code that should be implemented would be requiring a dedicated PHEV outlet in new home construction. An incentive for reduce customer anxiety about battery reliability would be having a warranty available if the battery fails prematurely.

TABLE 9. TOP PRIORITY PINCH POINTS

- Battery Issues
  - Production Capacity
  - Reliability and Warranty
- Consumer Acceptance/ Education
- Codes and Standards
- Charging Stations/ Locations
  - Home Charging
  - Standardized Charging Stations
- Low Gasoline Prices
- Fleet turnover

Enhancing public education and awareness of benefits associated with owning PHEVs may be a key tool in addressing any questions or misconceptions about the new technology. Simple-to-use charging stations must be easily installed in homes of PHEV owners, and charging locations must be accessible to PHEV owners with no garages (e.g., in apartment complexes and parking garages). Ample charging stations must be installed throughout cities so that PHEV owners may charge between commutes and during errands. Implementing set codes and standards for implementation of PHEVs and charging stations would do much in advancing acceptance of this technology.

TABLE 10. TOP PRIORITY POLICIES, INCENTIVES, AND REGULATIONS

- Energy Policy Driven Effort
  - Determine electrification role
- Efficiency Incentives (for OEMs, suppliers, utilities, and customers)
- Federal Gasoline/ Petroleum Tax and Rebate/ Fee bate Program

One day, consumers will more readily accept the new technology as the greater financial benefits become more obvious. This will likely happen when the prices of PHEV technology become more competitive on their own, and consumers will no longer need to be enticed by incentives and rebates. The integrated solutions envisioned at this workshop will be economic, social, and environmental, and the sooner we begin, the better. Such strategies will need to range from the near to long-term, and not abandoned with the next administration, but become an integral part of our nation's competitiveness in the global marketplace.

Tables 4-7 below provide the details of the results of the breakout group discussions.

TABLE 11. LIST OF PINCH POINTS

(◆ Indicates votes received for top priority)

Charging Stations & Locations	Public Education & Consumer Acceptance	Codes & Standards	Energy Costs & The Economy	Smart Metering Technology/ Infrastructure
• Standardized charging stations/ plugs that will support Smart Grid and AMI functions • ◆◆◆ – Accommodate different communications platforms (vary by utility) – Simple and user-friendly • Available to people w/o garages or living in apartments/ condos ◆◆◆◆ – Simple and user-friendly • Public charging station – Ensure enough charging stations to meet demand – Located close enough to encourage trips beyond AER	• Public education ◆◆◆◆◆◆◆ – Metrics/ measures – No "social" instrumentation of vehicle energy use and cost – Consumers have no experience with grid connected vehicles – Must change driving cycle/ behavior – Lack of public education on PHEV performance – Lack of understanding of home infrastructure improvement to enable 240V charging Consumer Acceptance ◆◆ – Overcome anxiety about new technology – Limited variety of models to choose from limits customer base – Acceptance of different vehicle attributes – Vehicle design that appeals to consumers – Celebrity endorsements	• Not having a national standard would limit technology acceptance ◆◆◆◆◆◆◆◆◆ • Building code requiring dedicated PHEV outlet in new homes	• Low conventional fuel cost prevents consumers from seeing financial benefits of PHEVs ◆◆◆◆◆◆ • Financial stability of OEMs • Depressed economy – Consumers not buying new cars	• Sufficient communication between vehicle and grid • Universally acceptable architecture for PHEV billing while roaming ◆ – Ability to accommodate dynamic pricing • National Energy Policy Driven • Local utility distribution system upgrades to support "early adaptor" neighborhoods and subdivisions • Infrastructure: how much, when, and where, at initial deployment ◆◆◆ • Lack of 120V access at home compliant with NEC standard • Installation and maintenance of V2B and V2G technology • Companies allowing employees to charge during workday • PHEV service training and certification of technicians ◆

TABLE 12. LIST OF PINCH POINTS (CONTINUED)

(◆ Indicates votes received for top priority)

Battery Technology	Battery Production	Business Model	Power Electronics & Electric Motors	Environmental Issues
• Battery cost, reliability, and warranty concerns ◆◆◆◆◆◆◆◆◆◆ • Maintaining advertised AER for entire life expectancy (10 yr) • Development that allows deep charge and discharge – Ability to test durability in marketplace	• Battery production ramp-up capable of sufficiently meeting demand ◆◆◆◆◆◆◆ – Non-transportation applications – Need standards to encourage commoditization • Remain cost-competitive ◆◆◆◆ – Domestic manufacturing – PHEV power train costs – High barrier to entry	• Business model that results in "wins" ◆◆◆◆ – Industry/ supply chain • 2nd life market for lithium "auto" batteries not developed • Influence customers to charge during off-peak hours • Transferable warranty – Get warranty credit for replacing old battery • No clear demand signal to OEMs for grid connected vehicles • Little time left for development of communication standard for infrastructure to vehicle communications	• Uncertainty of costs for rare earth metals (for permanent magnets)	• Delays in clean-up of the grid • Lithium extraction and availability

TABLE 13. ANALYSIS OF TOP PRIORITY PINCH POINTS

Pinch Point Topic	What needs to be done to eliminate the pinch point and during what time frame?	What organizations need to be involved?	How much money and effort will be needed? (low, medium or high)	What would be an immediate next step(s)?
Battery Production, Reliability, and Warranty (Assumption: Batteries will be good enough in PHEVs. R&D will lead to this).	Production: Manufacturing capacity should be developed, preferably domestic Understand the critical pinch point within battery production (e.g. manufacturing facilities, raw material avail, etc.) Time frame: 2012 - 2015	Primary: OEMs Battery manufacturers Federal and state government agencies	Production: Cost will be high- will require major capital investment with potentially high depreciation Effort will be moderate- scaling up of production has been done before	Production: DOE/ Industry understanding of ramping up critical paths to domestic production Guaranteed demand/ minimum orders of batteries so manufacturers know how to prepare.
	Reliability and Warranty: Risk management; share the responsibility Reassurance of early market risk to boost market (FDIC- type of batteries) Time frame: 2012 - 2015	Others: Electric utilities as early adopters 3rd party business models	Reliability and Warranty: Cost will be variable (from nothing to total cost of battery) Depends on reliability of the battery Effort will be low, this has been done before	Reliability and Warranty: Create "FBIC:" Federal Battery Insurance Corporation
Market Acceptance of PHEVs -Education on attributes and benefits - Institutions have not yet worked together to realize benefits of PHEV in new business model	Facilitate partnerships Precompetitive (yes) Competitive (off the table) Time frame: Now – within 1 year	OEMs, Public Utility Commissions (PUCs), DOE OEM, Utilities separately in marketplace	Federal: $500K/ year for 4-5 years plus company investment	Establish the legal authority for a voluntary association as an entity
	Standardization of vehicle - communications and advanced…and infrastructure, EZ Pass billing (type metering) Time frame: Gen 2/3	SAE standard bodies, PUCs, DOE, IEEE, OEMs, utilities, OEMs, National Association of Regulatory Utility commissioners (NARUC)	Federal money plus time and money from associations and companies for 10 years	Identify standards that are needed (SAE/EPRI infrastructure)- Establish structure/ prime pump • Find out what is going on • Identify gaps • Ensure communication and coordination
	Establish a simple Smart Grid	SAE standard bodies, PUCs,		Form small group to design

Pinch Point Topic	What needs to be done to eliminate the pinch point and during what time frame?	What organizations need to be involved?	How much money and effort will be needed? (low, medium or high)	What would be an immediate next step(s)?
	application to support PHEV Time frame: Gen 2/3	DOE, IEEE, OEMs, utilities, OEMs, National Association of Regulatory Utility commissioners (NARUC) (Same as above)		Smart Grid applications for PHEVs (i.e. white paper on how "Dumb" Grid can support PHEV and path to Smart Grid
	Investigate the function of specifications of PHEV operation/ charging Time frame: Now	OEMs, dealers, PUCs, utilities, existing energy providers	Follow on to ORNL Value Proposition study- long term, ongoing- $2 million/ year	Value Proposition study on steroids- draft specifications, hold workshops, and develop consumer education program
Low Fuel Prices	Raise cost of fuel tax (presently .47 cents/gal) using floor so that gas prices won't ever go below set amount Tax will pay for rebates on PHEVs	Federal Government: Congress DOE DOT Economic advisors CEQ (Consulate of Environmental Quality) Office of Mgmt. and Budget Department of Commerce	Money: Could be structured to be revenue neutral, as money will come from tax Example: taxing .01 cents/gal would generation one billion dollars	Introduce environmental legislation. Combine groups to form coalition; "hawk" organizations to help w/ national security. Develop specific plan, translate group input into legislative proposal.
	Increase tax .10 cents/year relative to other policies in place Time frame: 10 years	Others: Oil Industry Utilities Environmental Groups Auto Companies	Effort will be high, need political will and clout to defeat lobbyists	
	Limit amount of imports			

TABLE 14. LIST OF POLICIES, INCENTIVES, AND REGULATIONS
(◆ Indicates votes received for top priority)

Incentives ◆◆◆◆◆◆◆	Fuel Efficiency Incentives ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆	Consumer Education ◆◆◆◆
• Consumers – Personal tax credit for home charger install – Tax credit for PHEVs (kWh) funded by gas tax increment – Electricity rebate program for first four years of sales – HOV Lane Access – Preferred parking, city center access, reduced tools for high performance vehicles – Tax credits to cover incremental cost – Tax rebate to consumers for purchase of PEVs that meet certain technical criteria= clean vehicles – Trade-in discount to consumers for PHEV when trade in vehicles with fuel economy lower than 10 mpg – Waive urban congestion charges for PHEVs • OEM and Suppliers – Supplier incentives for US production – Investment tax credits for PHEV manufacturers and component suppliers – Sliding "VAT" on vehicles based on EPA fuel economy rating – Accelerated depreciation for capital investment in battery manufacturing – Mandates forcing vehicles with specified EV range – PHEV job creation tax credit • Business Owners – Third party leasing of battery or PHEV – Provide incentives for companies to adopt free charging if potential sales increases not enough – Company or building fleet demonstration supported by tax incentives – Lease arrangements with rental car companies – Restaurants/ retail stores provide free charging to customers • Utilities and Infrastructure – Electric utility leasing of PHEVs – PHEV increment, battery cost in utility rate base utility + PUC – Local demonstration projects involving government and utilities	• Programs to provide vehicles to government agencies or requirement for agency purchase • Mandated high performance vehicle fleets (postal service, rental cars, etc.) • Establish market to securitize PHEV future fuel savings • Tax-Saver program for efficiency products including PHEVs • Feebate program shift to fuel efficient and low CO_2 • Reduced federal excise tax on tires for high efficiency vehicles	• Clear policy and incentives that do not confuse customers or create negative impressions

Federal Gas Taxes ◆◆◆◆◆◆◆◆◆◆	PHEV Priority for Available Resources ◆◆◆	National Energy Policy Driven Effort ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
• Use federal gas tax to "buy down" the sales price of PHEVs or offer tax credits • "Blenders" tax credit for battery kWh (equivalent to ethanol for gallons saved) • Increased federal gas tax as driver to reduce consumption of conventional fuel	• Parking fee waivers or discounts locally • Federal and state purchase of PHEVs at set profit rate (procurement) • Organized "clubs" for industry w/ battery warranty program • PHEV fee waiver to national parks and museums • Require a percentage of federal fleet purchases to be PHEVs • PHEV CAFÉ credit (similar to flex-fuel but real)	• Energy policy driven effort that focuses on national priorities, not just marketing and development perspective

TABLE 15. ANALYSIS OF TOP PRIORITY POLICIES, INCENTIVES, AND REGULATIONS

Policies, Incentives and Regulations Topic	What needs to be done to eliminate the pinch point and during what time frame?	What organizations need to be involved?	How much money and effort will be needed? (low, medium or high)	What would be an immediate next step(s)?
Efficiency Incentives Addressing: • Faster market growth • Accelerating changeover of vehicle fleet • Accelerating changeover of grid/ smart/ renewable • Accelerating infrastructure access	Technology must be ready • Vehicles • Battery • Grid, etc. Incentives to accelerate ahead not necessarily helpful Time frame: 2013 for battery, vehicle, and grid first phase of readiness	• OEM'S • Suppliers • Utilities • Policy Setters: Federal, State, and Local • DOE/ other regulatory agencies • Education community at all levels • NGO'S • Media	Technology: Cost will be high ($100's of billions) Battery: need plants and research Vehicles: need re-tool and product development Grid-readiness	Analyze potential incentives such as consumer, OEM's, suppliers, and utilities
	Consumer education and policy maker education to develop and accept incentives • Recognize incentives need to be interconnected and address consumer, OEM, supplier, and utility needs/ participation • Fleets and real product plus examples of benefit Time frame: Now and continue on		Education: Cost will be medium ($100-300 million) Fleets: Cost will be medium ($100 million) for 500-1000	Develop education plan 1. Policy makers: state of technology and challenges 2. Education community 3. Media (opinion-shapers)
	Identify funding sources for policy support		Funding source: Cost will be high ($2-5 billion)	Fund an education/ demonstration fleet of vehicles
Federal Gas Taxes • Use as transfer payment rather than tax increase (revenue neutral) • Increase is for gasoline only, not diesel	Temporary fuel tax increase to fund incentives for PHEVs and other highly efficient vehicles (reduce sticker price) • Don't set quotas by manufacturer • Amount of sticker price reduction is dependent on fuel efficiency of vehicle • Some revenues may be used to finance	• Congress • OEMs • Consumer groups • Dealers	Cost will be low- medium: Tax between 1-10 cents/ gallon (Example: 1 cent increase = $1 billion dollars raised)	Study and work out the details • Develop metric to set rebate amount based on fuel efficiency/ oil savings

Policies, Incentives and Regulations Topic	What needs to be done to eliminate the pinch point and during what time frame?	What organizations need to be involved?	How much money and effort will be needed? (low, medium or high)	What would be an immediate next step(s)?
	OEM retooling or service technician retraining Time frame: In effect for 5-10 years, phase out as national energy goals are met			
National Energy Policy Driven Effort	Clearly define goals: Objectives: • Specific • High-level Potentials: • Efficiency • Petrol displacement • Diversification - environmental stewardship Time frame: 3 months	*Danger of politicalization • Executive (White House)	Effort will be high: Issue is national will and commitment, not man-hours Money will be low	Citizens demand this direction and industry stresses that this direction is required
	Identify electric vehicle's role in achieving goals: • HEV • PHEV • BEV Time frame: 6 months	• Executive (White House)	Money and effort will be medium: priority given to electrification's role will determine level of each.	Complete step one, then take the same next steps
	How does it happen? • See other group's examples of incentives, regulations, etc. to put in place • Education • Taxes Similar examples: DOD technologies and the highway system	See other breakouts: Government, OEM's, utilities, etc.	Money will be low: may NOT require more money, just more focused money Effort will be high	Refer to "next steps" from other breakout group's top priority incentives

CONCLUSIONS AND PATH FORWARD

The objective of this workshop was to conduct a thorough analysis of PEV and PHEV market introduction. While it is critical to make sure that the key pinch points are properly identified, and that appropriate policies and incentives are put in place to address them, there is still the issue of getting the market introduction phase started and moving forward. There is a need at the national level for a comprehensive policy and clear priorities for the modernization of both the transportation and electricity sectors. This is necessary so that the role for PEVs (relative to other energy and transport options) can be properly defined and funded, including research, development, demonstration, testing, and analysis, along with the policies, incentives, and regulations that will be needed to transform markets and induce customer acceptance.

Toward this end, more extensive and effective coordination will be needed within the federal sector, between federal agencies and the states, the electric power industry, auto manufacturers, equipment suppliers, universities, and national laboratories. DOE is well positioned to lead these efforts but authorized funding will need to be appropriated by Congress. The Offices of EERE and OE will need to expand their efforts to coordinate activities.

Once potential action items from the workshop have been compiled and prioritized, they will be provided to analysts or ORNL to be input into its PHEV consumer choice model. With this model, the project team will be able to evaluate which action items are likely to have the greatest impact on overall PHEV sales nationwide. Currently, ORNL's PHEV model assesses the following factors:

- Vehicle attributes
  - Purchase price
  - Performance
  - Fuel economy
  - Fuel price
  - Vehicle capacity
  - Battery cost
  - Range
- Range of choice among makes and models
- Value of home refueling
- Availability of refueling infrastructure
- Subsidy and tax credit
- Housing type
- Vehicle and component supply constraint
- Consumer attitudes toward new technology
- Technology learning by doing
- Driving behavior among area types and among census divisions

Once the modeling is complete, the results will be presented in the PHEV Market Study Introduction Final Report. This report is scheduled for release in February, 2009.

APPENDIX A. WORKSHOP AGENDA

DECEMBER 1, 2008

12:30 pm	Welcoming Remarks	U.S. Dept. of Energy Representatives
	Lee *Slezak*	*Vehicle Technologies Program*
	Pat Davis	*Vehicle Technologies Program*
1:00 pm	PHEV Value Proposition Study Results	
	Bob DeVault	*Oak Ridge National Laboratory*
1:20 pm	PHEV Market Introduction Study Overview	
	Karen Genung	*Sentech, Inc.*
1:40 pm	Charge to the Breakout Groups	
	Rich Scheer	*Energetics, Inc.*
1:45 pm	Break	
2:00 pm	Breakout Sessions Begin (2 groups of 25 participants each)	
	Breakout Discussion Topic #1 ***Identification of Top Priority "Pinch Points"***	
4:00 pm	Break	
4:15 pm	**Breakout Session Discussion Topic #2** ***Analysis of Top Priority "Pinch Points"***	
5:30 pm	Adjourn for the day	

DECEMBER 2, 2008

8:00 am	Continental Breakfast
8:30 am	Breakout Sessions Resume **Breakout Session Discussion #3** ***Identification of Top Priority Policies, Incentives and Regulations***
10:00 am	Break
10:15 am	**Breakout Session Discussion #4** ***Analysis of Top Priority Policies, Incentives and Regulations***

DECEMBER 2, 2008 (CONTINUED)

11:30 am	**Breakout Session Discussion #5** ***Preparation of Breakout Group Reports***	
12:15 pm	Breakout Sessions Adjourn	
12:30 pm	Lunch with Breakout Session Reports	
1:30 pm	Path Forward	
	Lee Slezak *Bob DeVault*	*Vehicle Technologies Office* *Oak Ridge National Laboratory*
2:00 pm	Workshop Adjourns	

APPENDIX B. PHEV MARKET INTRODUCTION STUDY GUIDANCE AND EVALUATION COMMITTEE

Michael Andrew
Manager
Hybrid Battery Development Program,
Johnson Controls - SAFT

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