BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

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COMMENTS OF THE ENVIRONMENTAL COALITION ON ALTERNATIVE-FUELED VEHICLE POLICIES

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I. Introduction

In accordance with Rule 6.2 of the Rules of Practice and Procedure of the California Public Utilities Commission ("Commission") and the Order Instituting Rulemaking, the Natural Resources Defense Council ("NRDC"), Friends of the Earth ("FoE'), and the Center for Energy Efficiency and Renewable Technology ("CEERT," hereafter the three groups are for purposes of these comments the "Environmental Coalition") submit these comments on the Commission's policies on alternative-fueled vehicles. Our participation in this proceeding is guided by four overarching goals, which are described in greater detail below.

The Commission is wise to look at the issues related to alternative-fueled vehicles in a separate docket. As is often the case with cutting-edge issues that affect the environment and the economy, California is among the first to realize that reducing greenhouse gas emissions means major changes in the transportation sector, in this case changes that require use of the utility infrastructure. We are also mindful of PUC Code[1] § 740.8 which provides that the interests of ratepayers include activities that benefit ratepayers and "promote energy efficiency, reduction of health and environmental impacts from air pollution, and greenhouse gas emissions related to electricity and gas production and use, and increased use of alternative fuels." The Environmental Coalition appreciates the opportunity to participate in this discussion. We are confident that the Commission is once again establishing precedents that will be followed by other states and the Federal government.

[1] Unless otherwise noted, all references to ""Code" refer to the California Public Utilities Code.

In considering how best to create policies that will lead to a robust market for alternative-fueled vehicles, one that helps California achieve its energy and environment goals, the Environmental Coalition suggests the Commission adhere to the following principles:

1. *Reduce barriers for consumers to "fuel switch" through plug-in electric vehicles*. As with any new technology, many barriers must be overcome before plug-in electric vehicles ("PEVs" which include plug-in hybrid electric vehicles and battery electric vehicles)[2] will be widely adopted by consumers. Some barriers are beyond the jurisdiction of the Commission, while others are within the Commission's influence.

2. *Ensure the environmental benefits of plug-in electric vehicles are maximized*. Electrification of transportation is moving forward. Automakers are beginning to commercialize PEVs; State and Federal energy and carbon policies are driving cleaner and more efficient technologies, including PEVs; and customers are seeking new ways to reduce their energy costs and dependence on gasoline. Absent clearer direction and incentives from the Commission, electrification of the transportation sector could result in the construction of more conventionally fueled power plants to meet increased peak demand loads. Although a move from continued fossil fuel use in conventional internal combustion engines to PEVs is beneficial, the CPUC can ensure much greater benefits from this transition. A well-planned alternative-fueled vehicle program can shift a significant amount of charging to off-peak times, thereby avoiding new capacity builds and increasing utilization of existing plants; help encourage customers to use integrated renewable energy to charge their vehicles; and promote the most energy-efficient plug-in vehicles. Doing so helps California achieve its renewable portfolio standard goals as

[2] As used in these comments, "PHEVs" refers only to plug-in hybrid electric vehicles that run on both gasoline and off-board electricity. PEVs (plug-in electric vehicles) includes PHEVs and BEVs (battery electric vehicles) that do not use gasoline. PHEVs + BEVS = PEVs. Hence we prefer the broader category.

well as broader goals around reducing greenhouse gas ("GHG") emissions and improving air quality.

3. *Minimize electricity grid impacts and maximize potential grid benefits*. Ensuring that utilities have the tools and capacity to manage PEV load in an efficient, reliable, and environmentally preferable manner will be critical. A well-recognized concern about the coming PEV load is its potential impact on electricity demand during peak periods. If many people arrive home in the late afternoon and plug in their PHEVs for recharging, this could increase peak demand on the system, an undesirable effect. It also could overload distribution circuits, leading to neighborhood power outages and faster degradation of distribution assets.

4. *Ensure cost-effective service for utility customers.* Utility involvement in alternative-fueled transportation infrastructure can help ensure that costs to all utility customers – as well as electric transportation customers – are minimized from this expected new load. Ensuring utilities, third party infrastructure providers, and customers alike are managing the load in an efficient manner will help minimize potential impacts.

A. *Organizational Interest in Alternative Fueled Vehicles*

NRDC is a national environmental advocacy organization with over 1.2 million members and online activists, some 250,000 of whom live in California. NRDC has six major offices, including two in California. NRDC has a long history of working to improve the State's energy efficiency and meet State air quality and greenhouse gas emission reduction goals – all while protecting and preserving the State's natural resources and minimizing the social costs of the reliable energy services that a healthy California economy needs. NRDC has also worked for nearly three decades to reduce emissions and energy use from the transportation sector and the

electricity sector to the benefit of all Californians, who breathe cleaner air and have saved money on their utility and fuel bills.

To this end, NRDC has participated in numerous Commission proceedings in the past including those related to electric transport, such as the 2002 utility applications under the Low Emission Vehicle ("LEV") program.[3] NRDC has worked at both the State and Federal level to support clean energy policies. In California, NRDC's work has included sponsoring Assembly Bill ("AB") 32 (the Global Warming Solutions Act); AB 1493, the Pavley Clean Car Standards; Senate Bill ("SB") 375 (California's Sustainable Communities and Climate Protection Act); as well as development of the Low Carbon Fuel Standard. At the California Air Resources Board, NRDC has worked to successfully implement these and other programs, including the Low Emission Vehicle Program and Zero Emission Vehicles Program. At the California Energy Commission ("CEC"), NRDC's efforts have included support for AB 118 (Alternative and Renewable Fuel and Vehicle Technology Program), which will help provide funding for alternative vehicle and fuels infrastructure. At the Federal level, NRDC's advocacy has included work on such significant environmental efforts as the Obama Administration's National Program to reduce global warming pollution from cars and trucks vehicles as well the recent passage of the American Clean Energy and Security Act of 2009 (H.R. 2454) in the House.

Friends of the Earth is a national non-profit environmental group that works to promote energy efficiency, support development of clean energy, and protect ratepayers and the general public from wasteful spending on inefficient and polluting energy. FoE has been involved in a wide variety of projects to protect ratepayers and the environment, including encouraging energy efficiency programs, fighting uneconomical power projects, and providing ratepayers with clean

[3] Application No. 02-03-047, 02-03-048, 02-03-049.

energy credits. FoE has also successfully worked to increase the efficiency of vehicles and to promote alternative fuel vehicles such as plug-in hybrid and electric vehicles, including helping to draft and define the state of California's recent alternative fuel policies, laws, and regulations. FoE has over 10,000 members in California.

FoE has worked at the State and Federal levels to support the development of electric transportation and policies that drive their adoption. At the State level, FoE was instrumental in drafting and passing the Pavley Clean Car Standard (including working to ensure credit for plug-in hybrid electric vehicles) and defending that law in court. FoE also worked with other key stakeholders to draft and pass Assembly Bill 118's Alternative and Renewable Fuel and Vehicle Technology legislation and to ensure strong regulations were put in place. FoE supported AB 32 legislation and has worked to promote plug-in vehicles in California's Zero Emission Vehicle program. At the Federal level, FoE has supported strong vehicle efficiency programs; successfully brought suit to compel the Federal government to comply with alternative vehicle requirements of the Energy Policy Act; and filed a petition under the Energy Policy Act to give credit to hybrid vehicles.

CEERT is a unique coalition of key environmental organizations and companies devoted to promoting, developing, and providing clean energy options, including clean transportation, energy efficiency, renewable supply-side resources, and demand-side resources. CEERT's affiliates also share the policy goals of fighting climate change, improving air quality and energy independence and security in the electric generation and transportation sectors in California and the West through reduced dependence on fossil fuels and greater efficiency in energy use and increased reliance on renewable resources. This work extends to participating in the development and implementation of many of the state's key transportation-related policies and

regulations including: AB 32; AB 1493; AB 1007 (State Alternative Fuels Plan); the AB 1811 (AFIP (– Alternative Fuels Incentive Program) component of AB 1811 (Statutes of 2006); AB 118 (Alternative and Renewable Fuel & Vehicle Technology, Air Quality Improvement, and Enhanced Fleet Modernization Programs); the California Predictive Model and other alternative fuels-related research at the ARB; the Low Emission and Zero Emission Vehicle standards; and the Low Carbon Fuel Standard, to list but a few. From time to time CEERT also assists in the coordination and development of related policies and regulations at the national and international level. CEERT is a party to many other proceedings at the Commission including the related Smart Grid Rulemaking (R. 08-12-009).

The Environmental Coalition welcomes this opportunity to participate in this new rulemaking. We urge the Commission to focus attention on the development of "Alternative-fueled vehicle tariffs, infrastructure and policies to support California's greenhouse gas emissions reductions goals" that yield the greatest environmental and overall customer benefits.

B. *Recommended Commission Actions*

There are key actions the Commission should take in the course of this Rulemaking. These are summarized below:

1. Adopt the policy goals put forward herein by the Environmental Coalition.
2. Ensure that utilities are using time-of-use rates to encourage (1) vehicle charging at times that do not adversely impact the grid, and (2) integration of on-site renewable distributed generation.
3. Examine placing certain components of the residential charging infrastructure related to load management in rate base, including installation of some distribution system equipment.

4. Allow utilities to develop energy efficiency incentive programs for PEVs and provide customers about alternative-fueled vehicle efficiency, similar to the programs and information utilities provide for other appliances.
5. Require third-party providers to coordinate with utilities so there are not adverse grid impacts from charging at privately owned facilities, and to ensure that third-party providers use renewable energy to charge vehicles. Commission rules governing energy service providers may be a good model here.
6. Coordinate with the California Energy Commission on building codes and standards to incorporate and encourage on-site charging facilities.
7. Require any revenue that utilities receive from compliance with low carbon fuel standards be returned to ratepayers in the form of minimizing grid impacts or minimizing rates.
8. Incorporate information on alternative-fueled vehicle programs into the statewide marketing, education, and outreach efforts, which already have been directed to include demand response, integrated demand-side management, and renewable energy, including the California Solar Initiative.
9. Ensure utility investments meet the Commission's policy goals and principles and refrain from endorsing specific technologies or business models.

II. Policy Goals

Increased electrification of transportation is expected to occur as a result of current trends in the vehicle market. Drivers of these trends include continuing oil price volatility, stimulating increased consumer demand for fuel efficient vehicles, and new State and Federal standards and policies that encourage or require clean, lower greenhouse gas, alternative fuel and vehicle

technologies. Together with recent innovations in vehicle and battery technology, these trends are facilitating and enabling the large-scale commercialization of plug-in electric vehicles. The public is also excited about these new vehicles, with nearly 50% of consumers recently stating that they are either extremely or very interested in PHEV cars.[4]

Both State and Federal energy and environmental policies will help drive increased electrification of the light-duty vehicle sector. For instance, California's Clean Cars program, which adopted the world's first global warming pollution standard for new vehicles, is now being adopted nationwide. Under a proposed joint U.S. Environmental Protection Agency ("U.S. EPA") and Department of Transportation rulemaking, a national program is being established that will dramatically reduce greenhouse gas emissions and improve fuel economy from new cars and trucks sold in the U.S.[5] These standards will help drive increased production of PEVs by automakers as one potential compliance strategy.

It is clear that, to achieve California's goal of an 80% reduction in GHG emissions by 2050, deep carbon reductions will be needed from transportation fuels, vehicles, and VMT (vehicle miles traveled). As indicated in Figure 1, absent reductions in every sector, particularly transportation, greenhouse gas emissions will increase at a rapid pace. The need for PEVs is clear – nearly all long-term scenario analyses analysis for the transportation sector have has identified vehicle electrification as being a critical component to reaching 2050 GHG emission reduction goals.[6,7] NRDC's analysis also has shown that concerns over both climate change and

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[4] Pike Research, September 8, 2009. Electric Vehicle Consumer Survey.

[5] "Proposed Rulemaking to Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards," EPA–HQ–OAR–2009–0472; FRL_XXXX-X; NHTSA-2009-0059] RIN 2060-AP58; RIN 2127-AK90, http://www.epa.gov/otaq/climate/regulations/ghg-preamble-regs.pdf

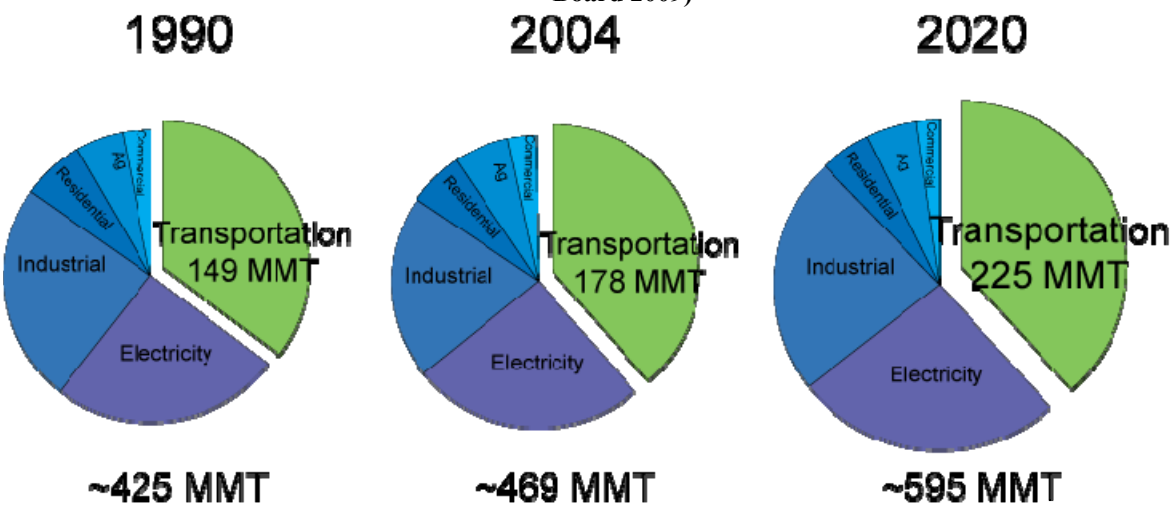
[6] Plug-in electric vehicles (PEVs) are widely recognized as being more energy-efficient compared to today's gasoline and diesel-fueled vehicles.

[7] For example, separate analyses by California's own Energy Commission and by the University of California have consistently shown the large role electrification will need to have in the transportation sector. See for instance,

petroleum dependency will continue to be major policy drivers for electric transportation.[8] As shown below, increased deployment of plug-in electric vehicles will be necessary to achieve these policy goals (Figure 2).

Utility customers will benefit from the CPUC helping ensure that electrification of the transportation sector proceeds in a way that maximizes potential system, consumer, and social benefits and that minimizes, for example, peak loading, unnecessary expansion in generation capacity, and stresses to the distribution and transmission system. Given that electric transportation is expected to result in increased and variable electricity load in the future, the CPUC can help develop a regulatory framework that ensures demand is met in an efficient, reliable manner and that the opportunities to obtain environmental and energy-efficiency benefits from PEVs are maximized.

Figure 1: Business-as-usual trends in California. Direct emissions only are shown (California Air Resources Board 2009)[9]

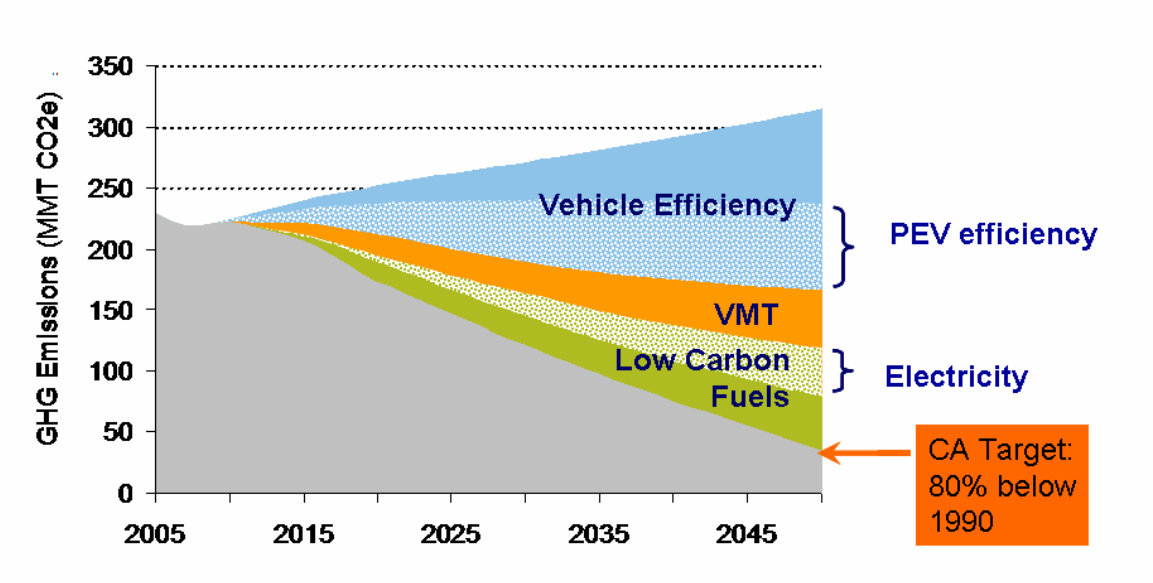


CEC's "State Alternative Fuels Plan," AB 1007; "Developing a Methodology to Allocate AB 118 Program Funds for LDVs (2050 Vision Analysis), Gerry Beemis, CEC, 2009; Steven Schiller, "Implications of Defining and Achieving California's 80% GHG Reduction Goal," University of California, Office of the President, presented at the 4th Annual California Climate Change Conference, September 10-13, 2007.

[8] See for instance, EPRI-NRDC (2007), "Environmental assessment of plug-in hybrid electricAssessment Of Plug-In Hybrid Electric Vehicles." NRDC (February 2009), "Fueling the Clean Energy Economy: Solving Global Warming Pollution in the Transportation Sector." Cap 2.0 Policy Brief.

[9] CARB (2009), *Overview of the California Low Carbon Fuel Standard*, Plug-in 2009 Conference, Long Beach, California, August 12, 2009, as presented by Bob Fletcher.

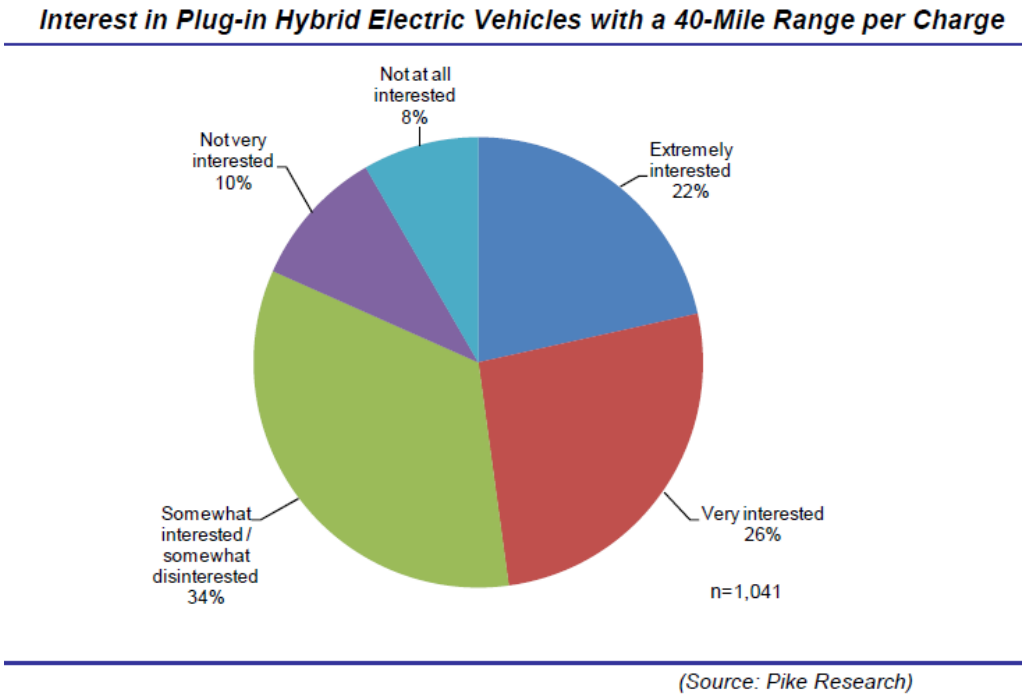
Figure 2: Analysis showing one scenario of the reductions needed from vehicle efficiency, reductions in vehicle miles traveled (VMT), and low carbon fuels in order to achieve California's long term goals in the transportation sector. Note that lifecycle GHG emissions (including upstream emissions) are shown. The reductions due to vehicle efficiency improvements from PEVs and from electricity used as a low carbon fuel are highlighted. NRDC (2009)[10]



Several major automakers have now announced plans to produce either PHEVs or pure battery electric vehicles ("BEVs") between the 2011 to 2014 timeframe.[11] As the Figure 3 indicates, below, nearly 50% of consumers surveyed earlier this year are either extremely or very interested in PHEV cars with 40 miles of electric range, while 85% felt that improved fuel efficiency would be an important criterion in selecting their next vehicle.[12]

[10] NRDC (2009), *Cooling California's Transportation System: Clean Energy Solutions for Meeting State Greenhouse Gas and Oil Reduction Goals*. To be published.
[11] See, for example, http://www.cpuc.ca.gov/NR/rdonlyres/3916875A-910E-40DB-A931-5B4BF37F1F55/0/SaulZambranoPGE.pdf, and http://www.greencarcongress.com/plugins/index.html
[12] Pike Research (2009), "Electric Vehicle Consumer Survey," Research Report.

Figure 3 Consumer Interest Survey Results (Reproduced from Pike Research 2009)



The Commission has an important role in developing consistent statewide policies and standards that can help provide sustained support for this expected transition from petroleum to electricity use in the transportation sector and ensure that both the environmental and overall consumer benefits from plug-in electric vehicles are maximized. The Commission can accomplish these overarching policy goals by adopting policies that: (1) reduce barriers to consumers to "fuel switch" from conventional internal combustion engine vehicles to more efficient plug-in electric vehicles, (2) maximize the environmental benefits of PEVs, (3) minimize potential grid impacts while maximizing potential grid benefits, and (4) minimize costs to utility customers from this expected increase in load.

A. Reduce Barriers to Plug-in Electric Vehicles

The Commission can reduce consumer barriers by encouraging utilities to develop programs, in coordination with automakers and the relevant permitting authorities, to encourage and/or facilitate:

- Installation of necessary infrastructure or upgrades at the customer location in order to allow utilities to manage load in an efficient and environmentally preferable manner;

- Streamlining the permitting process for consumer electric vehicle supply equipment ("EVSE") installations in order to allow customers to charge and operate their vehicles with minimal delay upon purchase;
    - For example, if readiness requirements for Smart Grid and PEVs were incorporated into the Title 24 code and Green Building Standards, permitting installations for all future construction could be further expedited because the challenges posed in retrofitting a building could be avoided.

- Reduction of vehicle battery costs (a major contributor to the purchase price of a PEV) consider by considering:
    - allowing utilities to develop programs employing vehicle battery packs in first use for stationary storage applications, or exploring the financial and technical issues involved with the secondary use of vehicle batteries in stationary storage applications, thereby helping to reduce costs by expanding or extending the market for these batteries;
    - exploring the establishment of models for battery leasing arrangements between consumers and the utility and/or automobile manufacturer.

- Development of voluntary pilot programs that allow utilities to better understand customer charging behavior and vehicle usage patterns, local grid impacts, and the effectiveness of time-of-use rate programs.

B. Ensure That the Environmental Benefits Of Plug-In Electric Vehicles Are Maximized

The Commission should encourage the development of utility programs that:

- Provide additional incentives for customers who install renewable, distributed generation such as solar either at their home or business, or purchase renewable energy in order to charge their vehicles;

- Provide customers with timely information on the net energy, cost, and emission savings associated with PEVs;

- Educate customers on the desirability of selecting time-of-use rates and allowing for efficient load management services;

- Encourage the most energy efficient types of PEVs, on a kWh per mile basis, by developing consumer energy efficiency programs modeled on successful state and/or federal appliance efficiency programs;

- Encourage utilities to maximize the integration of intermittent, renewable resources with PEVs, including maximizing the potential for demand response and vehicle-to-home or vehicle-to-grid applications. Utilities can partner with automakers that are currently developing communication technologies for the vehicle and grid.

C. Minimize Electricity Grid Impacts and Maximize Potential Grid Benefits

The Commission should establish policies that create incentives for improved load management, thereby avoiding increased peak load charging and the need to build new capacity peaker plants, which are typically less efficient than baseload generation. To ensure this outcome, we encourage the Commission to develop policies that cause utilities and third party providers to deploy devices and policies that support load management.

The Commission is obligated under Public Utilities Code §451[13] to insure that PEV electricity demand is met in a safe, reliable, and efficient manner. The Commission can do this through effective load management that minimizes impacts to the grid and maximizes potential grid benefits. Effective load management, when coupled with environmental programs and policies, can also result in improved environmental performance of the system, including opportunities for increased integration with renewables and reduced greenhouse gas emissions.

The increased use of PEVs can provide several overall environmental as well as system benefits to ratepayers. While a large PEV fleet would increase total demand on the electrical grid, the optimal dispatching of power to off-peak periods would improve the system load factor

[13] Decision 03-10-086, Finding of Fact 11. In Application 02-03-047, et al.

and could significantly reduce the need to ramp power plant operation up and down throughout the day, thereby lowering overall plant operational costs. At the same time, a PEV fleet would enable the greater use and inclusion of intermittent renewables such as wind energy, which is currently underutilized today.[14] The extent to which PEVs would support a greater contribution from intermittent renewables will be a function of the:

- PEV fleet size;
- Percentage of vehicles plugged in at any one time;
- PEV time of use charging;
- The average PEV battery size or capacity and power capability.

By allowing for the increased marginal utilization of renewable generation, PEVs could displace even greater amounts of transportation-related emissions by utilizing power with substantially lower GHG emissions than the average California grid mix.

As vehicle-to-grid ("V2G") technology becomes more practical at some point in the future, the storage capability of the vehicle batteries could help to reduce generation costs by building more flexibility into a utility's load management capability. This will avoid the need to dispatch inefficient peaker plants in the short-term and, potentially, the need for more baseload capacity in the longer term.[15] Likewise V2G capability would further enable the inclusion of intermittent renewables, helping to smooth and balance the contribution of this power source to the grid. Further, V2G has the potential to be used in support of frequency regulation (responding nearly instantaneously to second-to-second fluctuations in load balance). With a large enough PEV fleet, PEVs combined with V2G could even provide spinning reserve capacity

[14] NREL (2006), *A Preliminary Assessment of Plug-In Hybrid Electric Vehicles on Wind Energy Markets*. Technical Report NREL/TP-620-39729. April 2006

[15] NREL (2006), *An Evaluation of Utility System Impacts and Benefits of Optimally Dispatched Plug-In Hybrid Electric Vehicles*. Technical Report NREL/TP-620-40293. Revised October 2006

to the grid. The potential exists for these ancillary services - which are valued at a price premium relative to wholesale power prices - to provide overall benefits to system ratepayers. In summary PEVs could decrease overall utility costs and increase the utility's return on its existing infrastructure.[16]

D. Ensure Cost Effective Service for Utility Customers

Code § 451 also requires the Commission to ensure PEV "service, instrumentalities, equipment, and facilities" are "reasonable." As more PEVs are sold over time, there will be costs to utilities associated with meeting increased loads. Utilities and PEV customers can be encouraged to ensure those costs are kept to a minimum by allowing for investments in active load management. Investing in load management will allow for utility customer rates overall to be kept reasonable, while failing to do so is likely to impose costs on the entire system, potentially leading to unnecessary outages, distribution system upgrades, and new capacity builds. Lack of investment will also mean missed opportunities to utilize demand response and increase capacity factors for baseload plants, as well as reducing environmental benefits.

The costs associated with load management are appropriately borne by utility customers overall who will benefit from proactive load management, particularly in avoiding unnecessary impacts to the grid and ensuring utilities' capacity to provide efficient and reliable service. In addition, there are opportunities for utilities to manage PEV load in a manner that, in principle, would lead to downward pressure on overall costs. For example, utilizing existing baseload

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[16] U.S. DOE, Electricity Advisory Committee, December 16, 2008, *Bottling Electricity: Storage as a Strategic Tool for Managing Variability and Capacity Concerns in the Modern Grid*. NREL, *An Evaluation of Utility System Impacts and Benefits of Optimally Dispatched Plug-In Hybrid Electric Vehicles*, Technical Report NREL/TP-620-40293, revised October 2006. NREL, *A Preliminary Assessment of Plug-In Hybrid Electric Vehicles on Wind Energy Markets*, Technical Report NREL/TP-620-39729, April 2006

capacity to a greater extent would allow for faster cost recovery on assets and allow for increased plant efficiencies.

III. Response to Specific Questions

A. *Residential Charging Infrastructure and Policy*

1. What types of residential metering arrangements are appropriate for PHEVs and BEVs and why? Should the Commission require a particular metering arrangement, or should it allow more flexibility in metering arrangements by investor-owned utilities or others? If so, why?

The Commission should establish, at a minimum, general principles and guidelines for IOUs to develop metering arrangements, and other capabilities for utility interface with PEVs, while allowing flexibility for IOUs to contract and work with vendors in offering specific products. The Commission should generally require all IOUs (and third party providers) to separately meter, or sub-meter, the additional load from PEVs. Doing so will allow specific time-of-use ("TOU") rates to be applied to these vehicles so that efficient load management is encouraged. In addition, it would be preferable for sub-meters to allow for energy management capability either through direct communication with the utility and/or internally (i.e., through the home area network). The sub-meter should provide information to the customer, including the appropriate price signal, electricity usage, and carbon footprint of that electricity where feasible. As part of the California Air Resources Board's ("CARB") Low Carbon Fuel Standard, utilities or third party providers will be also required to sub-meter and measure electric transportation separately from other residential or commercial loads in order to receive credits under the program.

Last, the electricity used to charge the vehicle is also, in some respects, unique because it serves as a transportation "fuel." In the future, Federal and State policy may require the electricity used to charge vehicles to face excise taxes similar to petroleum-based fuels.

2. How will electric vehicle meters or sub-meters and EVSE's interact with the advanced meters currently being installed across the service territories of investor-owned utilities? What policies does the Commission need to consider concerning any such interaction?

We note here that this issue is currently being addressed at least in part through the development of interoperability standards at the National Institute of Standards and Technology.[17] Clearly, given the rapid advancements in technology that can be anticipated during the nascent phase of the Smart Grid and PEV deployment, the Commission should consider policies that encourage the use of technologies that are the most easily upgradeable for the least cost. For example, the use of technologies with the greatest flexibility to adapt – e.g., software and/or plug-and-play upgradeable – as the Smart Grid and charging infrastructure evolve. We recommend that this issue be explored and developed through workshop(s). We also reserve the right to respond further on this question in reply to the responses of other parties.

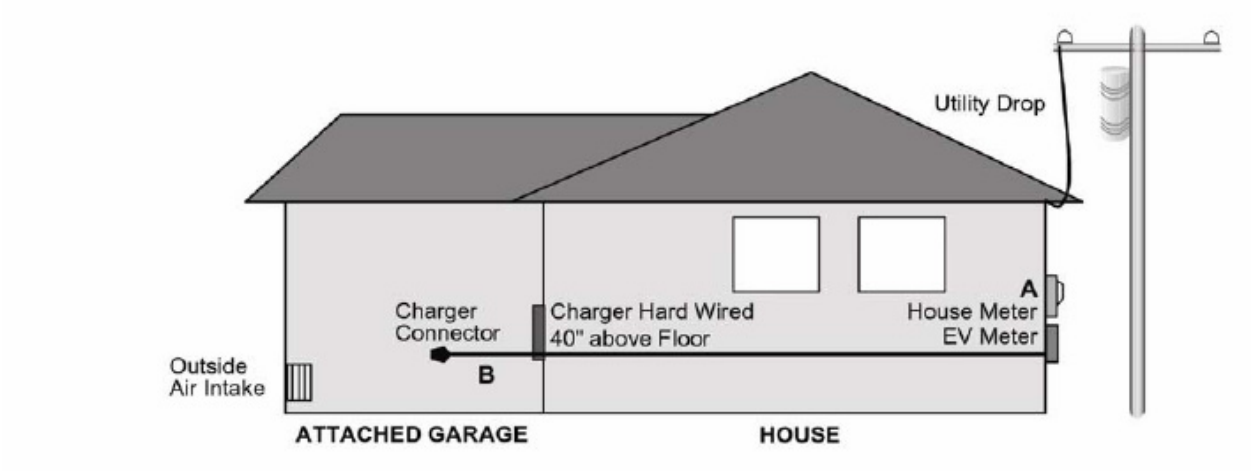
3. What kinds of equipment and electrical improvements will typically be needed to support residential charging for PHEVs and BEVs, e.g., EVSE's, metering, electrical system upgrades? Who should pay for residential equipment and improvements required to support PHEVs and BEVs, and why?

a. Equipment Needed. We understand that utilities and other parties with past experience in installing charging infrastructure will likely cover this question in their comments. We would like to draw the Commission's attention to some recent work conducted by the U.S. Department of Energy's ("U.S. DOE") Idaho National Labs. Figure 4 below, a diagram from this study, provides a schematic of the components needed for PEV charging using Level 2

[17] eg. See: "NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0", released September 24, 2009. (http://www.nist.gov/public_affairs/releases/smartgrid_interoperability.pdf), and accompanying communications standard development for PEVs: "Develop and standardize common object models for electric transportation (6.2.4)" http://collaborate.nist.gov/twiki-sggrid/bin/view/_SmartGridInterimRoadmap/PAP11PEV, and http://www.nist.gov/smartgrid/paps/11-Common_Object_Models_for_Electric_Trans.pdf .

charging (240 VAC, 40 amps).[18] Level 2 charging will likely become the preferred method of residential charging because charging happens more quickly than with Level 1 charging, particularly for PEVs with larger pack sizes. Level 2 charging also provides the utility with greater dynamic control in managing distribution load. It is important to note that customers who choose to use Level 1 charging (120 VAC, 15 or 20 Amps) may still need to invest in a dedicated, new circuit to avoid overload conditions on existing 120 VAC branch circuits, which typically serve multiple outlets.[19] As discussed below, the charging infrastructure cost(s) can be significant.

Figure 4: Depiction of a typical Level 1 and Level 2 installation for a residential garage. Reproduced from DOE (2008).



In general, the installation typically may include a PEV submeter, an EVSE (electric vehicle supply equipment) charging unit, the EVSE charge cord (or connector), and the wiring from the meter to the EVSE unit.

Table 1 shows the U.S. Department of Energy ("DOE") estimated infrastructure costs for individual residences and assumes that separate circuits for both Level 1 and Level 2 charging

[18] DOE (2008), *Plug-In Hybrid Electric Vehicle Charging Infrastructure Review*, Final Report, Battelle Energy Alliance, Contract no. 58517. U.S. Department of Energy Vehicle Technologies Program – Advanced Vehicle Testing Activity. INL/EXT -08-15058.
[19] Ibid., p. 16.

are installed, requiring labor and materials contracted from an electrician. These costs may be reduced if an existing 120 VAC or 240 VAC circuit is already available in, for instance, the garage or car port. These cost estimates also assume that no breaking or cutting of concrete is necessary, that the existing breaker panels are sufficient to accommodate the additional load, and that the EVSE units are manufactured at high volumes greater than 100,000 units.[20] The cost estimates do not include the costs of a sub-meter which would be needed to apply PEV-specific TOU pricing to encourage off-peak charging. It is estimated that such sub-meter material and installation costs might add an additional $400 to $600 to the costs set forth below.[21]

Table 1; Infrastructure Costs for Level 1 residential charging (top) and Level 2 residential charging (bottom). Tables reproduced from DOE (2008). Does not include the costs related to submetering.

Level 1 Residential	Labor	Material	Permits	Total
EVSE (charge cord)	- -	$250	- -	$250
Residential circuit installation (20A branch circuit, 120 VAC/1-Phase)	$300	$131	$85	$516
Administration costs	$60	$43	$9	$112
Total Level 1 Cost	$360	$4 24	$94	$878

Level 2 Residential	Labor	Material	Permits	Total
EVSE (32 A wall box)	- -	$650	- -	$650
EVSE (charge cord)	- -	$200	- -	$200
Residential circuit installation(40A branch circuit, 240 VAC/1-Phase)	$455	$470	$155	$1,080
Administration costs	$91	$94	$31	$216
Total Level 2 Cost	$546	$1,414	$186	$2,146

These costs can pose a significant barrier to customers choosing to purchase plug-in electric vehicles, even considering the Level 1 case. For example, if a PEV with twenty to forty miles of electric range has an incremental cost of $8,000 to $11,000 versus a conventional

[20].http://www.habitatmag.com/publication_content/save_the_environment_save_the_world/electricity_submetering. Last viewed 9/24/2009

[21] Ibid. p. 30.

vehicle, Level 2 residential infrastructure (including the sub-meter) may represent an additional 20 to 30% in incremental costs.[22] Longer term, the costs of PEVs are expected to fall significantly with the mass production of lithium batteries for PEV applications, suggesting that the charging infrastructure will represent an increasing fraction of total incremental PEV costs for customers.

Load management software and utility communication devices that may be part of the EVSE charging unit or submeter, as well as back-end information technology, are also key elements to allowing more efficient, reliable service. These capabilities would also be expected to allow customers to adopt demand response or load shedding programs. These capabilities could also allow for increased integration with intermittent, renewable electricity generation, helping to reduce overall impacts to the system.

Finally, the EVSE may also include components that allow utilities to engage in additional demand response functions. This includes components that allow, for instance, the utilities to modulate current rates used to charge vehicles, thereby allowing for active load management to enhance grid reliability. Residential EVSE units would also allow for Level 2 charging, benefiting PHEV customers directly by allowing charging to occur within a more reasonable time (e.g., 3 hours instead of 8 hours). The EVSE unit also allows utilities greater flexibility to bring load on and off during off-peak hour periods. In aggregate, this functionality also allows for reduced distributional impacts by avoiding the need to turn on all PHEVs within a specific neighborhood circuit at the same time (PEV charge sequencing).

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[22] The PHEV cost estimates are based on estimates from DOE (2006), *Cost-Benefit Analysis of Plug-in Hybrid Electric Vehicle Technology*, NREL Conference Paper, NREL/CP-540-40485. presented at the 22nd International Battery, Hybrid and Fuel Cell EVS-22. Yokohama, Japan, October 23-28, 2006.

b. Who Should Pay? There is a strong justification for utilities to cover some of the costs of residential equipment or improvements in order to benefit the overall interests of utility customers, as defined in PU Code § 740.8:

> As used in Section 740.3, "interest" of ratepayers, short or long-term, mean direct benefits that are specific to ratepayers in the form of safer, more reliable, or less costly gas or electrical service, consistent with Section 451, and activities that benefit ratepayers and that promote energy efficiency, reduction of health and environmental impacts from air pollution, and greenhouse gas emissions related to electricity and natural gas production and use, and increased use of alternative fuels.

The adoption of PEVs in California will create significant environmental benefits in terms of reduction in GHG emissions, improvements in air quality, and enhanced household energy efficiency.[23] In addition, use of PEVs will significantly offset state petroleum use, thereby decreasing our oil dependency and enhancing our energy independence. Utility programs that can reduce barriers to fuel switching will increase these benefits.

Without incentives, PEV customers will fully bear the costs of residential equipment and improvements. Customers are also unlikely to invest in additional components and features that allow utilities to manage the load in an efficient and reliable manner unless they are incented to do so. To reduce the upfront cost burdens to PEV customers, which are likely to discourage them from purchasing and using PEVs, utilities can use innovative financing programs, such as on-bill payment, or other tools to help amortize or reduce these residential equipment and improvement costs over time. Doing so could significantly reduce a major barrier to achieving greater adoption of PEVs – and would help fulfill numerous overall State policy goals.

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[23] EPRI-NRDC, July 2007. Joint Technical Report, Environmental Assessment of Plug-In Hybrid Electric Vehicles,
Volume 1: Nationwide Greenhouse Gas Emissions,
Volume 2: United States Air Quality Analysis Based on AEO-2006 Assumptions for 2030

Utilities also should be encouraged to inform customers of municipal financing programs that may be established pursuant to Assembly Bill 811 or follow-on legislation.[24] This would allow the cost of energy-efficient infrastructure investments to be attached to the property rather than requiring the PEV owner to undertake a personal loan. The State's policy with regard to the California Solar Initiative offers another useful model. The CSI provides an incentive to utility customers who install rooftop solar technology, but employs a tiered incentive structure that progressively declines, such that incentives decline as increasing market penetration thresholds are achieved.

Reducing costs of meters, at least initially while PEV load is growing, is also in the *direct* interests of all utility customers to ensure that PEV load is met in a manner that ensures safe, reliable, and less costly electricity service. To the extent that meters are avoided, due to high costs, the utilities' opportunity to affect time of use charging will be reduced (if not otherwise compulsory).

4. What policies should the Commission adopt to encourage competition and innovation in the market for residential infrastructure development for PHEV and BEVs?

We respond jointly to questions 4 and 5 below.

5. Should the Commission consider allowing utilities to invest in and rate-base residential electric vehicle charging in order to encourage and support early adoption of PHEVs and BEVs? If so, what components of the infrastructure should the utility be authorized to invest in, e.g., wiring upgrades, EVSE? Should utility investment continue once the market matures? What impact might this have on the competitive marketplace relating to electric vehicle charging infrastructure by non-utility entities?

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[24] D.09-09-047, issued September 24, 2009 in A.08-07-021 et al. (utility applications for energy efficiency programs), describes conditions where utilities can interact with these municipal financing programs. See p. 285. The Commission has said that while it does not see a direct role for utilities in the development of municipal finance programs, it does recognize a role for utilities in providing information about these programs and improvements that can occur under them.

As discussed in response to the questions above, it is in the interests of all utility customers to ensure that this new electricity load is met in an efficient manner that minimizes the need for new capacity builds and avoids negative impacts to the transmission and distribution systems. There are also potential opportunities for load management to have beneficial impacts to the system. For example, greater utilization of existing baseload capacity would tend to create downward pressure on customer rates. In addition, there may be additional value created from the integration of PEVs with variable generation resources such as wind energy. FERC, in a recently proposed policy statement, identified potential challenges to resource management from variable generation resources that may over-generate during off-peak periods.[25] PEVs with "dispatchable" demand response capabilities may be able to provide system benefits by helping address over-generation from new renewable resources and by allowing for improved balancing of the bulk-power system.

Absent the proper residential equipment, utilities will have little ability to ensure PEVs are charged in a manner that minimizes the negative grid impacts and maximizes potential grid benefits. Utility investment and rate-basing components that allow effective load management to occur are consistent with PU Code § 451, and will result in less costly service. These components can include, but may not be limited to, sub-metering, bi-directional communications and energy flow and control, and the software components on the utility or residential side of the meter.

It is important to note that this justification is separate from encouraging and supporting early adopters of PHEVs and BEVs. As discussed in response to question 3, it is expected that

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[25] "Proposed Policy Statement and Action Plan," Federal Energy Regulatory Commission, Smart Grid Policy, 126 FERC 61,253, p. 14, Docket No. PL09-4-000. http://www.ferc.gov/whats-new/comm-meet/2009/031909/E-22.pdf

PEVs and BEVs will begin to be mass-produced in the near future[26] and may quickly enter a post early-adopter stage. *It is particularly at this stage – when PHEVs and BEVS become more ubiquitous – that load management becomes all the more critical and necessary.* Utility investments and programs to manage the load will be even more important as the market develops and potential grid impacts become more significant. The introduction of BEVs, in particular, may drive the development of public infrastructure or workplace charging. These trends may increase the amount of daytime charging, including charging during peak times, as well as result in the use of Level 3 fast-charging (charging at 440/480 VAC and between 60 to 150 kW) – both of which will result in additional system impacts. It is therefore even more critical that the Commission allow utilities to encourage behavior that is consistent with minimizing impacts. The Commission also must ensure that infrastructure developers (i.e., third-party service providers) are working with utilities to manage this load.

For the other components of the residential equipment and infrastructure that are not necessarily part of load management, the Commission also can consider alternative mechanisms to traditional "rate basing," including allowing for utility on-bill financing, low-interest loan programs, leasing or renting the equipment to customers, partnerships with other agencies or banks to help customers obtain funding, or utilizing state or federal incentive funds (e.g. AB 118, the Alternative and Renewable Fuel and Vehicle Technology Program).

The presence of utility programs will, on the whole, increase competition in the electric transportation marketplace. Similar to other utility programs related to energy-efficiency,

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[26] See, Southern California Edison, August 24, 2009, *Update On SCE Electric Transportation* for IEPR Workshop on Transportation Demand. http://www.energy.ca.gov/2009_energypolicy/documents/2009-08-24_workshop/presentations/07B_SCE_update_on_ET.pdf, Also see: Pike Research, July 8, 2009. Plug-in Hybrid Electric Vehicles: The Global Outlook for PHEVs: Business Issues, Technology Issues, Key Players, and Market Forecasts

distributed energy generation, or Smart Grid technologies, utilities will contract with vendors who supply these products. Increased demand from utilities and customers for load management devices, for example, will likely attract more vendors into the market, increasing competition, product offerings, and stimulating job creation. It is important to note that nearly all the EVSE suppliers are small or start-up companies and that utility involvement will likely grow the market for their products and services. There are numerous California businesses that stand to benefit from growth of PEVs, load management technologies, and infrastructure development. These include EVSE suppliers, third party service providers, PEV companies, lithium ion battery companies, load management software developers, and even PEV component suppliers.

If there are concerns regarding utilities also offering similar EVSE or infrastructure products or services, the Commission can ensure that utility customers are able to select products from non-utility vendors and that consumer choice is not limited. Because the market for residential infrastructure and PEVs has been small so far, the expected growth in the PEV market will likely provide opportunities for new product and technology innovations to occur. Considerable investments in technology research, development, and deployment are being made by automakers, EVSE and infrastructure service providers, utilities, and software developers alike. The Commission can help further this innovation by not focusing on a specific technology type, vendor, or business model. Instead, the Commission should identify the specific principles and policy goals it desires and ensure that utility investments are consistent with these principles and policy goals.

The many issues identified in response to these questions illustrate the need for the Commission to examine carefully placing certain components of the residential charging infrastructure related to load management in rate base.

6. If a utility proposes to own customer-premises EVSE's, how will the Commission ensure that near-term EVSE and metering capital investments are interoperable with future generations of PHEV and BEV technology?[27]

Major automakers are working with the Electric Power Research Institute ("EPRI") under the National Electric Vehicle Infrastructure Working Council ("IWC") to develop and finalize standards for EVSEs, including communication protocols. These standards are expected to be adopted by the Society of Automotive Engineers ("SAE"). Commission staff can participate in the Infrastructure Working Council as needed. The Commission should ensure that the near-term EVSE and metering equipment purchased by utility customers meet general codes and standards, including but not limited to:

- Equipment standards under the SAE and Underwriters Laboratory ("UL")
- Safety standards with the National Fire Protection Association, the National Electrical Codes, and California Building Codes (including construction features to address shock hazards and battery off gassing concerns).[28]

In addition, the Commission should confirm whether existing "smart meters" will have the capacity to interface with sub-meters or other load management/tracking software as it comes to the market. If not, the Commission should work with utilities to enable these capabilities.

7. What approaches are there to provide PHEV and BEV charging for owners who do not have regular access to a garage for residential recharging (including single family dwellings and multiple dwelling units (MDUs) like apartments, condominiums, and duplexes)? What regulatory issues does the Commission need to address relative to infrastructure for such residents?

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[27] For example, automakers currently exclude a second meter or sub-meter from planned factory-production PHEV and BEV models. Future vehicle designs may include an on-board meter with the currently available on-board vehicle charger and communication hardware and software.

[28] For an initial, although now dated, reference, see Mark Rawson and Sue Kateley, *Electric Vehicle Charging Equipment Design and Health and Safety Codes*, August 31, 1998, California Energy Commission. Please also refer to our response to question 2.

According to the U.S. DOE (2008) study we referred to in our response to question 3, the costs of residential charging infrastructure for multiple dwelling units ("MDUs") are somewhat similar to residential, single family homes with a garage (with higher up-front costs but lower costs on a per charger basis). That said, utility customers living in MDUs who do not have regular access to charging will likely not purchase PEVs. In fact, automakers are initially targeting only those customers who have access to home charging. There is a clear need, however, to address this barrier in order to achieve State and Federal policy goals for substantial reductions in oil dependency and GHG emissions. Some opportunities to address this issue, include:

- Incentives, such as under the LEED-ND (Leadership in Energy and Environmental Design for Neighborhood Development), to have MDUs install charging for plug in vehicles or other alternative fuel vehicle infrastructure.

- Encouraging programs that overcome the split incentive problem between the owner of a property and the tenant for energy efficiency improvements. The Commission is addressing this to some extent in its low-income energy efficiency program, and may be able to bring that knowledge to bear in deployment of the infrastructure required to support alternative-fueled vehicles.

- Continually updated building codes, appliance and vehicle standards, and performance-based incentives.[29]

Commission policies should strive for consistency and parity between residential homeowners and those living in multi-tenant buildings. The goals of ensuring active and effective load management, maximizing environmental benefits, and minimizing costs hold just as strongly for MDUs as they do for detached single homes with garages.

8. How can the Commission, in coordination with utilities, relevant state agencies, federal authorities, local governments, and other entities, streamline EVSE permitting, installation, and approval processes from the time of PHEV and BEV purchase to EVSE activation?

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[29] NRDC (April 2009), "Cap 2.0: Policy Solutions or Curbing Global Warming and Building the Clean Energy Economy." www.nrdc.org/cap2.0

What jurisdictional barriers should be assessed to achieve a streamlined permitting, installation, and activation process for residential EVSE?

Currently, automakers planning to release BEVs and PHEVs have been working at various governmental levels to ensure market readiness in cities and regions. For example, the current launch of Nissan's battery electric vehicle, the Leaf, was prefaced by many months of outreach to States, utilities, local companies, universities, non-governmental organizations, and the public to ensure the needed infrastructure and permitting process would be in place. Given the unique needs of the different service territories the Commission might – in collaboration with the CEC and other key regulatory authorities – produce a set of standardized guidelines that can be easily adapted by local and regional permitting authorities to highlight the importance of expediting permitting while ensuring proper equipment installation.

Figure 6 below shows that a critical barrier to PEV deployment is the time and steps currently necessary for customers to have available the appropriate EVSE and home charging infrastructure installed. At a minimum, utilities will need to be prepared to: (1) respond to customers requesting information about installing EVSE and submeters, including providing a description of all necessary equipment, equipment providers, permitting requirements, etc.; (2) ensure that there is adequate power circuitry available in the existing supply panel; (3) educate customers on PEV charging rates; and (4) ensure equipment is installed and connected to the grid in a safe manner.[30]

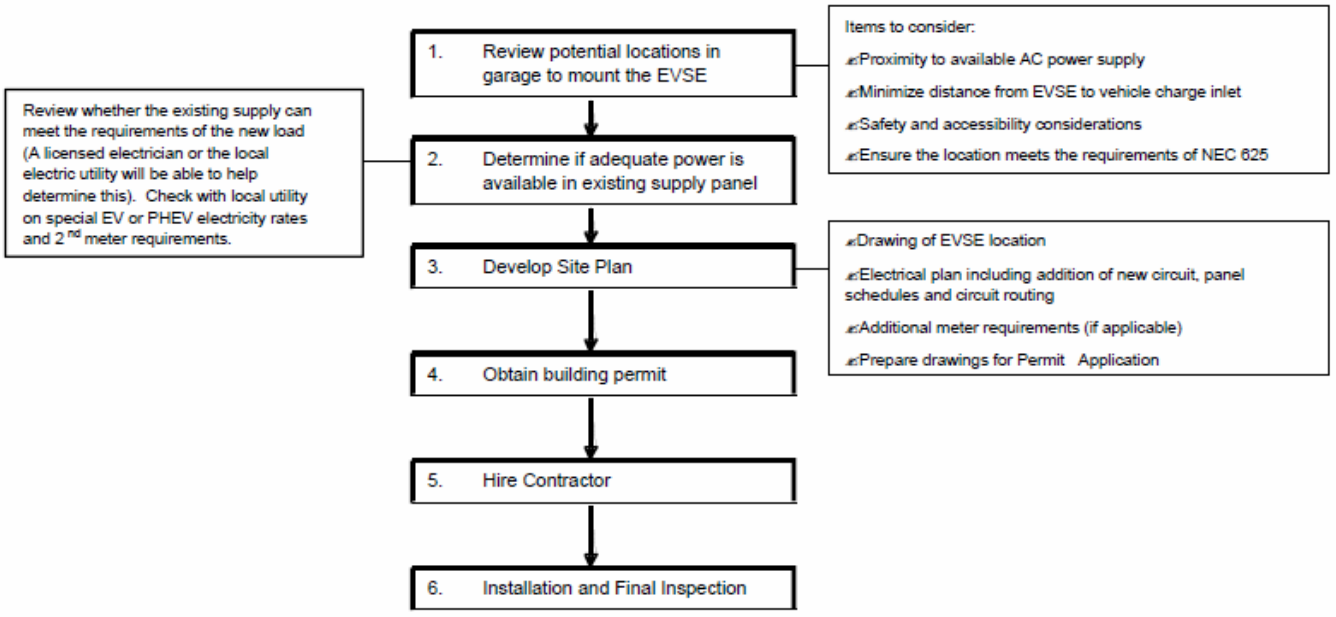
Customers would benefit from this process taking minimal time, being integrated with the vehicle purchase, occurring in less than one week (or within the time of their vehicle

[30] This is similar to Conclusion of Law 11 in D.03-10-086 (the last Commission proceeding related to this issue, in that case low emission vehicles), which states: "The use of ratepayer funds to educate customers on how to fuel and charge their vehicles safely meets the requirement that LEV funding enhance customer safety."

delivery), and ideally involving only one visit from a single company. The Commission can help streamline this process by working with other State and local agencies, utilities, and automakers to develop overall goals for the State in terms of streamlining this process, establishing overall State guidelines, and reducing the number of entities with which customers must interact to install equipment.

Given the unique needs of the different service territories the Commission might – in collaboration with the CEC and other key regulatory authorities – produce a set of standardized guidelines that can be easily adapted by local and regional permitting authorities to highlight the importance of expediting permitting while ensuring proper equipment installation.

Figure 6: Process map for installation of residential Level 1 and Level 2 EVSE charging. (DOE 2008) [31]



[31] USDOE, November 2008. Plug-in Hybrid Electric Vehicle Charging Infrastructure Review.

B. *Commercial and Public Charging Infrastructure and Policy*

9. How should electricity used for PHEVs and BEVs be metered at commercial and public charging facilities?

There is a strong need to ensure that active load management occurs at both commercial and public charging facilities because of the more likely use of Level 2 (240 VAC, 2.8-19.2 kW) and Level 3 (or fast charging at 440/480-VAC and between 60 - 150 kW,), as well as day-time charging. Because both commercial and public charging facilities will be managed, for the most part, by private commercial entities, the Commission should consider what equipment, including sub-metering, might be required by the Commission for these entities to minimize grid impacts and costs.

10. Who should pay for commercial and public meters, EVSE, and related upgrades?

These costs will be properly born by commercial property owners or private, commercial entities deploying the public charging infrastructure as the cost of their business. Incentives for initial commercial and public metering and start-ups have been made available through policies such as State and Federal incentive programs (i.e., AB118, ARRA of 2009). While commercial property owners and third-party infrastructure providers (3PPs) are unique in that they:

1. Serve as intermediaries between utilities and the PEV owner in supplying the electricity in the manner that fits their business model(s).
2. Earn profit or other benefits from the installation and/or management of the specific infrastructure equipment used.[32]

[32] These include enhanced customer service benefits, for instance, if the infrastructure is installed at a mall or store and made available for free to customers.

3. Are not required to make investments on the behalf of all utility customers and are not obligated to serve.

4. Likely have the capacity to include devices and software on their systems to enable, potentially, active load management functions.

Utilities are obligated to meet and manage the load from commercial and public infrastructure regardless of who purchases the infrastructure. Commercial entities that install and manage electric transportation infrastructure should be encouraged, or potentially required -- if the Commission finds it has jurisdiction -- to have contractual/permitting arrangements with the utilities to ensure the utilities are aware of the presence and location of all charging infrastructure, the size and time of the load, and that commercial entities make reasonable efforts, or allow and enable utilities to, minimize grid impacts. As discussed in our response to question 15, the Commission likely has jurisdiction over third-party electric service providers, however, this issue is one that might best be explored and developed through workshop(s).

11. How should the Commission ensure that commercial and public charging facilities are cost-effective, openly-accessible, and interoperable with a Smart Grid system?

We refer to our response to question 3. Absent Commission jurisdiction over commercial and public charging facilities and specific requirements that standards be met, commercial and public charging facility providers will largely determine the level of cost-effectiveness for PEV customers, open access, and interoperability. Some third party providers have identified that they will provide "open access," albeit at a potentially higher service charge to the public not already subscribing to their service plans.

If the Commission finds it has jurisdiction, then it can establish policy goals and metrics for these facilities. As discussed in response to question 10, the Commission can also require that facility providers, or third party providers ("3PPs") participate in, or allow utilities to

implement, load management programs, and communicate the location and presence of the charging infrastructure to ensure necessary upgrades are made to the distribution system.

With respect to utility costs from distributional upgrades due to the public charging facilities, these costs should generally be borne by all utility customers similar to other commercial entities provided those facilities work with utilities to ensure effective load management can occur. We recognize, however, that this is a complex issue, and that currently no analysis of specific distribution costs associated with these facilities is publicly available. The issue of who should pay for distribution upgrades might best be explored and developed through workshop(s).

12. Are additional building codes needed for residential, commercial and public charging facilities to supply sufficient electrical services to PHEVs and BEVs? What role, if any, can the Commission play in this regard?

Additional codes may be needed. As we mentioned in our recommended general principles and response to question 8, the Commission should coordinate with the California Energy Commission and the California Building Standards Commission on issues related to building codes. The *Strategic Plan for Energy Efficiency*, jointly adopted by as the Commission and the CEC, calls for zero net energy homes and commercial buildings by 2020 and 2030, respectively. Readiness requirements for Smart Grid and PEVs should be incorporated into the Title 24 code and the Green Building Standards.

13. What policies should the Commission adopt to facilitate competition and innovation in the commercial and public infrastructure market?

No comment at this time.

14. What issues need to be addressed related to the relationship between regulated electricity utilities and third-party electric vehicle service providers that are proposing and/or implementing charging services at residential, commercial and public locations?

One of the key issues, based on the policy goals described throughout these comments, is the issue of how utilities can best manage the load from customers who are third-party providers ("3PPs"). Utilities should encourage or require the same off-peak charging behavior from commercial customers and 3PPs as they do for residential customers. However, 3PP business models are primarily based on providing access at any time to electric charging, potentially including fast charging, or even charged batteries that can be swapped out as cars pull in to PEV "service stations." While this may be beneficial for BEV customers in particular, the model does increase the potential of negative impacts to the grid and makes it more challenging to meet the Commission's overall goals of ensuring reliable and cost-effective service. The Commission should consider how to best incent or require 3PPs to work with utilities to manage the load in a manner that will minimize costs for utility customers overall.

Also see our response to question 15 where we address some additional issues.

C. *Legal Issues Related to the Ownership and Operation of Charging Infrastructure*

15. Under what circumstances are third-party electric vehicle service providers public utilities and/or electrical corporations pursuant to Pub. Util. Code § 216 and Pub. Util. Code § 218? What implications do Pub. Util. Code § 216 and Pub. Util. Code § 218 have on the competitiveness of the third-party electric vehicle service provider market? If the Commission has jurisdiction over third-party electric vehicle service providers, what is the appropriate level of regulatory oversight?

PU Codes §216 through §218 appear, on their face, to provide jurisdiction over most third-party electric vehicle service providers.[33] Third-party providers typically own, control,

[33] PUC Code §217 defines an "electric plant" as including all "…fixtures and personal property owned, controlled, operated, or managed in connection with or to facilitate the . . . furnishing of electricity for…power…." Section 218(a) provides that an "electrical corporation includes every corporation or person owning, controlling, operating, or managing any electric plant for compensation within this state unless the electricity is [for] its own use or that of its tenants and not for sale or transmission to others." Section 216(a) provides that whenever… an electrical corporation… performs a service for, or delivers a commodity to, the public or any portion thereof *for*

operate, or manage charging equipment (Code § 218) that facilitates the furnishing of electricity for power to the public (Code § 217), for which compensation or payment is received (Code § 216). Thus, such providers can be regarded as a public utility subject to the jurisdiction, control, and regulation of the Commission. (Code § 216). The language of the Code is quite broad and is not limited only to circumstances where 3PPs charge consumers for electricity use. Commission case law, however, is likely to be relevant to answering this question and thus we do not currently take a position on whether, or under what circumstances, 3PPs are subject to the jurisdiction of the Commission. We recommend that the Commission's legal jurisdiction is another area that would benefit from a workshop to explore the full range of issues, both from a legal and policy perspective.

We do note, however, that third-party providers of vehicle recharging systems are likely to cumulatively charge hundreds or, in the near future, thousands of vehicles. These systems, if not carefully integrated and controlled, have the potential to negatively impact grid operations and system reliability. Even a single PHEV can overload a neighborhood transformer,[34] and hundreds of cars charging during peak hours can put significant pressure on grid resources, with the potential to interrupt grid services or to increase the need to additional generation capacity. By establishing jurisdiction over 3PPs, the Commission is more likely to be able to ensure the provision of reliable and cost effective service to California electric customers. This is especially the case as fast charging becomes cheaper and more ubiquitous.

If the CPUC finds that it has jurisdiction over 3PPs, it should exercise that jurisdiction in a limited manner. Positive innovation and competition are now occurring in the charging

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which any compensation or payment whatsoever is received, that… electrical corporation… is a public utility subject to the jurisdiction, control, and regulation of the commission and the provisions of this part."

[34] *See*, *e.g.* Presentation: "Effects of Transportation Electrification on the Grid," Arindam Maitra, EPRI, Plug-In Conference, August 2009, slides. 22-26.

infrastructure market; to avoid stifling this emerging market with inapplicable or burdensome requirements associated with an "electrical corporation," we recommend that such 3PPs be conditionally exempt and subject only to a limited set of rules and procedures governing their interaction with utilities and the provision of vehicle charging. These procedures should be designed to ensure that high quality, reliable, and environmentally sensitive service is provided to California electric customers. Procedures could include:

Notification: 3PPs should provide notice of the following to the IOU:

- when chargers will be installed and activated
- location of chargers
- charger capacity, i.e., amps/volts/level 1,2,3
- communications system software type
- changes to equipment type or location (e.g., upgrade to level 2 or 3 chargers).

Technical and operational standards: 3PPs should ensure the following prior to installation of charging systems:

- Use of SAE J1772, UL approved plugs/receptacles (for Level 2 charging. Level 3 standards are still under development)
- Ability to implement, or allow utility to implement, peak load management measures, including time of use rates; sequential charging to avoid transformer stress; load shedding; and/or optimization of power utilization.
- Disclosure of pricing of services in a format clearly legible and easily understandable to consumers

Other considerations:

- 2-way smart grid communications

- Payment toward transmission and distribution costs
- Tracking of fuel consumption for purposes of credits
- Potential maintenance obligations on the owner of the meter or installer.
- Incentives for development of distributed renewable energy sources, such as solar or wind, in conjunction with installation of chargers.

16. What statutory changes, if any, should the Commission propose to the legislature to encourage innovation and competition in the charging infrastructure market?

While the CPUC may conclude that third-party electric vehicle service providers ("3PPs") are public utilities within the meaning of PU Code Section 216, we do not believe that the extent or type of jurisdiction that can be exercised over 3PPs would necessarily end there. The CPUC may also find it must deal with one or more CPCN (Certificate of Public Convenience and Necessity) proceedings to determine that a public need exists for these "3PP public utilities" to serve a specific segment of customers on a monopoly basis (without competition) with a defined service territory map. This could prove cumbersome to 3PPs at the risk of dampening competition, suggesting a need for legislation that either: 1) establishes transparent rules that reduce the burden that otherwise applies to a CPCN finding for a public utility, or 2) provides the CPUC with specific statutory direction, like that which exists to define the service and regulation of ESPs (energy service providers) and CCAs (community choice aggregators) and which allows for competition.

D. *Codes and Standards*

17. Please identify current and pending Society of Automotive Engineers vehicle design and interface technical requirements, the Underwriters Laboratory listed components and systems, and the National Electric Code, California Electric Code, and California Building Code Regulations that govern the installation, operation, and maintenance of charging infrastructure at the residential, commercial, and public charging EVSE. How does the

timeframe for each code and standard adoption impact current and future vehicle and EVSE products? What role, if any, can the Commission play in improving or encouraging this process?

No comment at this time.

18. How important is consumer choice as to Charging Levels ((Level 1, 2 or DC)? If important, how may the Commission best balance driver and grid benefits for all residential, commercial, and public charging infrastructure?

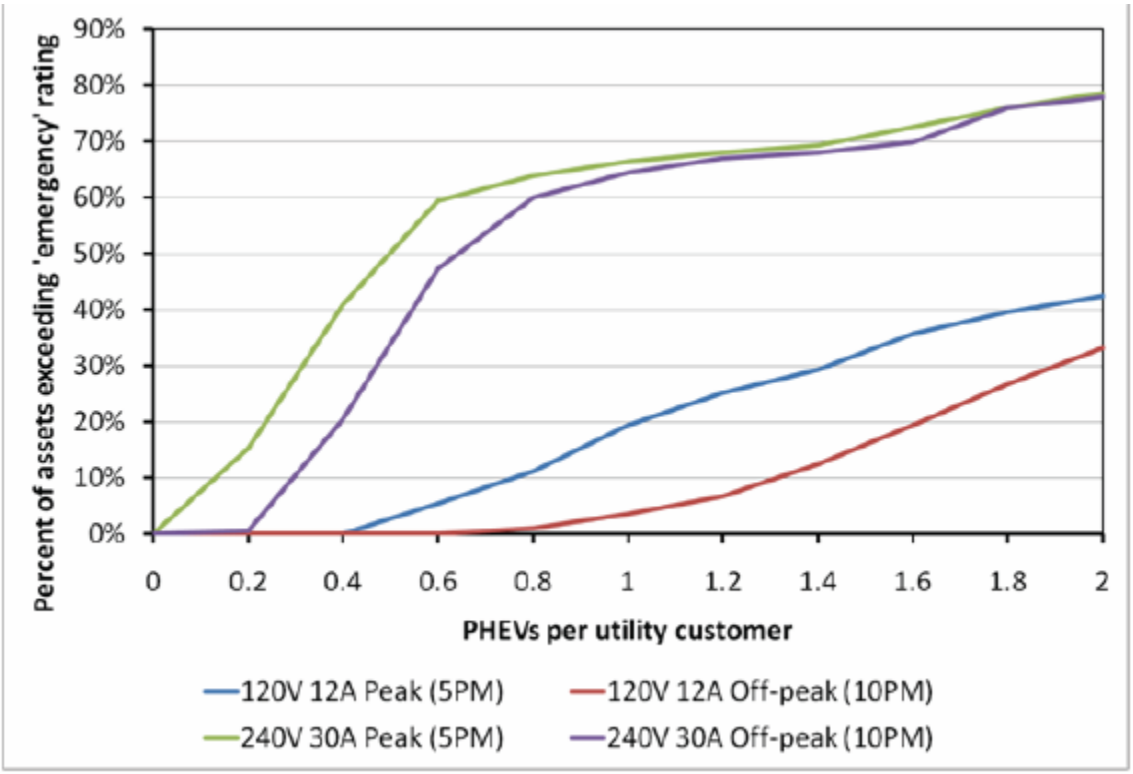
There is likely to be a wide range of charging needs and desires across the spectrum of electric transportation users. Allowing consumers to choose the type of charging infrastructure they want will facilitate the growth of electric transportation. The Commission can balance electric transportation user needs with the need for grid stability and efficiency by requiring and assisting utilities in planning for growth in this market -- from establishing TOU rates, to appropriate smart grid communication software, to facilitating use of in-home meters by making the process of meter installation straightforward and easy (including working with cities and counties to standardize permit processes).

The Commission should generally support the deployment of Level 1 and Level 2 charging, as these will be the main types of charging for nearly all PEV households. However, as a study by EPRI (2009) demonstrates, Level 1 and Level 2 charging can potentially have different impacts. There are greater opportunities to engage demand response techniques with Level 2 charging.[35] Level 3, or fast charging at 440/480 VAC and between 60 to 150 kW, is likely to be offered by third party charge infrastructure providers in the future. Level 3 charging, however, can have even greater negative impacts on the system. Commission policies in general

[35] EPRI (2009), Arindam Maitra, "Effects of transportation electrification on the electricity grid," Plug In Conference 2009, Long Beach , California. August 11, 2009. NB: Marcus Alexander also presented this and the transformer degradation slide at the July 15th PUC workshop. EPRI (2009), Marcus Alexander, "Effects of transportation electrification on the electricity grid." CPUC Smart Grid Workshop 4 – Plug-in Electric Vehicle Integration Issues, San Francisco, July 15, 2009.

should ensure certain minimum standards are met for Level 3 charging from commercial entities in terms of load management, such that this aggregated load is either isolated from the distribution grid or shifted away from peak hours and that entities work with utilities to mitigate system impacts. As we see in Figure 7, charging at higher power generally increases asset demand, particularly if it is unmanaged.

Figure 7: EPRI (2009) showing potential asset overloading with increased charging rates.



19. What role can the Commission play to ensure EVSE compatibility with a unified EVSE conductive charge coupler standard (J1772) for all residential, commercial, and public charging EVSE within regulated utility service territories? What role can the Commission play to ensure that EVSE be forward compatible with emerging Society of Automotive Engineers loads, messages, and programs communication standards (J2293, J2836, and J2847)?

No comment at this time.

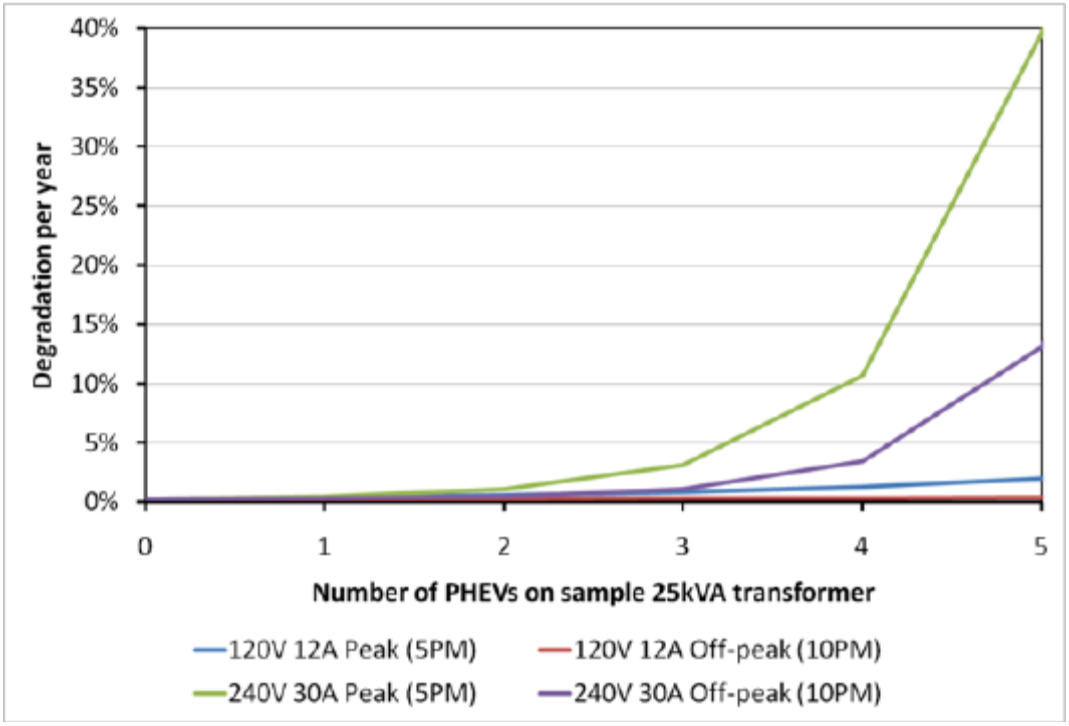
E. *Electrical System Impacts*

20. What are the potential electrical distribution system impacts associated with geographically concentrated PHEV and BEV charging in the near-term? How will utilities anticipate these impacts and make capital investments needed to ensure service network reliability? How should the utility capital investments be paid for and recovered?

As identified in the Commission electric transportation white paper, the July 15, 2009 hearing on this issue, and various analyses and reports from utilities,[36] if the Commission's Energy Division and the utilities are not prepared, electric transportation has the potential to create negative impacts on the electrical distribution system, from reducing the life of transformers to pushing peak demand above the limits of current generation capacity. Concentrated electric transportation charging – as could occur when a pocket of PEVs develops in a residential neighborhood or commercial area – in particular, is likely to stress existing infrastructure. As demonstrated in Figure 8 below, transformers in many neighborhoods are currently operating at or near their limits. Adding only one or two PEVs may cause such transformers to overload.

[36] See the separate comments dated July 1, 2009. from EPRI, and Southern California Edison Company on: California Public Utilities Commission Staff's White Paper, *Light-Duty Vehicle Electrification in California: Potential Barriers and Opportunities*, May 22, 2009

Figure 8: EPRI (2009) showing the effect of increasing PHEV load on Transformer aging.



Utilities can anticipate and prepare for these problems in a number of ways. First, utilities must affirmatively plan for increased use of electric transportation. Utilities can and should gather information about where electric transportation is likely to occur. For example, the history of hybrid purchases will be indicative of where electric transportation is likely to be used. Another predictor of where a utility should anticipate future high adoption rates could involve the use of income and education levels, analogous to trends involving conventional hybrid electric vehicles. It could be expected that as the market develops and costs fall, the PHEV and BEV technology will become increasingly used across many model lines. Research of this type is currently being done by a variety of university researchers. Utilities should also be communicating with automakers as to specific roll-out plans to anticipate areas where initial sales are likely to occur. Communication with 3PPs will provide additional information as to where impacts are likely to occur and to what degree. In addition, utilities must be required or

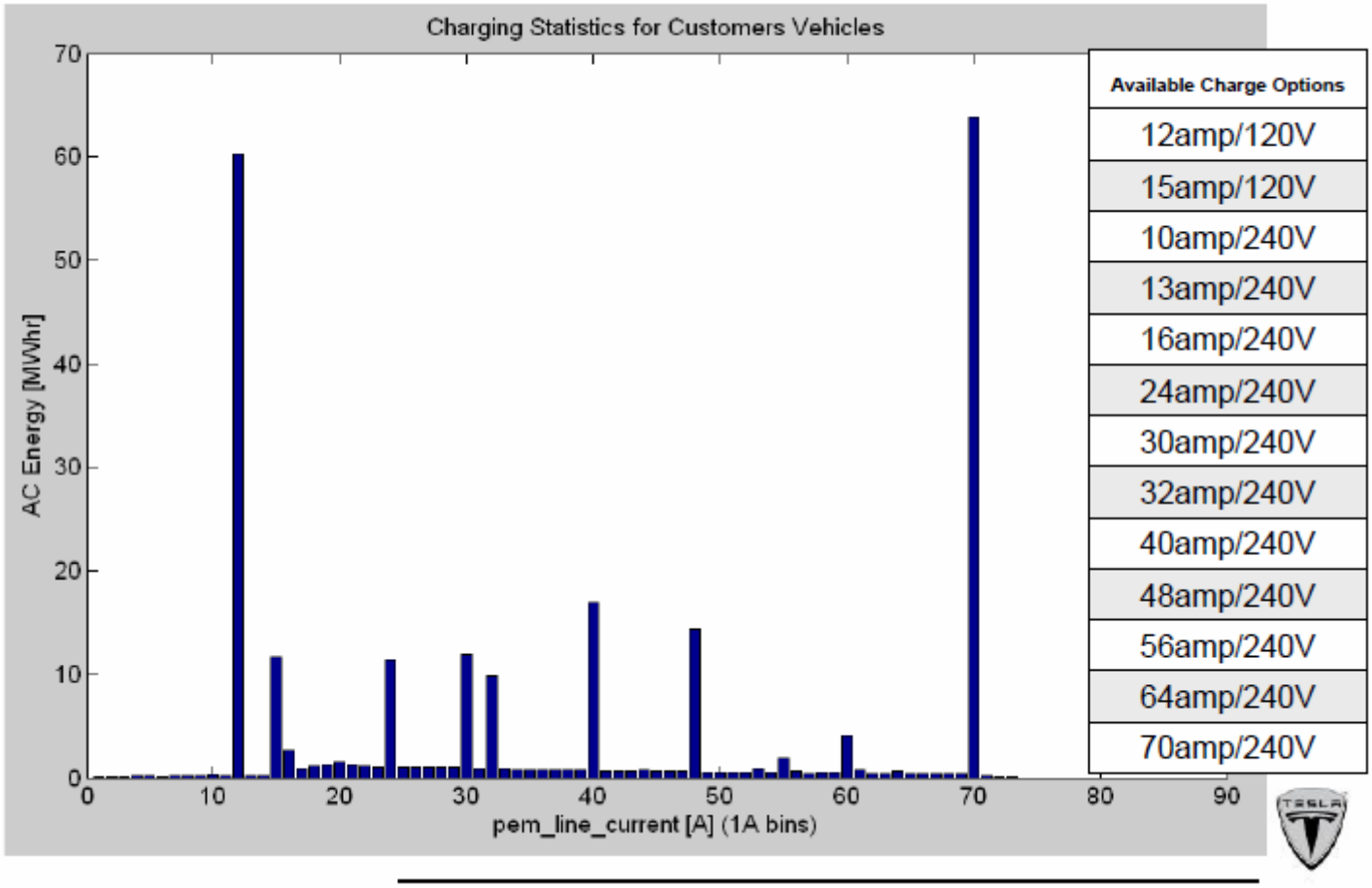
encouraged to develop proactive and easily accessible TOU rate plans, effective and easily installed metering equipment, smart communication software, and consumer incentive programs to encourage charging that best preserves system integrity. Investments in these programs should be rate-based, as they are critical for ensuring a continued reliable and efficient electrical distribution system for all users, similar to utilities' response to other high demand appliances. As discussed in our response to question 3 above, in-home meters and other vehicle charging infrastructure will largely be paid for by the users, but utility investments and incentives are necessary to ensure that this infrastructure is deployed with load management and TOU capabilities. In addition, as stated above, financing options such as on-bill financing in combination with Federal, State, or local incentives should be used to encourage the use of electric transportation.

21. What commercial and public infrastructure options are most likely to be deployed, e.g., Level 1 charging facilities, Level 2 charging facilities, "service station" model DC charging facilities, and/or battery swap stations? Should the Commission adopt policies to favor certain charging options taking into consideration cost-effectiveness, grid benefits, ability to meet PHEV and BEV driver charging demand, and ability to reduce BEV driver "range anxiety"?

Technology reviews and consumer surveys indicate that we are likely to see a broad range of infrastructure deployed. For instance, information from Tesla indicates that about half its customers were satisfied with Level 1 charging while about half use fast charging, as shown below in Figure 9.[37] This chart shows that many of the Tesla drivers charge their vehicles using Level 1 charging, while many others charge using Level 2 charging at high electricity rates.

[37] Tesla - Vehicle Fleet Experience Overview., September 22, 2009. Troy Nergaard presentation on behalf of J.B. Straubel to the California Air Resources Board 2009 ZEV Symposium.
http://www.arb.ca.gov/msprog/zevprog/2009symposium/presentations/straubel.pdf

Figure 9: Tesla Motors data showing charging statistics for customers.



Public infrastructure is likely to tend toward at least Level 2 charging, unless units are deployed at locations such as transit stations or other places where people would remain for enough time to charge at Level 1 rates. On freeways and interstate highways, where long distance travel occurs, fast charging at "service stations" is likely to be employed as the technology matures. Currently, at least one company is beginning to install service station type charging systems.[38] It is likely that, if notification and load management requirements are required of third party providers, little

[38] DMC Green, Inc. presentation to September 23, 2009 California Air Resources Board Workshop on electric vehicle charging infrastructure needs. Also see: http://www.businesswire.com/portal/site/home/permalink/?ndmViewId=news_view&newsId=20090805005356&newsLang=en

more will need to be done by the Commission. The market will provide an appropriate range of charging infrastructure.

Although not necessary, the Commission could consider working with the CEC or other State entities to develop funding mechanisms or incentives that promote the installation of charging infrastructure. The government of Japan provides a good example. It is currently funding the installation of fast charging infrastructure in specific areas in Japan. Initial analyses indicate that the existence of publicly available fast charging units has encouraged consumers to increase the distance they drive their cars, without dramatically increasing use of public fast charging infrastructure, i.e., just knowing that fast charging was available encouraged fuller use of battery range, while the majority of charging still occurred at home.[39] The advantages of this type of program are that the Commission and the utilities would have greater control over the planning and development of charging infrastructure (in conjunction with 3PPs).

22. What potential load shape impacts associated with PHEV and BEV charging should utilities anticipate in the near-term? How can time variant pricing, demand response programs, and advanced meters mitigate load spikes associated with uncontrolled, simultaneous charging found to occur at specific times of day, for example, when drivers arrive home from work? How should the Commission address potential load spikes if a large number of customers begin charging simultaneously when lower electricity rates apply under TOU rate schedules?

Certain utilities, including Southern California Edison, have analyzed load shape impacts associated with increased use of electric transportation. These projections demonstrate the potential for significant load impacts in the absence of controls such as time variant pricing and demand response programs. As various presenters noted at the July 15, 2009 Smart Grid hearing, even time variant pricing has the potential to create load spikes if the majority of drivers

[39] Tokyo Electric Power Company (2009), Fast Charging Technology - Tokyo Electric Power Company's EV Demonstration, Plug-in 2009 Conference, Long Beach, California, August 10 & 13, 2009 presentations by Takafumi Anegawa

set timers to begin charging when off-peak rates begin. To avoid load spikes, utilities are likely to seek greater control of vehicle charging, including required use of communication systems that facilitate utilities' ability to control charging, such as the ability to load shed or to ramp or regulate charging. The benefits of such control to the utility system are obvious, but any such load control systems must also be designed to ensure that electric transportation users can reliably charge their vehicles as they need. To the extent that utility load control mechanisms decrease consumer confidence in their ability to obtain a full charge when needed, the use of electric transportation will decrease and the benefits associated with this mode of transportation will also decrease.

23. In the long term, what are the benefits and drawbacks on electric generation and transmission associated with projected PHEV and BEV market growth in California?

PHEVs and BEVs have many benefits. These highly efficient cars decrease greenhouse gas pollution, decrease petroleum use, increase use of domestic power, and reduce criteria pollutants in highly impacted urban areas. Further, by linking electric vehicle charging times and rates to peak wind or solar generation, electric vehicles can optimize the use of intermittent renewable energy. This increases renewable resource utilization, decreases cost, and brings wind and solar within the cost range of, and in some cases below, fossil fuel-based generation. This, in turn, can drive increased employment and additional investment in the clean energy sector. In addition, when arrayed in a future smart network, large numbers of these vehicles can aid in providing some ancillary services such as distributed energy storage or regulation services. PHEVs and BEVs can improve existing generating capacity asset utilization. These vehicles also can be linked with on-site distributed generation systems such as rooftop solar or wind, which can reduce impacts to transmission systems as well as the need to build additional transmission and distribution lines.

The potential drawbacks of the projected market growth in these vehicles are real, but can be avoided or minimized with advance planning. As discussed throughout these comments, uncontrolled charging of PEVs and BEVs can, if not appropriately managed, impact peak load requirements, negatively impact grid reliability, and increase the need for fossil-fuel based generating capacity, unnecessarily increasing costs to consumers. Over the long term, as electric transportation use becomes more ubiquitous, generating capacity may need to increase, depending on advances in onsite generation technologies, but can be mitigated by encouraging the use of clean, renewable energy.

F. *Tariff-Related*

24. Should the Commission authorize a default time variant electric vehicle rate applicable to all residential electric vehicle tariff customers? What changes, if any, to the rate protection provisions of AB-1X30 are needed to authorize a default time variant electric vehicle rate applicable to residential customers?

Given the critical need to manage load in an efficient and reliable manner, time-of-use rates should be made available to all residential electric vehicle customers as an alternative to the AB – 1X increasing-block pricing ("IBP") schedules. IBP schedules would pose a barrier to use of PEVs and would not incent customers to charge off-peak or allow for active load management. While IBP schedules play a critical role in encouraging households to improve their energy-efficiency and conserve with respect to electricity use, the current IBP schedule does not account for energy savings and environmental benefits that may be gained by fuel switching – in this case, from gasoline to electricity, preferably renewable.

Households using PEVs would be increasing their overall household energy-efficiency and conservation by switching from gasoline to electricity, as well as decrease their GHG footprint. For example, a household owning one plug-in electric hybrid (PHEV) achieving forty

miles of range might use 2,900 kWh per year if the battery pack is fully discharged and charged on a daily basis – a significant increase for a household that, for instance, uses 6,000 kWh per year.[40] If those same miles were traveled using a conventional vehicle however, the customer would consume approximately 10,000 kWh of gasoline (or approximately 300 gallons of gasoline), while also emitting a significantly higher amount of GHG emissions.

TOU tariffs will be an important tool for utilities to ensure optimal load management and minimize adverse load impacts on the grid from PEVs. In addition to customer education programs, price is one of the main tools that will encourage optimum charging behavior. TOU policies can lower demand during peak times and reduce the level of investments necessary to meet new generation, transmission, and distribution capacity. Similarly, TOU policies can affect the amount of off-peak charging and the degree to which greater asset utilization can occur.

The Commission should require utilities to establish default, real-time TOU rates for PEV customers. It is recommended that a single set of TOU rates should not be used statewide and that utilities be allowed flexibility to establish different TOU rates to reflect real differences in the cost of service across territories. However, utility investments in residential infrastructure and equipment related to load management (as recommended earlier) should be contingent upon households utilizing TOU rates in order to capture the full benefits.

The Commission should establish some basic principles or requirements in establishing PEV tariff schedules, providing utilities with guidance in their design. Generally, there should be broad eligibility for all residential customers coupled with requirements for active load management and use of on-site renewable distributed generation.

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[40] Assuming the usable energy in the battery pack is 8 kWh.

25. What rates should apply to customers charging their PHEVs or BEVs at commercial, industrial, and public charging facilities that are in the same service territory as their home utility?

It is unclear at this time whether the CPUC can establish specific tariffs for customers charging their PEVs at commercial, industrial, or public charging facilities as opposed to the Commission approving the tariffs that govern the relationships between 3PPs and utilities. We ask the Commission to clarify this issue. We believe that requiring these private and public entities (e.g., cities that own charging facilities) to eventually impose TOU rates or other load management tools is critical. We note that, currently, a number of private and public entities (e.g., Costco) offer free public charging as a benefit to their retail customers, a policy that we support at this time, in order to catalyze a market for PEVs, but one that could be adjusted as PEVs are successfully commercialized and increasing numbers of PEVs are put into service.

The Commission should also clarify whether, if the above entities are not required to pass through electricity rates to PEV owners, how load management and off-peak charging could still be encouraged at commercial, industrial, and public charging facilities. We are concerned that if PEV owners do not receive an adequate price signal, there will be no incentive to charge during off-peak hours instead of on-peak.

26. What rates should apply to third-party operators of commercial charging facilities? Should the Commission establish new rates for commercial charging facilities taking into account the costs and benefits created by these entities?

We ask the Commission to make the same clarifications as requested above (question 25) regarding the pass through of electricity rates from third-party operators to their PEV customers. The Commission should generally establish new rates for commercial charging facilities that reflect the costs and benefits created by these entities. Different tiered rates, for instance, could

be established that account for practices by 3PPs or commercial facilities that decrease their impacts, including but not limited to utilizing on-site distributed generation[41] thereby reducing peak daytime load; passing through TOU rates to their customers; utilizing load management and Smart Grid technologies; and communicating the presence and location of infrastructure to utilities.

The Commission should work with utilities, third parties, and commercial facilities to identify, from a system perspective and overall utility customer perspective, what set of practices should be encouraged through the new set of rates as well as what set of practices should be discouraged. While third-party operators are a relatively new industry, the Commission can help establish guidelines for good practices and ensure these practices are adopted early, before significant infrastructure is deployed. Doing so will ensure that unnecessary system costs are avoided and that reasonable rates are established for all utility customers.

27. How should a customer pay when charging a PHEV or BEV in another utility's service territory? Please evaluate options set forth below, or suggest alternative approaches:

a. A customer pays a posted price for electricity to a specific electric charging provider at the time of the transaction, similar to how gasoline is purchased.

b. The second utility bills the customer's home utility and the home utility adds the electric vehicle electricity cost to the customers' energy bill. A third-party clearing house could facilitate these transactions.

d. A customer has a relationship with a third party charging provider and pays that third party wherever the customer charges.

e. A customer has a choice of all or some of the above options.

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[41] Distributed generation is a parallel or stand-alone electric generation unit generally located within the electric distribution system at or near the point of consumption (Commission Order Instituting Rulemaking (R.) 04-03-017, March 16, 2004). Renewable DG technologies generally include photovoltaic, solar thermal electric, wind, and fuel cells using renewable fuels.

Because the deployment of vehicles is still at an early stage, it is premature to determine whether there is a single approach that is best or whether there will necessarily be multiple approaches used. Some basic principles regarding information, however, should be met for all transactions, including but not limited to the:

- Identification of the price charged by the electric charging provider on a per kWh basis.
- Identification of additional charges to the customer (e.g., non-membership fees, third party billing fee)

28. What types of costs and benefits are generated by electric vehicle adoption on different aspects of the electricity system, including transmission, distribution and procurement costs?

See comments elsewhere in this document.

29. Should the electric vehicle rate structure be designed to align rates with the system costs and benefits of PHEVs and BEVs, and if so, how? Should the Commission assign additional costs and benefits attributable to PHEVs and BEVs to specified electric vehicle rate classes or socialize the costs and benefits attributable to PHEVs and BEVs to all customer classes? Should the PHEV and BEV rate classes bear existing rate component costs?

In general, the electric vehicle tariff structure should reflect real time-of-use costs (as well as benefits) to the electrical system and electric transportation customers. Some of the costs will inevitably include investments needed for generation, transmission and distribution, and load management systems. However, the Commission should also account for both the economic and non-economic societal benefits to customers switching from gasoline to electricity as a transportation fuel. For example, all utility customers benefit from reduced petroleum use, GHG emissions, and air pollutants.

The Commission should also recognize that the use of active load management by PEV customers will benefit all ratepayers by minimizing potential costs and, in some cases, by reducing current utility costs (e.g., increasing load factors, renewable distributed generation

integration). By comparison, other consumer devices such as plasma screen television sets may benefit the owner but have none of the environmental and energy benefits associated with PEVs, including environmental benefits, increased use of intermittent renewables, and potential load management services. The Commission should strive to ensure PEV rates do not penalize PEV users disproportionately for their grid impacts any more than other types of appliances. In general, upgrades to distribution systems should be appropriately folded into the normal cost of service for meeting load, as opposed to specifically linking this cost to PEV rates. As a practical matter, it may also be difficult to tie specific PEV impacts and PEV rates to specific system upgrades.

We recommend that the Commission encourage desirable practices that generally are known to result in avoided impacts. For example, utilities could establish generic TOU rates for customers that plug in their PEVs to a conventional outlet or EVSE, but then allow lower TOU rates for customers that enable utilities to actively manage the load or that integrate renewable distributed generation with their PEVs.

30. Should the electric vehicle rates reflect the marginal cost of service, particularly for off-peak electricity charging and, if so, how?

The off-peak electricity rate utilities provide to residential or commercial customers should generally reflect the marginal costs of providing that service and generally differentiate between different types of loads and power consumption levels (for instance, Level 3 charging will have higher costs of service than Level 1). As stated above, there should also be differentiation among customers that install and utilize load management devices, including on-site renewable generation. This should reduce the marginal cost of service and allow for potential grid benefits.

31. Should rate incentives be created for electric vehicles to be paired with distributed generation incentive programs, such as the California Solar Initiative (CSI) and Self-Generation Incentive Program? Should rate incentives be created for electric vehicles to be paired with demand response programs? How should these incentive programs be incorporated into electric vehicle rate structures? Who should pay for such incentives?

As discussed above (Questions 29 and 30), the Commission should differentiate PEV rates for customers who pair PEV vehicles with renewable distributed generation or participate in demand response programs (or other load management programs). For example, customers might have tiered TOU rates depending on what practices they utilize to charge their vehicle. Linking PEV rates with other programs that the Commission regulates is an excellent way to aide deployment of renewable distributed generation technologies and load management devices. For example, customers should be encouraged to install rooftop solar systems that are large enough to meet both building load and PEV charging load. The Commission should evaluate what the potential benefits and costs are for different types of PEV customers and their practices.

The Commission should also allow for utility programs, at least early on, to experiment with different incentive programs to evaluate the most popular and most effective strategies to encourage customers in these practices as well as to reflect the stage of market acceptance of PEVs. This might include strategies like on-bill financing for infrastructure upgrades together with distributed generation at the home or incentive-based PEV rates. Smart Grid technologies, as well as programs, are also at the early stage of commercialization. There are benefits to all utility customers to understanding the most cost-effective ways to encourage effective load management and use of renewable distributed generation. Because the benefits accrue to all customers, these types of programs should be covered by all customers.

32. Under what circumstances can utilities and third parties aggregate PHEV and BEV services to participate in California Independent System Operator (CAISO) ancillary service markets? What policies, if any, does the Commission need to consider in this regard?

Over the longer term, aggregated PEVs and BEVs may be able to provide ancillary services.[42] This market should be encouraged over time because it may provide value both to utilities and generators as well as to PEV customers. Third parties as well as utilities should in general be allowed to participate in the development of this potential market. At this time, we do not have specific recommendations regarding policies related to CAISO.

G. *Low Carbon Fuel Standard*

33. What recommendations, if any, should the Commission make to the California Air Resources Board regarding the treatment of electricity under the Low Carbon Fuel Standard?

The Commission should request that CARB staff participate in the Commission rulemaking proceeding and that CARB review its current regulations pending the information and outcome of this rulemaking. The Commission also should consider the issue of whether the appropriate entity for the regulated party, and therefore recipient of the low carbon fuel standard ("LCFS") credits, should be third-party providers or utilities, taking into account who bears the costs associated with the new load, including costs related to the infrastructure as well as the management of the load.

There are environmental and cost principles at play here. The LCFS credit value is a potential mechanism to mitigate costs associated with upgrades and improvements to the grid and households to manage electric transportation effectively. The LCFS credit is also a potential mechanism to keep costs low for all utility customers. Furthermore, there is additional environmental benefit from encouraging utilities, commercial facilities, or 3PPs to manage the

[42] NREL (2006), *An Evaluation of Utility System Impacts and Benefits of Optimally Dispatched Plug-In Hybrid Electric Vehicles*. Technical Report, NREL/TP-620-40293. Revised October 2006

load in a manner that avoids construction of new capacity. Absent LCFS credits being used to mitigate cost impacts from the expected load increase, there are potentially increased costs to all customers.

The Commission should consider whether the PEV rates provided to utility customers, including both residential PEV owners and 3PPs, should generally reflect the marginal cost of providing service, taking into account whether LCFS credits have helped to defray the costs. The Commission also may wish to examine whether providing LCFS credits to 3PPs will increase their revenue and profits, thereby encouraging business models that provide additional revenue when customers charge, regardless of whether that charging is on- or off-peak. The Commission may also wish to refer to its adopted policy on ownership of Renewable Energy Credits ("RECs"), stated in D.05-05-011, in which the Commission ordered: "The owner of a renewable DG facility owns the renewable energy credits associated with the generation of electricity from that facility, consistent with D.03-06-071." We ask the Commission to consider whether there are distinct parallels and/or differences with respect to LCFS credits in regards to the principles for assigning ownership.

The Commission should hold a workshop jointly with CARB to more fully discuss this issue.

34. If a utility generates and sells credits under the Low Carbon Fuel Standard regulation due to customers' use of electricity as a transportation fuel, what should the utilities do with the revenue from the credits?

As the Commission works with CARB to enhance its understanding of this topic, it may wish to consider whether utilities should be required to return the value of the credits to customers, by:

- offsetting overall cost impacts to the system to the benefit of all customers;
- keeping costs to both PEV customers and other customers low;

- helping fund customer energy–efficiency programs for PEVs;
- helping fund load management infrastructure programs for customers; and
- helping fund programs to encourage the increased use of renewable generation with PEVs.

It is important to note that the overall value of these LCFS credits will likely be low initially, reflecting the lower stringency of the program in the early years and the small number of PEVs on the road. Over time, however, the value of the LCFS credits will increase with the stringency of the program, as larger numbers of PEVs are sold, and as average battery pack sizes and/or capacity grows.

H. *Programs and Incentives*

35. Should utilities and/or government provide low-interest finance incentive programs for residential and commercial EVSE? Should these programs incorporate tax incentives available through the American Recovery and Reinvestment Act (ARRA) of 2009?

No comment at this time.

36. Should utilities and/or government provide incentives that encourage customers to purchase higher-efficiency electric vehicles rather than less efficient electric vehicles, and if so, how should the incentives be structured?

We recommend the Commission and the utilities encourage customers, through incentives and customer education, to buy the most efficient PEVs on the market. Doing so will reduce load growth on the system, reducing the need for new capacity builds and helping minimize costs to utility customers. We also recommend that the Commission evaluate the energy efficiency potential of both PEVs and BEVs. It is likely that, similar to traditional internal combustion engine vehicles, there will be opportunities to develop more efficient electric drive trains, to reduce parasitic charger loads and improve charging efficiency, and to reduce overall electricity demand within the vehicle due to accessory loads.

Utility education programs can be used to help customers choose the most efficient PEVs, much like current programs explaining the most efficient and least costly appliances in terms of operating costs and payback times. As the PEV market deepens and more vehicle models are developed, the Commission should authorize utilities to establish programs that encourage, through incentives, the most energy efficient PEVs to be purchased rather than less efficient PEVs, potentially based on a kWh/mile metric. Such a metric would help customers become more energy efficient and minimize added load on the system to the benefit of all utility customers. For example, PEVs may use approximately 0.25kWh/mile, while larger, more energy intensive PEVs being developed could use nearly twice the kWh/mile. While the development of both PEV cars and PEV trucks should be encouraged, it is in the interest of all ratepayers to have active energy efficiency programs that encourage the most efficient PEVs, thereby avoiding unnecessary load increases.

37. How should the Commission ensure that any policies developed related to electric vehicles provide a level playing field for transportation fuels and technologies?

The Commission should avoid picking fuel winners and losers in general by focusing on performance-based criteria (such as GHG emission reductions). However, because the large-scale commercialization of battery electric vehicles and plug-in hybrid electric vehicles in the consumer automotive market will occur over the next several years, with large system impacts at stake, the Commission is rightfully focusing most of its attention on policies to ensure that utilities and their systems are ready to manage this new load.

38. How could electric vehicle adoption impact other Commission policies and initiatives including the Renewable Portfolio Standard, the Long-Term Energy Efficiency Strategic Plan, energy efficiency goals, and zero net energy homes goals?

Electric transportation technology can help the State meet other climate change goals, as discussed above with the examples of zero net energy buildings and deployment of onsite

distributed renewable technology. The Commission should seek to align its policies with overall State and Federal policies driving the electrification of transportation. In principle, both utilities and customers should be encouraged, and not penalized or discouraged, to switch to more energy efficient vehicles and low-carbon fuels. This is particularly so if utilities have done everything in their control to adhere to the policies described above, including managing new loads in an efficient manner.

Load increases due to demand from PEVs should not count against utility and household energy efficiency goals. Customers using PEVs improve their overall household energy efficiency (including both electricity use and liquid fuel use) by switching from gasoline to electricity to power their cars should not be penalized. We are currently evaluating the implications of greater PEV use on other policies, such as the RPS and may provide additional comments on this area in the future.

I. *Education and Outreach*

39. What entities and programs best facilitate customer outreach and education regarding convenient and timely EVSE installation options and customer tariff education to ensure awareness of off-peak versus on-peak charging costs?

The Commission is in the process of establishing a web portal and brand for ratepayer-funded energy efficiency programs. In concept, this portal will expand to include related programs, including demand response. The Commission should work with other State agencies to have a one-stop education and information program on all these components of energy management, including alternative-fueled vehicles.

Specific to alternative-fueled vehicles, in addition to the issues identified in the preceding questions, the utilities should work with automakers to ensure customers have information on secondary and recycling options for PEV batteries, including automaker take- back programs.

Utilities should also consider PEV batteries for secondary applications such as stationary energy storage. Doing so would extend the useful life of the batteries and help drive down the overall costs for PEV batteries.

J. *Scope*

40. Should the Commission consider natural gas vehicles as part of this rulemaking, or consider natural gas vehicle issues through utility filed Application(s) and/or Advice Letter(s)? What are the near-term tariff, infrastructure, incentive programs or other issues that the Commission should address with respect to natural gas vehicles?

No comment at this time.

41. Should the Commission consider medium-duty electric vehicles, heavy-duty electric vehicles, and off-road electric vehicles as part of this rulemaking? If so, what issues specific to these vehicles should the Commission consider?

No comment at this time.

42. What other issues should the Commission consider in this rulemaking? What are your recommendations regarding those issues?

No comment at this time.

IV. Procedural Recommendations

As indicated in the above text, the Environmental Coalition recommends the Commission use workshops to further refine several of the issues identified in the Rulemaking. These include:

- Who should pay for the costs associated with distribution system impacts
- Working with CARB to understand the relationship of utilities and private and third-party providers with respect to the Low Carbon Fuel Standard
- Potential CPUC legal jurisdiction over third parties providers (3PPs)

The Commission must continue close collaboration with both the CEC and CARB, as they are concurrently developing policies and programs that can impact the development of the

alternative-fueled vehicle market. In particular, the Commission should work with the CEC on building codes, to ensure that those codes include guidelines and incentives for PEV charging in both residential and commercial facilities.

V. Conclusion

The Commission has a tremendous opportunity with this rulemaking to ensure that utilities and customers are well prepared for increased electrification of the transportation sector. The policies that guide this market development should include:

- Reducing barriers to PEVs;
- Ensuring that the environmental benefits of PEVs are maximized, particularly through use of renewable generation – both central station and distributed on-site technologies – to charge vehicles;
- Minimizing electricity grid impacts and maximizing potential grid benefits; and
- Ensuring cost-effective service for utility customers.

Dated: October 4, 2009

Respectfully submitted,

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For THE ENVIROINMENTAL COALITION

CERTIFICATE OF SERVICE

I, Jody London, certify that I have, on this date, served a copy of "Comments Of The Environmental Coalition On Alternative-Fueled Vehicle Policies" on all known parties to R.09-08-009 by transmitting an e-mail message with the document attached to each party named in the official service list, and by serving a hard copy on the Administrative Law Judge.

I declare under penalty of perjury, pursuant to the laws of the State of California, that the foregoing is true and correct.

Dated October 5, 2009 in Oakland, California.

Jody London

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