BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

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Order Instituting Rulemaking on the Commission's own motion to consider alternative-fueled vehicle tariffs, infrastructure and policies to support California's greenhouse gas emissions reduction goals.	Rulemaking 09-08-009 (Filed August 20, 2009)

OPENING COMMENTS OF SAN DIEGO GAS & ELECTRIC COMPANY (U 902 M) AND SOUTHERN CALIFORNIA GAS COMPANY (U 904 G) IN RESPONSE TO THE COMMISSION'S ORDER INSTITUTING RULEMAKING TO CONSIDER ALTERNATIVE-FUELED VEHICLE TARIFFS ("OIR"), INFRASTRUCTURE AND POLICIES TO SUPPORT CALIFORNIA'S GREENHOUSE GAS ("GHG") EMISSIONS REDUCTION GOALS

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I.
INTRODUCTION

In accordance with the Rules of Practice and Procedure of the California Public Utilities Commission("Commission" or "CPUC") San Diego Gas and Electric Company ("SDG&E") and Southern California Gas Company ("SoCalGas") (collectively hereafter as "Sempra Energy Utilities" or "SEU") hereby file these comments in response to the Commission's Order Instituting Rulemaking to Consider Alternative-Fueled Vehicle Tariffs ("OIR"), Infrastructure and Policies to Support California's Greenhouse Gas ("GHG") Emissions Reduction Goals.

The Sempra Energy Utilities commend the Commission in leading the effort to address critical issues facing the Low Emission Vehicle (LEV) / Alternative-Fueled Vehicle (AFV) market at this formative stage. The Plug-in Electric Vehicle (PEV) market is a "clean sheet" that will grow rapidly with proper policy support. The Natural Gas Vehicle (NGV) market is further advanced but is still in need of significant policy support and active market development in order to advance. SEU believes that this proceeding can address the important issues in both clean transportation market segments while not hindering the ongoing development of the NGV market or delaying important policy deployment pending solutions to critical areas such as interoperability, communication standards and Smart Grid integration, which are primarily electric-only issues.

The Commission raises many relevant and timely issues within the specific questions posed in this OIR. With time and the input from all stakeholders, SEU is optimistic regarding the critical policy foundation that can be set in this OIR, and the work that follows to support rapid growth of the LEV market in California (and the nation). Nevertheless, neither the parties to this proceeding nor the Commission should let the OIR process replace or delay the gathering of practical experiences that can be gained in the market today, and seize the opportunity to bring these findings into this forum. SEU's current collaboration with eTec / Nissan (discussed in SEU's response 21 below) should yield a number of applicable and timely findings regarding infrastructure requirements, as well as consumer preferences, and more. SEU is truly fortunate to be able to draw upon insights gained from this pilot in parallel with the OIR.

The Sempra Energy Utilities believe that CPUC regulatory policies and utility initiatives should be designed to promote low-emission, alternate transportation fuel use with the following goals in mind:

1. Ensure even handed policies that avoid the creation of policy preferences that advance or hinder one technology relative to another in ways not tied to economic and environmental benefits;
2. Ensure utility infrastructure is made available to meet the future electricity and natural gas demands of the transportation sector, and leverage system benefits to the advantage of ratepayers;
3. Create accurate price signals so electricity and natural gas reflect the full value of fuel to consumers, the utility grid, and pipeline systems;
4. Avoid the imposition of financial penalties, such as through increased GHG compliance costs, on electric and natural gas utilities and their customers when the market for alternate transportation fuel (electricity and natural gas) increases; and,
5. Use the authority of the Commission to ensure that customers are educated about alternate fuel technologies and their potential benefits.

Utilities can and should play an important role in enabling both electricity and natural gas as transportation fuels. This can best be accomplished by the utilities making available the infrastructure necessary for convenient vehicle refueling and charging, by having utilities provide cost effective commodity tariffs for electric and natural gas transportation, and by having utilities provide customers with information on available products and services, technical support and training, comparative fuel pricing, and education on the environmental benefits of electricity and natural gas as transportation fuels.

II.
SUMMARY

SEU's responses stress the following points:

Residential, Commercial and Public Charging Infrastructure and Policy

- Policy should be driven from the underlying requirements and goals:
  - Safety
  - Ease of adoption for consumers
  - Reliable, revenue-grade, measurement of consumption to support billing
  - Ability to support time-of-use and other rate structures that support state policy goals including peak-demand reduction and support of Smart Grid functionality
  - Consistency with the state's Low Carbon Fuel Standards ("LCFS") requirements, including the ability to track electricity use as a vehicle fuel
  - Consumer protection and consumer choice
  - Adherence to standards minimization of obsolescence risk

- The Commission can best support market development and innovation by establishing clear policies and standards in the very early stages of market development, applying consistent policy to provide certainty on rules and requirements and using Commission programs, including utility programs, to promote expansion of the LEV markets.

- For Residential, commercial and public charging, authorize the utility to provide infrastructure to meet the future electricity and natural gas demands of the transportation sector, and leverage system-wide benefits to the advantage of all ratepayers. For standard refueling solutions, system upgrades should be treated as any other upgrades required for new load.

- Adopt policies that ensure that vehicle load can be separately metered and tracked to support special rate and program design, integration with energy efficiency ("EE"), demand response ("DR") and distributed energy resources ("DER") programs and Smart Grid functionality such as Smart Charging.

- Costs of system upgrades should be allocated to general rates for Level 1 and Level 2 residential charging. Upgrades for Level 3 charging should be borne by the user. System upgrades for commercial and public charging should follow current cost allocation and rate approaches

- Regarding investments necessary to supplement market development, especially ensuring the availability of adequate infrastructure, utilities can be authorized to own and operate public re-fueling and charging facilities in a manner that does not stifle market competition while ensuring early availability of infrastructure. Whether utilities should be authorized to provide additional charging facilities in the future should be evaluated in the future after the maturity of the market has been evaluated.

- SEU remains open regarding participation in "behind the meter" services - until the market matures and there is more clarity about the scope of service potential and value. A utility role

in this area might well help accelerate market development while not hindering market-based solutions. SEU encourages the Commission to consider such options.

- SEU supports a commercial and public charging business model that encourages "third party charging entities" to provide retail services through charging (and re-fueling) facilities. The Commission should also consider authorization of utility provision of such services where it will support infrastructure adequacy, support early market development and ensure appropriate access for all ratepayers.

- SEU supports the use of existing line and service extension rules and tariffs for providing utility infrastructure (through the metering) to commercial customers and "third party charging entities."

Legal Issues Related to the Ownership and Operation of Charging Infrastructure

- SEU's view is that the CPUC does not have jurisdiction over third party entities that provide access to EV charging. SEU relies upon the logic of D.91-07-018 which stated that "resale of [natural gas] would not require any regulation by the CPUC" in the case of CNG vehicle fuel.

- SEU advocates an open and competitive market for third-party PEV charging services.

Codes and Standards

- CPUC should allow the marketplace and consumer choice to determine success among charging levels Level 1, Level 2, and DC.

- The Commission should move quickly to establish standards where it has jurisdiction such metering and Smart Grid interoperability (while ensuring maximum consistency with national and other state standards).

- The Commission should continue to be an active participant in related stakeholder process where it does not have direct jurisdiction such as the EPRI working group on PEV standards and the ongoing building codes and standards processes in California.

Electrical System Impacts

- Overall system load impacts are not known with certainty and will likely not have a major impact for a number of years. However, even in the early stages of PEV market development, local impacts can be significant, requiring transformer and circuit upgrades.

- To minimize costs and potential impacts to system reliability, the Commission should emphasize programs and rate designs that mitigate system peaks. Accurate and time variant pricing will encourage consumers to make economically driven decisions with respect to where and when they charge their PEVs. SEU also anticipates that as the market advances, and smart-charging technologies become standardized, manufacturers will offer consumer-

friendly charging that is compatible with utility system operations including peak demand management and Smart Grid functionality.

Tariff-related

- Create accurate, transparent and time variant pricing so electricity and natural gas reflect the full value of the transportation fuel to consumers, the utility grid, and pipeline systems. Residential, commercial and third party charging entities are charged a standardized TOU or CPP tariff for charging PEVs.

- New third party charging entities and existing commercial customers offering charging services should be authorized to set prices and re-sell power and market to PEV end-users.

- The Commission should also consider appropriate options for utility provision of service under cost-of-service models to ensure availability of cost effective options for all customers.

- SEU points out that the time variant electric rate structures are necessary to send appropriate price signals to EV customers and may be incompatible with AB1X rate protection for residential customers.

Low Carbon Fuel Standard

- SEU supports CARB's current policy direction of allowing one-way transfer of LCFS credits into the broader AB32 market.

- SEU continues to strongly advocate an LCFS framework that does not shift compliance costs from the transportation sector to the utility sector and that ensures accurate and verifiable measurement of electricity and natural gas as vehicle fuels.

Programs and Incentives

- Ensure even-handed policies that avoid the creation of policy preferences that advance or hinder one technology relative to another in ways not tied to economic and environmental benefits.

- Avoid the imposition of financial penalties, such as through increased GHG compliance costs, on electric and natural gas utilities and their customers when the market for alternate transportation fuel (electricity and natural gas) increases throughput on the utility delivery system.

Education and Outreach

- Establish programs for utilities to provide customers directly or through trade allies' information on available products and services, technical support and training, comparative fuel pricing, electric and natural gas refueling system safety, and education about the

environmental benefits of electricity and natural gas as alternative transportation fuels. Offer technical support and training to third party charging entities and existing customers regarding the development of re-charging and re-fueling facilities.

- Allow utilities to offer services that can stimulate the market and address unmet needs in the marketplace.

Scope

The Commission should consider NGVs as part of this rulemaking in order to ensure coordinated treatment of issues common to alternative-fuel vehicles including education and outreach programs, vehicle incentives, and analysis of adoption economics, environmental benefits, and ratepayer impact. Based on recent legislative changes and market developments, the Commission should also revise in this proceeding the policy set in D.95-11-035 which SEU believes takes an overly restrictive view of ratepayer benefits and utility participation in the NGV market.

- The Commission should consider medium-duty electric vehicles, heavy-duty electric vehicles, and off-road electric vehicles as part of this rulemaking. The critical issue is the timeline for availability of such vehicle stock, as well as understanding the expected performance characteristics (advantages and limitations) of these vehicles.

III.
DISCUSSION

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?

For this question, SEU's response focuses on single-occupant dwellings. Other residential settings will be addressed elsewhere in this response.

There are a number of metering arrangements possible. Metering can occur through the main meter in the home, through a separate meter serving a dedicated PEV load or through a sub-meter. There are various physical locations possible and the meter could be owned by the utility, the vehicle owner, or, theoretically, a third party. It's too early to prescribe a single, preferred solution. The current focus should be on clarifying functional requirements and ensuring that convenient and timely solutions are available to consumers.

Some of the key requirements for residential PEV metering are:

- Safety
- Ease of adoption for consumers
- Reliable, revenue-grade, measurement of consumption to support billing
- Ability to support time-of-use and other rate structures that support state policy goals including peak-demand reduction and support of Smart Grid functionality
- Consistency with the state's LCFS requirements, including the ability to track electricity use as a vehicle fuel
- Consumer protection and consumer choice
- Adherence to standards minimization of obsolescence risk

Identification and tracking of electricity consumed by electric vehicles is important for a number of reasons including: implementation of special PEV rate programs, Smart Grid integration, potential usage-based vehicle taxes or registration fees and LCFS tracking and need to be time-differentiated. SEU believes that separate, time-differentiated metering of vehicle usage should be a priority. Such functionality will support accurate price signals that lead to economically efficient decisions as to when PEV consumers choose to charge their vehicles and under what circumstances, and when they might make PEV electric storage capacity available to support grid reliability during times of peak demand.

In order to maximize the likelihood that state policy objectives are met, SEU recommends that the Commission establish standards and requirements for PEV metering that include authorization for utilities to provide this service. Fee structures and promotion of this service should be designed in ways that do not hinder competitive markets. Initially, utility authorization should be broad enough to ensure that the objectives stated above (safety, metering accuracy, ease of adoption, adherence to standards, etc.) are available to the entire market in a timely, transparent and well publicized manner. As the market matures, the long-term scope of the utility role can be revisited.

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?

Wherever the PEV meter resides (e.g., on-car, in the EVSE, between the car and EVSE, or parallel with AMI meter), it will be important to achieving Smart Grid objectives that the PEV communicate with the AMI meter through the meter's home area network communication platform. In the case of SDG&E, that platform is ZigBee wireless. The automotive OEMs, PEV

meter and EVSE manufacturers are also exploring using other communication platforms, including public and private cellular networks.

The Commission should adopt policies that maximize the compatibility between PEV meters/sub-meters and utility electric systems across California and the United States. The goal should be to promote seamless alternative-fueled transportation across the U.S., with the ability to track alternative-fuel consumption to the vehicle and customer so all charges, wherever incurred, can be billed to that customer (by the utility or third party). The Commission should take a leadership role in helping forge such a national standard to ensure interoperability, as well as "smart-charging" across utility boundaries.

The ultimate responsibility rests with the "host" utility to work with the customer and third parties to secure data interfaces that ensure security and accurate metering. Through an open forum, utility standards will need to be established to enable communications and transactions across utility boundaries. This requires action outside the jurisdiction of this proceeding and of the Commission, but this OIR provides an excellent opportunity to take leadership in establishing policy and standards that can set the stage for these other efforts. All communications systems have limited bandwidth and latency. PEV charging and related metering standards should be designed in light of the limitations and cost of potential upgrades to AMI systems (for example, one single communications network may not be the most appropriate for all possible interactions between the PEV chargers, utilities, third parties, and markets). Flexibility to leverage other communication networks may be necessary.

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?

Residential customers will require a meter with TOU capability and smart grid compatibility. Each customer with a PEV would also require a charging capability that will charge the vehicle battery from the electric grid. Residential customers using smaller main panels, rated at 100 Amps or less, are likely to require an upgrade to their mains and services. Residential customers with main panels rated at 200 Amps or higher will not require main panel upgrades, in most cases. If Level 2 (220V) charging is desired, additional upgrades will be required. These premise upgrades can cost from $750 to more than $5000. If Level 3 (440V) is

desired, the cost could be well above $10,000. These premise upgrades can also drive local system upgrades for the utility.

There is a good chance, depending on the level of PEV penetration within the neighborhood, that the secondary voltage (120/240V) electric facilities serving residential customers will have to be enhanced with added capacity, especially those served from overhead facilities. These secondary voltage electric facilities could include the distribution transformer (typically, 12kV or 4 kV to 120/240V), the secondary conductors (from the transformer to the service pole/handhole), and the service conductors (from the service pole/handhole to the customer meter). An alternative to replacing the distribution transformer would be to install a new, separate distribution transformer and reconfigure the secondary conductors. This is feasible for overhead areas, but far more costly for underground. Depending on the concentration of PEVs, it is also possible the primary (distribution) voltage in older "4kV" neighborhoods (overhead or underground) would require cutover to 12kV. The primary voltage equipment needing to be replaced or reworked could include: transformers, primary conductors and insulators or cables and connectors, line regulators, capacitors, switches, fusing and other protective devices. It is also possible substation transformers (typically 69/12 kV or 138/12 kV) and even transmission lines would have to be replaced with larger capacity equipment, depending on the number and concentration of PEVs, and the resulting load profile compared to the existing system.

PEV load may require infrastructure improvements, such as re-conductoring and additional transformers. These distribution system improvements will depend on the charging requirements for the vehicle and the customer's charging preferences. In developing a cost allocation policy for distribution system upgrades that will facilitate increased PEV use, it is important to recognize that PEV charging requirements will vary by location, voltage requirements of the charging system, the time of day preferences for charging, and other factors. Where customers are willing to utilize 120 or 240V single phase charging systems, even though some distribution system upgrades may be necessary, SDG&E believes that the charging requirements should be considered part of the basic electric service the utility offers. Essentially, meeting the demands to charge PEVs charging at 120 or 240V would be part of the utilities' usual and customary electricity service SDG&E provides. Costs associated with system upgrades necessary to provide that level of service should be recovered in rates from all

ratepayers. However, where a residential customer seeks a higher level of service (e.g., 480V for fast charging capability), system upgrade costs necessary to provide this higher level of service should be charged to that customer on an incremental basis. The 480V service level is currently not available to residential customers; it is primarily a service level used for large commercial and industrial applications. In those instances where a rearrangement or relocation of service is required and where SDG&E provides adequate infrastructure – then Rule 16 would apply. Currently, under Rule 15, the customer is responsible for any rearrangement required to create a source for the line extension.

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

Market innovators must navigate multiple competing priorities but, in general, investment in innovation is reliant upon the expectation of a robust future market with reasonably predictable characteristics. Three important keys that will be needed to support innovation in the PEV market are standards, policy consistency and early market support. Some of the ways that these can be achieved are:

- Require adherence to the standards being developed by the Society of Automotive Engineers (SAE).
- Create a clear and sustainable policy framework through this OIR as to how utilities can support PEV market development.
- Provide utilities assurance of recovery of costs necessary to accommodate PEVs, including electric distribution infrastructure costs (installation, service, ownership, maintenance), communication infrastructure, in line with and to enable market development. This would minimize a number of first cost barriers, help optimize the distribution systems as the PEV market expands, and create ratepayer benefits that result from investments in PEVs.
- The Commission should also authorize and encourage an appropriate utility role in developing, publicizing and executing streamlined processes for premises metering and upgrades required for PEV adoption.

Similar principles apply to NGV market development (although this market is somewhat more advanced and does not face the same issues on standards and interoperability, allowing for faster and simpler policy development). The Commission should adopt even-handed policies that avoid the creation of policy preferences that advance or hinder one technology relative to

another in ways not tied to economic and environmental benefits and correcting well identified market gaps.

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?

The Commission should authorize utilities to invest in and recover in rates from all ratepayers the costs necessary to accommodate the charging requirements at 120v and 240v levels up to and including the meter(s). While the home charging market is in the formative stage of development, the Commission should consider granting utilities the option of offering home charging services beyond the meter through the utility directly or in collaboration with third parties in a competitively neutral manner. The cost of beyond the meter upgrades should be born by the customer but rates or programs could be established to allow these costs to be recovered over time to ease the "first cost" burden for PEV adopters. This policy can be revisited as the market matures. Authorizing utility provision of this infrastructure ensures that such infrastructure will be available in a timely manner to support early market growth.

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?

The Commission can require utilities (as well as third parties) to adhere to standards being developed by the SAE for communication and charging interfaces when purchasing EVSEs.

The Commission can also provide assurance of cost recovery for costs incurred to make previously installed infrastructure compatible with these standards.

Although there may be some degree of obsolescence risk, the Commission should consider that, in relation to the potential impact of PEVs in California over the mid term, the risk of stranded investment in the near term is small in relation to overall market benefits. The Commission has addressed similar issues in the AMI program, the RPS program and will do so in the ongoing Smart Grid OIR.

7. What approaches are there to provide PHEV and BEV charging for owners who do not have regular access to a garage for residential charging (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?

Many of the key provisions are already in place in cases where the owner of the premises or a third party acting as agent wishes to sponsor the charging infrastructure. In this instance, a request for such a service can be made under existing rules and tariffs (e.g., Rules 15 & 16). As noted above, all infrastructure costs upstream of the meter, including the meter, can be recovered in rates from all ratepayers, as will any line extension allowances applicable to the request.

In cases where it is not feasible for the charging facility equipment to be owned and operated in this manner, and the utility is requested to offer such services, SEU asks the Commission to grant full cost recovery of this service (e.g., from either all ratepayers or that entity requesting this service). Situations may also arise where a vehicle owner has no access to residential charging, for example in neighborhoods where there is limited off-street parking. In these cases, street-side charging could be a viable option. The possibility of the emergence of under-served areas or difficult to serve areas could be a concern. SEU encourages the Commission to consider utility-provided infrastructure, developed in collaboration with local government, as an option in these areas. For MDUs, the Commission should consider working with jurisdictional agencies on requirements to ensure availability of charging at MDUs or establishing incentive programs to encourage provision of that infrastructure. Efforts should also be made, via utility education and outreach programs and other means, to research and publicize the "amenity value" of vehicle charging to maximize voluntary adoption.

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

The Commission should encourage utilities to take a leadership role to coordinate a streamlining process, as well as facilitate "turnkey" installation service for residential customers, many of whom may be unfamiliar with the requirements necessary for electrical work permitting and inspection process for installing PEV charging capabilities. The utility could establish a

network of local, qualified electrical contractors and other stakeholders and industry allies to help facilitate timely and convenient installation services. The Commission should also consider models under which the utility could act as the general contractor for this service under frameworks that do not distort competition. Utilities can explore the use of the existing network of contacts with local government to promote modifications to local procedures to expedite and simplify permitting and inspection processes and to share and communicate best practices with peer utilities.

The Commission should work through National Institute of Standards and Technology, National Association of Regulatory Utility Commissioners, and other appropriate venues to support the adoption of standards that could be employed across the country so that services for PEVs can be seamlessly used in all geographic areas of the country.

The Commission should provide assurance of cost recovery of costs incurred by utilities to construct infrastructure necessary to accommodate PEVs along the lines discussed above.

The Commission should encourage Authorities Having Jurisdiction (AHJs) to set up IOU notification protocols when electrical permit applications are made specifically for PEV charger installations, regardless of whether a main panel upgrade is also required. This has additional value in that this provides the utility the opportunity to confirm upstream infrastructure adequacy before voltage or load issues develop, due to unexpected increases in electrical demand.

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 are a number of important objectives in this area:

- Infrastructure needs to be available ahead of vehicle population growth to alleviate "range anxiety" and increase consumer confidence that PEVs are a mainstream vehicle option
- In order to support LCFS tracking, support special rates and eventual smart grid functionality (like smart-charging) it will be necessary to identify PEV load as such where these programs and policies are to be applied
- Protocols need to allow for various billing arrangement recognizing that for most commercial and public charging locations there will not be a single vehicle identified with a charging point
- Standards including interoperability and clearinghouse functions must be established well ahead of rapid market growth (i.e., within the next 2-3 years)

SEU urges the Commission to work with other state and Federal regulators to develop the necessary standards and regulations. SEU's preferred end-state for electric vehicle public charging includes the following:

Charging provided by utilities:

- Electricity used for PEVs needs to be associated with the vehicle being charged for electricity billing, tracking for LCFS, and, in the future, vehicle road taxes.
- The metering equipment must meet Commission-approved standards to ensure consumption and resulting revenue calculations are accurate.
- These standards must allow metering activity with a signal from the vehicle used to identify the consuming vehicle to the utility or billing entity.

Charging provided by third parties or existing (commercial) customers:

- If the charging facility is owned and operated by a third party charging entity or a commercial customer, then a utility-certified metering process needs to be in place to meter (and track) consumption and send consumption information to the utility or billing entity.
- The metering will measure the electricity supplied and used at a single or multiple meter(s), not the electricity used by each end-use PEV customer.

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

The Commission should authorize utilities to invest in and recover in rates from all ratepayers the costs necessary to accommodate the charging requirements at 120V and 240V levels. While the PEV public charging market is in the formative stage of development, the Commission should consider granting utilities the option of offering PEV charging services beyond the meter through the utility directly or in collaboration with third parties in a competitively neutral manner. For non-utility charging points, the cost of beyond the meter upgrades should be born by the charge location owner or a 3rd party acting on their behalf. For utility-owned charging locations, costs should be recovered from PEV users through appropriate rate structures, in such a manner to provide utilities the assurance of recovery of costs necessary to accommodate this area of market growth. Where appropriate, rates or programs could be established to allow beyond the meter costs to be recovered over time to ease the "first cost" burden for PEV charging hosts. This policy can be revisited as the market matures. Authorizing utility provision of this infrastructure ensures that such infrastructure will be available in a timely manner to support early market growth.

In the case of commercial and public charging (including the siting of commercial and public charging facilities and meters) provided by a third party charging entity, SEU supports the use of existing service or line extension processes. The utility provides infrastructure service and power to the third party retailer up through the meter, utilizing line extension service and allowances (such as with Rule 15 & 16). The utility owns and operates these facilities, including the communication infrastructure, up through the metering. The costs of the line extension should be paid for by the third party retailer, net of the line extension allowances (i.e., and not recovered through a utility PEV tariff from PEV end-users who use this facility). Also, as with residential customers, all costs associated with required distribution system upgrades upstream of the line extension should be recovered in rates from all ratepayers. Because this is a new market and service that is being provided to create environmental and other benefits for all ratepayers, utilities should be provided assurance of cost recovery for these costs even if the PEV market does not advance as anticipated. Line extension rules and tariffs allow a line extension allowance to be granted to the "third party charging entity" (and any utility customer) based on the value of the facility to all ratepayers (i.e., based on the expected present value of distribution revenues attributed to this facility). These allowances are costs recovered from all ratepayers today.

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

The Commission should allow the market to decide among the array of services that will ultimately be offered to PEV consumers. Consumer charging preferences, in combination with vehicle variety and availability, will drive these markets toward the most cost efficient solutions, and well as the most attractive and accessible charging facilities. At the same time, Commission requirements and standards, should be applied to all market participants. In addition, a "utility option" for these services should be available under Commission oversight and in ways that do not hinder or distort competitive markets should be made available to ensure availability of service to all communities and location types, and to promote infrastructure readiness to support early market growth. Smart grid interoperability will be assured by early standards setting and, where necessary, designing for down-stream upgrades.

SEU's smart grid developmental work under way today will provide opportunities to test various technologies that could be employed to help set the requirements needed to help advance interoperable, "smart-charging" standards. The market will adopt these standards and pass along their inherent value to consumers in the form of attractive products and services.

With regard to being interoperable with Smart Grid at commercial/public sites, there are a number of potential solutions. For example, if a vehicle is within its own territory, then it can potentially communicate via the AMI HAN or LAN, although this depends on the charging stations proximity to a meter and the technology employed by the AMI network and the communication requirements of the charging station. Because an existing AMI network may not always be present and because AMI communication technologies may have different bandwidth and latency, it is more likely that the charging station itself will be interoperable with the Smart Grid. The charging stations would need to contain the LAN/WAN communication technology within it, as well as the technology to communicate with the vehicle for any advanced smart-charging functionality or vehicle-to-grid preferences, and necessary financial transaction capabilities. This area will require significant focus over the next few years and should be a priority in the smart grid / PEV / AMI arena.

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?

There is not yet sufficient analysis in place to fully answer this question. An obvious question is whether new home construction requirements should allow for PEV charging readiness or whether new commercial or public facility projects should require PEV charging readiness. This depends, in part, on whether the market alone can ensure adequate availability of infrastructure. Stakeholders and the Commission should confer with the CEC on these issues as PEV policies are further developed in this proceeding.

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

Market innovators must navigate multiple competing priorities but, in general, investment in innovation is reliant upon the expectation of a robust future market with reasonably predicable characteristics. Three important keys that will be needed to support innovation in the PEV

market are standards, policy consistency and early market support. Some of the ways that these can be achieved are:

- Require adherence to the standards being developed by SAE.
- Create a clear and sustainable policy framework through this OIR as to how utilities can support PEV market development.
- Provide utilities assurance of recovery of costs necessary to accommodate PEVs, including electric distribution infrastructure costs (installation, service, ownership, maintenance), communication infrastructure, in line with, and to enable market development. This would minimize a number of first cost barriers, help optimize the distribution systems as the PEV market expands, and create ratepayer benefits that result from investments in PEVs.
- The Commission should also authorize and encourage an appropriate utility role in developing, publicizing and executing streamlined processes for in-premise metering and upgrades required for PEV adoption.

Similar principles apply to the NGV market development (although this market is somewhat more advanced and does not face the same issues on standards and interoperability allowing for faster and simpler policy development). The Commission should adopt even-handed policies that avoid the creation of policy preferences that advance or hinder one technology relative to another in ways not tied to economic and environmental benefits and correcting well identified market gaps.

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?

Some of the issues that need to be addressed include:

- The appropriate role of the utilities, acting under Commission oversight, as facilitators of early market development maximizing the benefit of the utility role while not hindering market-based solutions and innovation.
- Potential role and impact of potential utility-sponsored incentives, as deemed appropriate and authorized by the Commission, on competitive market development.
- Role of utilities in promoting standardization, universal access and addressing environmental justice concerns.
- Appropriate regulation of third party charging entities operating as retailers given the potential for time or locational "rents" to retailers if no regulation is in place
- Regulation of adherence to standards and interoperability requirements for unregulated retailers.

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?

- Relying on the logic of a Commission decision from the early 90's (D.91-07-018) in which the Commission states (in the context of natural gas) "resale of the commodity would not require any regulation by the CPUC," it can be argued by analogy, that third-party entities which simply provide access to electric vehicle charging or provide bundled charging infrastructure would not be jurisdictional public utilities or electrical corporations.

  In Decision No. 91-07-018, 1991 Cal. PUC LEXIS 509 (Cal. PUC 1991), the Commission found that alternate fuel providers should not be subject to CPUC jurisdiction as follows:

  > DRA proposes that the Commission should adopt rules and tariff provisions which would allow private entities to either transport or purchase natural gas from PG&E for resale at a service station for NGVs. This would serve to foster a competitive market for the sale of CNG. If CNG is a viable alternate fuel, then third parties other than utilities will be willing to invest in NGV service stations and accept the market risks associated with such an investment. Moreover, regulations in California mandate that the gasoline industry must provide for the dispensing of alternate fuels such as CNG. These vendors should be provided the opportunity to sell gas to this potential new market as an unregulated service. The transmission and distribution of gas to the NGV refueling station would continue to be regulated under a tariff, but resale of the commodity would not require any regulation by the CPUC.
  >
  > Findings of Fact
  >
  > 18. Persons operating service stations for the sale of CNG, other than those who are public utilities by reason of operations other than operating a service station, are not subject to regulation by this Commission. Those persons may sell CNG at prices they deem appropriate.
  >
  > 19. Our jurisdiction on CNG sales is limited to PG&E's side of the meter and the connection to the service stations' side of the meter.

Similarly, in D. 91-07-017 [1991 Cal. PUC LEXIS 508 (Cal. PUC 1991)], the Commission found:

> Findings of Fact
>
> 18. Persons operating service stations for the sale of CNG for use solely as a motor vehicle fuel, other than those who are public utilities by reason of operations other than operating a service station, are not subject to regulation by this Commission. Those persons may sell CNG as a motor vehicle fuel at prices they deem appropriate.
>
> 19. Our jurisdiction on CNG sales is limited to SDG&E's side of the meter and the connection to the service stations' side of the meter.

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 determines that third-party electric vehicle service providers are not subject to its regulation, then the primary issue the Commission would have to address would be how to best ensure that the electric IOUs offer tariffed electric vehicle charging services at rates and conditions of service that do not unduly discriminate against such third-party providers, assuming such parties exist.

If the Commission has jurisdiction over third-party electric vehicle service providers, what is the appropriate level of regulatory oversight?

See above.

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

None at this time.

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?

Attached as "Attachment A" is a summary prepared by the Electric Power Research Institute, Electric Transportation Program relative to the status, scope and interactions of the standard making progress for plug-in electric vehicles. SEU submits this document as an

appropriate summary of this process as it has been identified to date. There are seven separate but related standard setting entities noted. State and local building codes will be relevant as well. SEU suggests that continued participation of Commission staff in the EPRI Infrastructure Working Council (IWC) for PHEVs would be an appropriate venue for the Commission to obtain the updates and status of the standard setting initiatives that are currently in development. This knowledge gained will equip the Commission with the information necessary to reference these standards and incorporate their applicability within California relative to Commission jurisdictions and interests.

Safety is a paramount concern and will be addressed by all standard setting bodies. From a market development perspective, high priority should be placed on metering and communications standards. In order to reduce obsolescence risk and ensure that foundations are in place for PEV load management, Smart Grid interoperability and LCFS tracking, communications and metering protocols need to be in place during the initial stage of PEV adoption expected as early as late 2010.

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?

The following are characteristics to consider regarding consumer choice:

- Charging convenience and cost is a key factor in the desirability of owning a PEV/BEV. Automotive OEMs will provide consumers with the ability to choose the charging level they desire. Consumer choice regarding charging preferences, impacting infrastructure requirements, will play a key role in determining which PEV/BEVs are successful in the marketplace.
- The Commission should allow the market to determine charging levels and other innovative services that enhance the PEV ownership attractiveness and overall experience.
- Within the framework of customer convenience and choice, grid impacts and costs borne by all ratepayers should be considered in policy and rate design. The objective would be to allow all consumers to choose among charging options currently available to residences (110V or 220V) and have the distribution system costs borne by all ratepayers as any other increase in residential load. To facilitate this approach, it will likely be necessary to require customers to adopt smart-charging, demand response or other voluntary program features in order to be eligible for special rates or other utility programs. Costs associated with Level 3 (440V) or other special charging arrangements should be borne by the individual customer.

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)?

Please refer to Attachment A provided as the response to question #17 for the outline standards and the related processes. SEU suggests that continued participation of Commission staff in the EPRI Infrastructure Working Council (IWC) for PHEVs would be an appropriate venue for the Commission to obtain the updates and status of the standard setting initiatives that are currently in development. This knowledge gained will equip the Commission with the information necessary to reference these standards and incorporate their applicability within California relative to Commission jurisdictions and interests.

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?

A high concentration of PEVs will cause high loading on electric distribution facilities in specific regions. The amount of load drawn by the vehicles and the geographic concentration where the vehicles charge will dictate whether electric system facilities are overloaded. Multiple PEVs located on the same block and fed by the same distribution transformer will likely result in the transformer and the secondary voltage (120/240V) conductors being replaced or supplemented. Numerous PEVs located within a few blocks could result in primary conductor being replaced or supplemented. Many PEVs located in the same part of a town or city could result in the main feeder conductor and the substation transformer having to be increased or supplemented. Older, 4kV distribution systems are more likely than newer 12kV systems to require significant work to accommodate PEV loads. This work could include cutting over the old 4 kV systems to 12 kV.

Many PEVs located in the same part of a town or city could result in the main feeder conductor and the substation transformer having to be increased or supplemented. Depending on the quantity of vehicles charging, the transmission lines and transmission transformers that serve

the distribution substations could also be overloaded to the point of requiring replacement or supplement.

Utility investments in infrastructure to provide standard (240V) and slow (120V) charging services should be recovered in rates from all ratepayers. Infrastructure necessary to accommodate individual higher voltage residential home charging requirements should be allocated on an incremental basis to that customer. Utility investments in line extension infrastructure necessary for third party sponsored or existing customer public charging (240V) and fast charging facilities (480V) stations should be recovered from third party changing entities or customers through existing rules and tariffs (e.g., Rule 15 & 16). Infrastructure investments upstream of the line extension should be recovered in rates from all ratepayers.

Planning for and prediction of these costs will require modeling and analysis over the next few years, informed by early vehicle sales results and pilot studies planned beginning in 2010. By 2012, electric vehicle market growth will need to be fully integrated into T&D, electric resource and back-office planning processes.

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"?

Although the market will ultimately decide, SEU's current perspective is that 240V charging will be the most common source for PEVs. Presently the consensus within the PEV community is that Level 2 – 240V charging will be the primary charging choice for vehicle purchases made in late 2010 and beyond for residential use for highway safe vehicles (meeting standards of NHTSA). Auto manufacturers will market vehicles according to their charging time according to their 240V rate of charge. (e.g., eTec / Nissan demonstration project will market the LEAF at an 8 hour charge time at 240V, rather than the 120v 16 hour charge time). Legacy vehicles (pre 2010 PHEV conversions and neighborhood electric vehicles/low speed) that are still in use will continue to use Level 1 – 120V charging (wall receptacles) that they were designed for – pre-Level 2 charging standards. The use of 120V may still continue for small battery charging such as those used for electric bicycles and for some limited-range hybrid cars.

Level 3 – 480V fast charging installations will most likely be relegated to select commercial settings due to their high costs (~$30,000/charger unit) and three phase connection requirements.

Regarding the adoption of policies to promote certain charging options, SEU urges the Commission to develop only policies that promote market-based solutions, and refrain from creating policies that pick winners (i.e., preferred technologies). Such policies must be effective in supporting development of new markets, particularly where externalities and/or market entry barriers are significant, and technologies are emerging. With pricing policies in place that create accurate price signals, PEV consumers will be encouraged to pursue "smart-charging" technologies that enable charging when electricity prices are lowest in the off-peak, and conversely. SEU submits that, while not picking winners or precluding other options, it would be prudent for the Commission to focus significant attention on ensuring that it puts policies and programs in place to support significant expansion of 220V in-home and public charging.

California will get the chance beginning in 2010 to gather important "live" data to better inform the evolution of policies and programs to support PEV adoption. The San Diego region is privileged to have been selected as a test site for evaluating PEVs and will receive funding for charging infrastructure beginning in 2010. This is the result of stimulus award granted from the DOE to the Electric Transportation Engineering Company (eTec) for a five region project (SDG&E's service territory being one of the five)*. This award was announced August 5, 2009 and will provide approximately 1000 residential chargers for the first 1000 Nissan Electric Vehicle (known as the LEAF) purchases in the region. These chargers will be Level II (240V at 20 Amps – J1772 compliant). The project will also provide approximately ~1500 additional Level II Public/Commercial Chargers (240 V @ 20 A that can accommodate all J1172 compliant vehicles) and 50 Fast Charge Units (480V DC three phase – connector has not been specified as of yet). On 8/28/09, the CEC announced that it was awarding $8 MM to eTec as matching funding for this project, which will result in additional infrastructure being deployed to the San Diego region. This project is expected to provide many answers to consumer acceptance and assessment of necessary charging infrastructure needs for successful PEV deployments. Further information on this program can be found at:

*http://ecotality.com/pressreleases/080509_DOE_Ecotality_eTec.pdf

http://www.ecotality.com/newsletter/083109_CEC_funding.html
http://earth2tech.com/2009/08/31/etec-to-snag-8m-from-cali-for-mega-electric-car-charging-project/

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?

Accurate prediction of the magnitude and likelihood of load spikes as described is not possible at this very early stage of PEV market development. However, the potential for this phenomenon should be anticipated in Commission policy and program design. Time variant or peak pricing rates will provide an economic incentive to customers to charge their vehicles during off peak hours, but pricing alone would not prevent customers from charging during periods of system constraints or local distribution constraints. Special attention will be needed in establishing policy in this area, balancing consumer convenience and choice with the need to ensure grid reliability. Important policy priorities include separate tracking of electric vehicle load, separate metering and Smart Charging functionality.

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?

Benefits to the generation and transmission systems may include levelized loading for the utility electric system that would result from PEVs charging at night, when charging costs will be lowest. This will allow higher efficiency base-load generators to run with more continuity and with more levelized output. More levelized loading on the transmission lines due to higher night time loading means more revenues from more kWhs being sold. Assuming the same capital investment, allowing the capital cost to be spread over more kWhs, would result in lower cost per kWh. This potential benefit could be offset by upward pressures on costs in the event that transmission system upgrades are required due to higher line loading. Another benefit to the overall system is that PEVs in the future may be able to feed energy back into the grid, acting as a distributed energy resource, and could potentially help to offset demand during peak hours. A potential drawback could be felt at electric generation facilities, such that the generating units that are now scheduled for off-peak maintenance could in the future be required to run in order to meet off-peak demand. The load resulting from PEVs could result in increased demand for

generating facilities if vehicle charging occurs during peak hours, creating a need for more on peak capacity and energy, in addition to increased capacity at the distribution level.

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?

SDG&E currently offers optional TOU rates for PEV residential customers, and believes that it would be optimal for the Commission to authorize default time variant electric vehicle charging tariffs that reflect costs and send the appropriate price signals to customers, which will encourage customers to charge electric vehicles during off-peak periods. This would require the customer to give up their AB1X rate protection.

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?

As soon as practical, in a competitive market, the rates offered to PEV customers at these public charging stations should be set by the entity offering the service. The Commission should also consider, particularly in the early stages of market formation, authorization of utility provision of such charging services on a competitively neutral, cost-of-service basis to ensure adequate infrastructure to support market growth in all areas of the community.

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?

Rates for third party operators of commercial charging facilities (including existing customers) should be cost-based, consistent with the cost allocation and rate design principles used to set rates for other utility customers. The rate structure should include distribution demand charges for customers with demands greater than 20 kW. Energy rates should be time-variant. The greater the differential between off-peak and on-peak pricing, the greater the probability that the PEV consumer will prefer the lower cost alternative to charge off-peak.

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.

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

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

In the near term, the customer should have a choice of all of the above options to the extent they are feasible. As PEV adoption grows the charging facility marketplace, ultimately customer preferences will determine the preferred method of payment. Customers may wish to charge PEVs at location that charge a posted price (option a above), while utilizing billing arrangements to charge when they are at work and have those charges added to their home electric bills (option b above) and then have a relationship with a third party charging provider to provide them charging while at home, because they live in an MDU. In order to support option b, there may be issues to resolve such as how and whether payments to a third party entity are transferred and the associated impact on uncollectible expense in the event customers do not pay their bills. SDG&E is currently planning pilot programs which demonstrate the feasibility of both intra-utility "bill to home," where a customer charges from another customer's meter within the utility territory, and inter-utility "bill to home," referenced in choice, "b." Both programs would involve a third party transaction clearinghouse. The viability of any of these options will depend on how well they meet consumer preferences, and SDG&E's pilot programs should yield valuable information about preferences for EV charging methods of payment.

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?

The transmission and distribution system could potentially be impacted (i.e., incurring costs for required system upgrades) depending on PEV consumer recharging preferences, especially on sections of the transmission and distribution system that may already be heavily

loaded. Time-of-use rates that encourage off-peak charging should largely minimize charging during periods when heavy loads normally appear. However, it is possible that the loads created by off-peak charging could still overload existing transmission and distribution lines, resulting in the need to upgrade or replace them. Additional energy requirements to serve PEV loads could also have an upward pressure on procurement costs by requiring additional contracts to provide energy.

As mentioned above, system maintenance work may also become more difficult to schedule because many maintenance activities can only be performed on deenergized equipment. It will be more difficult to offload equipment if loading levels are higher, resulting in a smaller window for maintenance time and could potentially create an upward pressure on maintenance costs. For example, if maintenance or repair work must be done on one of the two transformers in a single substation, and the loading on both transformers is higher as a result of PEVs, the transformer to remain in-service may no longer have sufficient capacity to carry the load from the transformer to be taken out of service for maintenance.

As previously stated, the benefits to the transmission and distribution system would result from a more levelized load profile if time-of-use rates encourage PEVs charging at night. More night-time loading could potentially mean more energy being sold over the same infrastructure, so the capital cost could be spread over more revenue units (kWhs), resulting in lower cost per kWh. This benefit may be outweighed by additional costs required to upgrade the distribution and transmission system to accommodate the electric vehicle load. A more levelized load profile would also have a positive impact on procurement costs by allowing energy requirements to be met by baseload generators with higher efficiencies and lower costs. One additional benefit to transmission and distribution system in the future will be the ability of PEVs to act as a distributed energy resource, providing energy to the grid during peak load hours. Using PEVs to provide energy back to the grid could also benefit procurement costs by providing an alternative method of accessing energy resources during emergencies.

Careful data collection and analysis, as well as policies that strongly support or require identification of PEV load, will be important in the early years of PEV adoption. This will provide the knowledge base to support planning for electric T&D, electric resource and back-office requirements and also refinement of cost allocations and rate design.

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?

Allocation of costs should be based on cost causation and rate structures should time differentiated to better reflect the time dimension of electricity costs. Until the marketplace develops, it will be difficult to quantify the costs and benefits of electric vehicles on the electric system, as described in more detail in response to Q.28, above. These issues might be best addressed as part of SDG&E's future comprehensive marginal cost, revenue allocation and rate design proceedings. Although SDG&E does not expect requests for such services in the near future, costs necessary to provide 440V fast charging capacity at the residential level would be known and should, therefore, be charged on an incremental basis to the customer requesting that service. At the commercial charging level, site specific costs could be recovered through existing line extension rules and tariffs from the third party charging entity or existing commercial customer. PHEV and BEV rate classes should bear existing rate component costs consistent with long-standing principles of cost causation.

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

Yes, electric vehicle rates should be based on the marginal cost of service. As discussed above, a key component of the PEV rate structure are the time variant rates that reflect the cost of providing service. The closer these rates are to marginal cost, the more efficient price signal they will send.

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?

SEU agrees that where possible PEV charging should be integrated with existing incentive programs. PEVs should be considered as part of the overall resource set for demand response and DER programs and should be integrated into programs based on the marginal value

of PEV supply. This area will need further attention, especially with respect to SGIP and demand response possibilities in the future. Separately, more work is needed to better understand a financial basis for incentives for PEV growth (e.g., avoided costs, added value for all ratepayers). The financial incentives inherent in time variant rates offer economic value necessary for efficient consumer decision making - a strong price differential between on-peak and off-peak/super off-peak to provide an economic incentive to avoid on-peak charging. Pairing incentives from other programs such as self-generation and demand response with PEV ownership could further influence behaviors that can help reduce negative system impacts. These incentives, when combined with time variant rates, will help ensure that PEV charging decisions are compatible with utility system operations.

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?

Third parties should be allowed to aggregate PEVs for the purposes of selling ancillary services.

This will require that a clear market opportunity exists for these kinds of sales, that the promised ancillary services will be available when promised, and ability to verify that the PEV batteries were actually made available for this purpose when needed.

Policies should allow the aggregator and PEV owner to decide how to divide any revenue and any risks of having to procure replacement services should the PEVs not be able to provide the promised ancillary services.

Incremental communications requirements and costs necessary to participate in ancillary services markets of the CAISO should be considered when making policy in this regard.

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?

SEU supports the following statements in the white paper[1] which should be communicated to CARB:

> *"Assuming CARB allocates allowances on a sectoral basis, failure to make available additional allowances to the electricity sector due to electrification to the electricity sector risks overburdening ratepayers with the cost of transportation sector emissions. Provided that electrification occurs at a significant scale, CARB should consider a policy to shift allowances from the transportation sector to the electricity sector, while not changing the total cap on the pool of allowances."*

Unless appropriate policy provisions are put in place by the CARB and the Commission, increased throughput on the electric system to serve PEVs will shift environmental compliance costs from the transportation sector to the electric sector through increases in RPS requirements and potential GHG mitigation costs. Such a cost shift would run counter to the fundamental principles of providing accurate price signals to consumers and allocating environmental compliance costs to the sectors creating the environmental impacts. Similar policy should be advocated for Natural Gas Vehicles.

Commission staff expresses concern about the use of LCFS credits into other AB 32 markets. However, the CARB's LCFS Staff Report makes clear that this issue will be specifically addressed in the CARB rulemakings which create these other AB 32 markets. The CARB staff proposed this concept of allowing LCFS credits from electricity and other low-carbon fuels to be used in other AB 32 markets because of the difficulty in getting needed GHG reductions from the transportation sector, and the difficulty in developing low-carbon fuels. SEU supports the CARB's current policy direction of allowing the one-way transfer of LCFS credits into the broader AB32 market.

Commission staff also raises a concern that driving behavior of the operators of electric vehicles and other low-carbon fuel vehicles risks compromising actual verifiable emissions. SEU does not believe that this is an issue, because LCFS credits are based upon the actual measured fuel (including electricity) use. So if a driver is driving more miles, this will be captured by the additional measured electricity use. SEU believes that CARB is capable of

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[1] CPUC Staff white paper titled – "Light-Duty Vehicle Electrification in California: Potential Barriers and Opportunities," May 22, 2009

developing a crediting mechanism that can adequately address calculation issues posed by the carbon intensity units used in the LCFS standard. This issue should be left to CARB.

The Commission should also recommend to the CARB that identification of the regulated party for electricity in the LCFS regulation should be deferred until the Commission can complete an in-depth review of the issue in this proceeding.

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?

Utilities should be allowed flexibility to devote revenues from sale of LCFS credits to other utility programs related to costs of infrastructure needed to support delivery of alternative transportation fuels, offsetting of LEV program costs and to the implementation of AB 32 to reduce GHG emissions related to delivery of electricity.

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?

Reducing the up-front cost to consumers of adoption of low-emission vehicles requiring special infrastructure will help avoid skewing consumer preference to vehicle options that do not require such investment, such as those relying on existing petroleum fuel infrastructure. For this reason, SEU believes that government policy should consider mechanisms to spread those costs over the useful life of vehicles and to avoid excessive cost burden on early adopters (e.g., financing programs are an example of a means to accomplish this). SEU believes that incentives should be used with caution to avoid distorting market-based solutions. However, well designed incentives can be an effective mechanism for supporting development of new markets, particularly where externalities and/or market entry barriers are significant. Environmental externalities justify support for PEV and other new-entrant LEVs including NGVs. In addition, lack of legacy infrastructure could be a significant barrier to development of alternative-fueled vehicles that cannot take advantage of existing infrastructure and, therefore, government-sponsored tax incentives and other incentives may be warranted during early market development.

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?

Ideally, lower operating cost of more efficient vehicles should be the primary incentive for consumers to purchase more efficient vehicles. If policy goals and externality costs dictate a stronger incentive for vehicle selection, SEU believes that this should be implemented throughout the transportation sector rather than the utility sector. This can be done through CAFÉ standards and government sponsored incentives funded through vehicle or income taxes. SEU does not believe that it is appropriate to fund such incentives through utility rates.

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

As noted above, the Commission should ensure the development of even-handed policies that avoid the creation of policy preferences that advance or hinder one technology relative to another in ways not tied to economic and environmental benefits.

The Commission should adopt the same policies on cost allocation for home refueling of PEVs and NGVs, under which the costs of basic home re-fueling services are recovered in rates, but higher levels of service are priced incrementally to the individual consumer.

All commercial re-fueling providers (whether fleet owners or private retail re-fueling facility providers) should pay the same costs for utility services on a non-discriminatory basis. These same costs should be embedded in charges for any utility-provided infrastructure and services in so that such services do not distort competitive markets.

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?

PEVs will increase the overall load on the electric system. This will increase the renewable portfolio obligation and GHG compliance costs to electric utilities. The Commission and CARB should adopt policies that ensure that GHG-reducing fuel switching between sectors does not transfer compliance costs. For example, allowance allocation or auction proceeds can be used to address this issue.

PEVs will potentially increase electricity peak demand, depending on consumer charging preferences, and therefore may increase the need for on-peak capacity and energy. Rate design and smart charging should be the primary vehicles to ensure off-peak charging for PEVs.

The Commission's Long-Term Energy Efficiency Strategic Plan does not address the impact of PEVs or NGVs within the context of the zero net energy homes goals. While alternative-fueled vehicles fueled or re-charged in the home will increase household energy consumption, overall, consumer decisions will be made to adopt PEVs or NGVs or other low-carbon fueled vehicles for economic and/or environmentally beneficial reasons. As such, while seemingly inconsistent with the objectives of energy efficiency strategic plan, PEV penetration can potentially promote the same public policies that form the basis for EE requirements and as such would be consistent with the overall objectives of such a policy. PEV and NGV impacts will begin impacting load in a material way in 2015 and beyond. However, infrastructure and strategic planning should begin now.

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?

Experience with energy efficiency programs, as well as NGV programs, has demonstrated that IOUs can establish and deliver highly effective programs to promote state policy goals. Utilities, in collaboration with critical stakeholders, such as vehicle sales outlets, are in the best position to educate consumers on how quickly to become PEV and NGV enabled. For PEVs, educational programs can be one of the strongest means to communicate the benefits of off-peak charging, supplemented with vehicle dealer sales literature, facts about fuel-economy/fuel-cost ratings and comparative fuel pricing. Utilities can emphasize electric and natural gas refueling system safety, and educate consumers about environmental benefits of electricity and natural gas as transportation fuels. Technical support and training can also be offered to those interested in sponsoring PEV charging (as well as CNG refueling) facilities, while placing an emphasis on safety and the using smart-charging systems to minimize on-peak charging.

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?

NGVs represent a vital component of the Clean Transportation effort in California. Both natural gas and electricity meet the state's LCFS goals for carbon intensity in 2020 and benefit from existing utility infrastructure for their delivery. The Commission can use its authority to advance with low-carbon fuels to the benefit of California and utility ratepayers. NGVs are particularly well-suited to heavy-duty applications. Furthermore, NGVs are a mature technology available to customers today, and have already been widely deployed in the kinds of applications for which they are best suited – heavy-duty, high-fuel use applications such as transit fleets. At the same time, while fueling facilities and infrastructure technology for NGVs is much further developed than for PEVs, it is still far from mature, and NGVs have yet to penetrate significant market segments for which they are economically well-suited. Use

As two promising technologies still in the developmental stages of adoption, electric and natural gas-powered vehicles should be on equal footing in terms of Commission support with respect to education and outreach programs, technical support, and incentives. The Commission should employ the same processes in analyzing economic viability, environmental impact, awareness, convenience, and ratepayer impact for the two technologies, making it reasonable that NGVs should be included within this rulemaking.

Although not included in the preliminary scoping memo, questions in the rulemaking make it appear that the Commission may use the OIR to revisit policy set in D.95-11-035 which restricted the utilities' ability to own fueling station assets on third-party property. More recent developments in the marketplace necessitates such policy revisions, as does new legislation, including revisions in 2006 of the ratepayer interest test in Public Utilities Code § 740.8, and shifting statewide policy embodied in the adoption of AB32 and the Governor's Executive Order S-01-07. SEU strongly encourages the Commission to use this proceeding to establish policy supporting a strong utility role in market development for natural gas and electricity as vehicle fuels through provision of infrastructure, special programs and education and outreach.

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?

Yes. Many of the issues will impact these vehicle classes. Charging infrastructure needs will differ, but load impacts, charging cycles and incentives are equally relevant to all PEV classes.

A critical issue is the timeline for availability of such vehicle stock, as well as understanding the expected performance characteristics (advantages and limitations). Currently, CNG and LNG alternative-fuels vehicles in this class are available and actively promoted in the SEU service areas, as well as offer a significant source of GHG emissions reduction in California's transportation sector.

The evolution of medium duty and even more limited, heavy duty vehicles in electric transportation is just beginning. Attention should be focused on providing appropriate demonstration and education projects within each utility to help advance these options as they develop and become available to customers

IV.
CONCLUSION

SEU appreciates the opportunity to provide these comments and looks forward to further dialogue with the Commission and stakeholders.

Respectfully submitted

By *_/s/ Steven D. Patrick_*
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Dated: October 5, 2009

Attachment A

All PEV charging station installations are subject to national and local building and electrical codes[2][3][4]. These codes ensure the safety, accessibility, and equipment maintenance concerns of PEV equipment users, property managers, utilities, and maintenance workers. These rules and regulations fall into two categories: electrical code requirements and building code requirements.

Electrical code requirements cover the safe installation, operation, and long-term maintenance of the electrical equipment at the PEV charging site.

Building code requirements govern the physical construction and placement of the PEV charging station(s) and cover such aspects as accessibility of the equipment, stall dimensions, building materials, and placement on the property. The following sections list the existing and current standards in place and/or being developed.

A. CODES AND REGULATIONS REGARDING PEV CHARGING

1. Existing Standards

Table 1 Existing Standards

Vehicle Design & Interface	Certification	Regulations
Technical Requirements (Vehicle Aspects)	**UL Listed Components & Systems (Off-board Equipment)**	**National Building Codes (Premise Aspects Wiring and Installations)**
SAE	**UL**	**NEC**
J1772™ - SAE Electric Vehicle and Plug In Hybrid Electric Vehicle Conductive Charge Coupler	UL 2202 – Electric Vehicle (EV) Charging System Equipment	Article 625 – Electric Vehicle Charging System I – General II – Wiring Methods III – Equipment Construction IV – Control & Protection V – EV Supply Equipment Locations
J2293 - Energy Transfer System for Electric Vehicles Part 1: Functional Requirements	UL 2231 – Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits	

[2] "The National Electric Code, Article 625," NFPA, 2008

[3] "Electric Vehicle Infrastructure Installation Guide," PG&E, March 1999

[4] EPRI Report, "Plug-in Electric Vehicle Infrastructure Installation Guidelines," Vol. 1: Multi-Family Dwelling, EPRI TR 1017682, Sep 2009

and System Architectures	Part 1: General Requirements
Part 2: Communication Requirements and Network Architecture	Part 2: Particular Requirements for Protection Devices for Use in Charging Systems
SAE J2464 Electric and Hybrid Electric Vehicle Rechargeable Energy Storage System (RESS) Safety and Abuse Testing	UL 2251 – Plugs, Receptacles and Couplers for Electric Vehicles

2. Updates and New Standards

1. **SAE**
   - **Common EV Supply Equipment / Charging Coupler – SAE J1772™**
     - Updating connector
     - Increasing 120V (level 1) and 240V (level 2) power levels
     - Added diagnosable detection circuit
   - **Energy Transfer System for Electric Vehicles – SAE J2293**
     - Retained for existing equipment support
   - **Recommended Practice for Communication between Plug-in Vehicles and the Utility Grid – SAE J2847 & SAE 2836™**
     - J2836™ - TIR - General info including Use Cases
     - J2847 – RP – Detail information
       - /1 – Utility programs
       - /2 – DC Energy Transfer (off-board charger in EVSE - Simplified and replaces J2293)
       - /3 – Reverse Energy Flow
       - /4 – Diagnostics
       - /5 – Vehicle Manufacturer Specific
   - **Electric and Hybrid Electric Vehicle Rechargeable Energy Storage System (RESS) Safety and Abuse Testing – SAE J2464**
     - A major revision of the 10 year old document is intended to update the recommend practice to:
     - Improve test descriptions, procedures and data analysis, incorporating lessons learned from conducting testing.
     - Include other types of electric energy storage devices (e.g., electrochemical capacitors) and new types of electrified vehicular designs.
       - *Previous J2464 title was "Electric Vehicle Battery Abuse Testing"*
     - Make the test results more quantitative
   - **Charger Power Quality Requirements – SAE J2894**
     - New standard for on-board chargers

2. **UL**
   - **Electric Vehicle (EV) Charging System Equipment – UL 2202**
     - Charging station safety
     - Harmonization with SAE
   - **Software in Programmable components – UL 1998**
   - **Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits – UL 2231**
   - **Plugs, Receptacles, and Couplers for Electric Vehicles – UL 2251**
     - Updates required to include new connector
   - **XX – UL 2594**
     - New standard on cordset

- **Inverters, converters, controllers and interconnection System Equipment for use with Distributed Energy Resources – UL 1741**

3. **NEC**
   - **Electric Vehicle Charging System Equipment – NEC Article 625 Code Revision Task Force**
   - **Electrified Truck Parking Spaces – NEC Article 626 Code Revision Task Force**

4. **IEC**
   - **IEC 61851 (IEC TC69/WG4) Electric vehicle conductive charging system**, Part 1, 21, 22, 23
   - **IEC 61851-24 (IEC TC69/WG4) Electric vehicle conductive charging system**-Part 24:Communication between vehicle and charging station
   - **IEC 62196 (IEC TC23/SC23H) - Part 1: Plugs, socket-outlets and vehicle couplers** - Conductive charging of electricity vehicles
   - **IEC 62196 (IEC TC23/SC23H) - Part 2: Dimensional interchangeability requirements for pin and contact-tube vehicle couplers**

5. **ISO**
   - **ISO 12405-1 (ISO/TC22/SC21) Test specification for Lithium-Ion traction battery systems -- Part 1: High power applications**
   - **Joint ISO/TC 22/SC 23 - IEC TC69: Vehicle to grid communication interface**
   - ISO TC22 agreed to establish a joint working group with IEC TC69 to standardize the communication between electric road vehicles and charging stations. ISO TC22 will take the lead in this joint activity with experts from SC3/WG1, SC21 and also IEC/TC69

6. **Smart Energy 2.0 Development and Harmonization**
   - Develop and harmonize with SDOs to develop common messaging for PEV Communications
   - PEV requirements to be included in SE 2.0

7. **National Institute of Standards and Technology**
   - In cooperation with DOE, NEMA, IEEE, GWAC, and other SDOs, NIST is responsible for consolidating the standards associated with the smart grid efforts. PEV is identified as a component of the smart grid in NIST Interoperability Roadmap
     a. Recognize existing consensus standards and develop a roadmap to fill gaps
     b. Provide recommendations for new standards
     c. Harmonize SAE & SE 2.0 activities
     d. Develop testing and certification framework

3. Electric Vehicle Conductive Charge Coupler Standard

This SAE Recommended Practice covers the general physical, electrical, and performance requirements for the electric vehicle conductive charge system and coupler for use in North America. This recommended practice redefines AC Level 1 and AC Level 2 charge levels and specifies a new conductive charge coupler and electrical interfaces for those levels. Couplers and interfaces for DC and higher AC charge levels are currently being developed and will be added to this document upon completion.

Table 2 Components of PEV Charging System based on SAE J1772™

	US/Japan IEC 62-196-2 Type I
Pins	**5 pins** (2xpower, 1 xground, 2x signal)
Maximum voltage	240V
Maximum current	32A (80A in US)
Phases	1
Maximum power	7.2 kW (19.2 kW US)
Interlock	Mechanical latch on connector
Control Pilot	PWM signal
Proximity	Resistor in connector (also used to detect latch status)
Digital communication	PLC

A)

B) PEV CHARGING LEVEL

Electric vehicle charging is performed at different voltage levels and using different technologies depending on the model of the PEV and the type of charging situation. Level 1 and level 2 PEV charging are the most common while level 3 charging is most often associated with "fast charge" operations in fueling station or commercial fleet environments.

- AC Level 1 Charging* - 120V AC charging from standard 15 or 20 amp NEMA outlet, on-board vehicle charger (~1.9kw)
- AC Level 2 Charging* - 208 – 240 AC charging up to 80 amps, on-board vehicle charger (~19kw)
- DC Charging (Fast Charging)** - Off-board charger connects directly to vehicle high voltage battery bus

Table 3 Characteristics of Level 1 and Level 2 PEV Charging[5]

	Voltage	Amps	Power (kVA)	Phase	Outlet
Level 1	120	12	1.44	single	NEMA 5-15R
Level 2	208/240	12 - 80	6.7/7.7	single	SAE J1772

4. National Electric Code

The National Fire Protection Association's 2008 National Electric Code (NEC) has established standards for the installation of electric vehicle charging stations. Chapter 6, article 625 of NEC provides details for wiring methods, equipment construction, control and protection, and recommendations for

[5] SAE J1772 draft, "Electric Vehicle Conductive Charge Coupler"

EVSE locations. Section 4 of this report provides more technical requirements for wiring EVSE installations. Below are summaries of key NEC article 625 standards for EVSE installations:

Wiring – EVSE other than cord-and-plug, single phase, 15 or 20 amp must be permanently connected to service and fastened in place with no exposed live parts. Plugs must be non-interchangeable with other electrical devices, and the EVSE should have a means to prevent unintentional disconnection.

Equipment Construction – Equipment must be clearly marked with ventilation, voltage, and intended usage labels. Cables and equipment must provide a means for cable de-energization.

Control and Protection – Overcurrent protection provisions for the EVSE are required, as well as a listed system of personnel protection against shock.

EVSE Locations – Outdoor EVSE equipment must be no less the 600 mm (24 in.) or more than 1.2 m (48 in.) from the ground. Additional requirements for indoor and outdoor installations are detailed in the full NEC article 625.

Note that other NEC articles may apply, including standards for grounding, installation of conduit, and ventilation.

A) STATE AND LOCAL ELECTRIC CODES

While state and local electrical codes usually adhere to NEC safety recommendations, many have additional requirements which must be met to pass planning, permit, and final inspection stages of the PEV charging facility. City and county offices can provide property managers and contractors with the relevant codes for planning and installing EVSE in facilities to adhere to these local code requirements.

B) LOCAL BUILDING CODES AND ORDINANCES

While electric codes are of primary concern in the installation of EVSE, additional building codes may be applicable. For example, some municipalities may require that outdoor EVSE have minimum vehicle space dimensions for charging stalls, wheelstops, etc. Indoor charging stations may have similar space and material requirements. City and/or county offices can provide detailed information on EVSE building codes, if applicable.

C) CALIFORNIA ELECTRICAL CODE (CEC)[6]

The 1998 California Electrical Code (CEC), administered by the California Building Standards Commission and the state Fire Marshall's office, mirrors the NEC. Variations with the NEC were reconciled in 1998.

5. UL Listing and Equipment Certification

All EVSE used at the PEV charging station site should be listed and approved for use in residential multi-unit charging installations by the Underwriters Laboratory (UL). The contractor for the EVSE installation is responsible for certifying that all equipment is UL approved and meets or exceeds all national and local electrical code requirements. Underwriters Laboratory has an online certification verification directory at: http://database.ul.com

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6 "Electric Vehicle Infrastructure Installation Guide," PG&E, March 1999

Table 4 Codes and Specifications

Codes and Specifications for Supply Equipment (EVSE)	Codes and Specifications for Receptacle and cord plug
NEC Article 625	SAE J1772™
SAE J1772™	IEC 62196
SAE J2847 & SAE 2836™	UL 2251
UL 1998	
UL 2202	
UL 2231	
IEC 61851	

6. Communication Standards

While until as recently as 2007, the concept of the PEVs' control and communication system connected to the grid was foreign to the automobile manufacturers, this situation is rapidly evolving and in the span of last few months, a whole host of initiatives have been established to quickly address this gap in automobile's capabilities to communicate with the grid and control its own energy draw from the grid as needed, as well as provide acknowledgement of having done so. These initiatives range from SDOs such as OpenHAN[7] / OpenAMI[8] / ZigBee alliance[9] releasing their specification for Smart Energy Profile v1.0[10] to HomePlug[11] alliance working on their IEEE P1901[12] specification to SAE developing requirements for control and communication between plug-in electric vehicles and the electric grid under the aegis of SAE standards J2847[13] and J2836[14].

J2847/1 supports AC or DC energy transfer. J2847/2 supports the additional messages for DC energy transfer and replaces J2293. J2847/3 supports Reverse Power Flow (RPF) and this series is based upon requirements jointly developed by vehicle manufacturers, electric utilities, grid operators, technology suppliers, and other stakeholders. These requirements are reflected in SAE Information Report J2836/1, *Use Cases for Communication between Plug-in Vehicles and the Utility Grid*.

Whereas J2293 focused on communication between the vehicle and local, off-board electric vehicle supply equipment (EVSE) with optional grid interaction, J2847/1, /2 & /3 focuses on communication between the vehicle and grid, with the EVSE playing the role of local intermediary. Additionally, while J2293 included support for J1773-based inductive charging and J1850-based communication, these are

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[7] http://osgug.ucaiug.org/utilityami/openhan/default.aspx
[8] http://osgug.ucaiug.org/utilityami/default.aspx
[9] http://www.zigbee.org/en/index.asp
[10] www.**zigbee**.org/imwp/download.asp?ContentID=12484
[11] www.**homeplug**.org
[12] http://grouper.**ieee**.org/groups/1901/
[13] http://www.**sae**.org/servlets/works/documentHome.do?comtID=TEVHYB&docID=**J2847**&inputPage=wIpSdOcDeTaIlS
[14] www.**sae**.org/servlets/works/documentHome.do?comtID=TEVHYB&inputPage=wIpS

obsolete and hence not supported by J2847. In order to maintain information for existing systems, this task force has reaffirmed J2293, preserving that specification at its last revision level.
This specification addresses major changes that have occurred since 1997 (when J2293 was published) in the technologies of electric vehicles, the grid, and information processing, including:

(1) support for bi-directional energy transfer between vehicle and grid (FPF and RPF, as defined above);
(2) support for new local communications media between vehicle and EVSE (to replace J1850), such as power line communication (PLC) and wireless transports (Zigbee, WiFi, etc.);
(3) synchronizing with a major revision of J1772 which includes new connectors and signals between the vehicle and EVSE, and additional AC and DC power levels;
(4) support for new vehicle architectures such as plug-in hybrid (PHEV) and plug-in fuel cell (PFCV) vehicles;
(5) support for new rechargeable energy storage system (RESS) technologies and packaging methods;
(6) support for vehicle telematic communication transports; and
(7) support for new developments in both utility and customer premises equipment, such as advanced metering infrastructure (AMI) and home-area network (HAN) technologies

The purpose of J2836/1 is to document the set of use cases which must be supported by SAE Recommended Practice J2847/1, *Communication between Plug-in Vehicles and the Utility Grid*. The purpose is to

- To capture requirements associated with PEV infrastructure, core functions and related applications to facilitate successful integration of PEV into the utility enterprise
  - Develop ***Functional*** and ***Non-Functional*** requirements and specifications
  - Evaluate, Distill, Prioritize, and Publish requirements
- Develop and document the set of use cases which must be supported by SAE Recommended Practice J2847, *Communication between Plug-in Vehicles and the Utility Grid*.
- Requirements should support AMI as well as non-AMI environments
- Requirements should be independent of the transport layer
- Extract requirements from the usecases which must be supported by SAE Recommended Practice J2847, *Communication between Plug-in Vehicles and the Utility Grid*

A) HIGH LEVEL PEV COMMUNICATIONS REQUIREMENTS[15]

SAE J2847/SAE 2293 and SEP 2.0 will provide the messages and communications application standards for **Smart Charging**

- Standards-based implementation of 'application layer': SAE J1772/J2836 and Smart Energy 2.0
- Supports compatibility and interoperability among alternative message transport protocols – shall not specify the physical layer
- Supports Open, interoperable systems
- Single interface on automotive side, interoperable with diverse 50-state and Canadian utility smart grid infrastructure
- Standards shall apply to AMI and Non AMI communications solutions
- Standards address a specific direction toward the long term

[15] EPRI Report, "Smart Charging Development for Plug-in Hybrid and Electric Vehicles – Preliminary usecase Development for SAE Recommended Practice J2847/Jj2836," TR 1015886, Dec 2008

  - Should not divert or interject specifications for short term gap/bridges
- Market/Utilities will develop gap or derivative solutions but should be forward compatible with the long term direction provided in the standard
  - Examples are smart plugs, smart EVSE, and other intermediaries for a Dumb Vehicle
  - Intermediaries are acceptable but should comply to the standard and be compatible with a Smart Vehicle
- Avoid allowing for incompatible alternatives within the standard
- Supports secure two-way communication with the Energy Services Communication Interface (i.e., Utility)
- Supports time- or price-based charging preferences based on current electric rate/tier
- Supports vehicle charging at any voltage
- Support vehicle load correlation (end use metering of the PEV)
- Support Demand Side Management Integration
- Support vehicle charging regardless of utility metering and/or communication availability
- Supports vehicle roaming and unified billing infrastructure
- Supports Customer override/opt-outs
- PEV-to-Utility communications technology based on open standards

How does the timeframe for each code and standard adoption impact current and future vehicle and EVSE products?

TIMELINE

7. SAE J1772™

- 1st level ballot September 2009.
- Second level ballot start November 6th 2009 and close December 4th 2009
- Release for publishing by end of 2009

8. SAE J2847

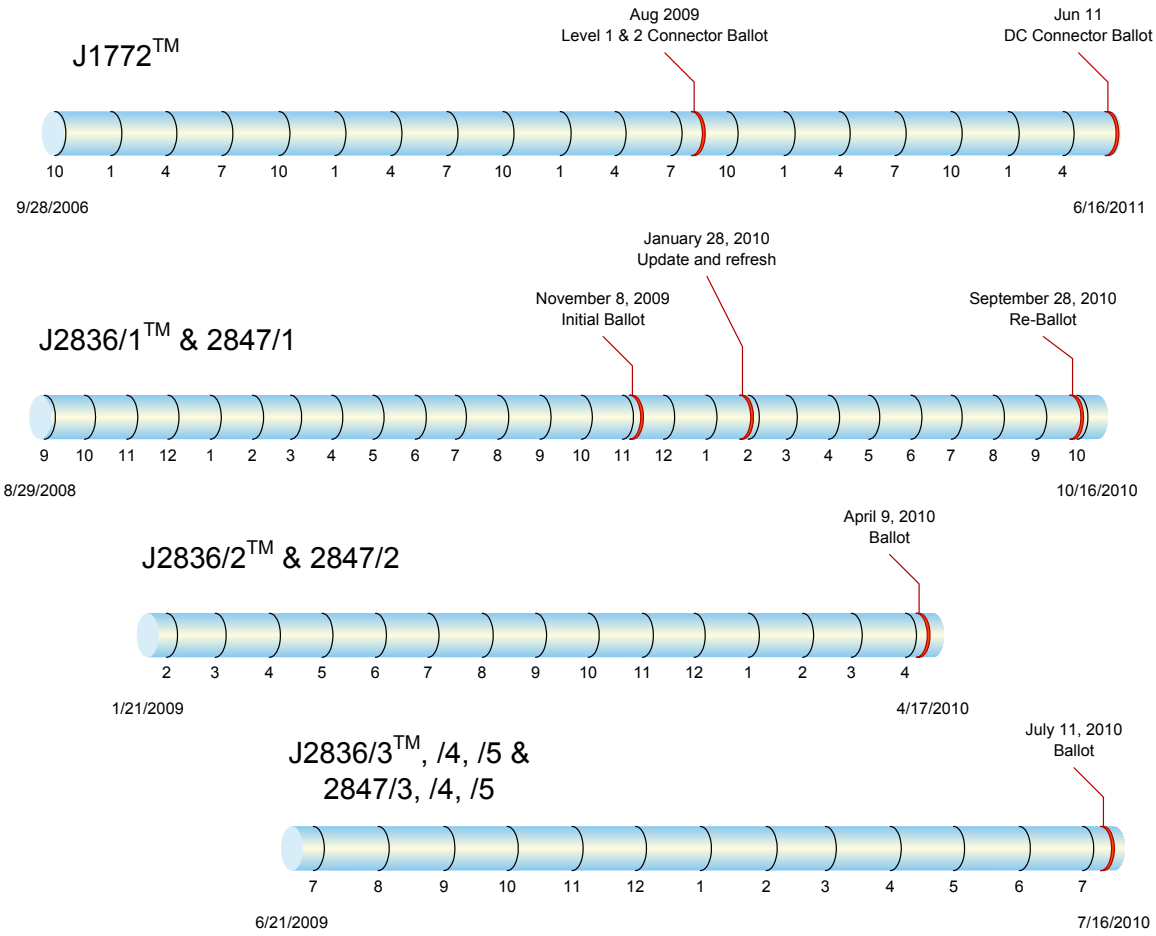

Figure 1 Timeline for SAE Communication Documents[16]

9.

[16] SAE Communication Task Force J2847 & J2836

10. SE 2.0

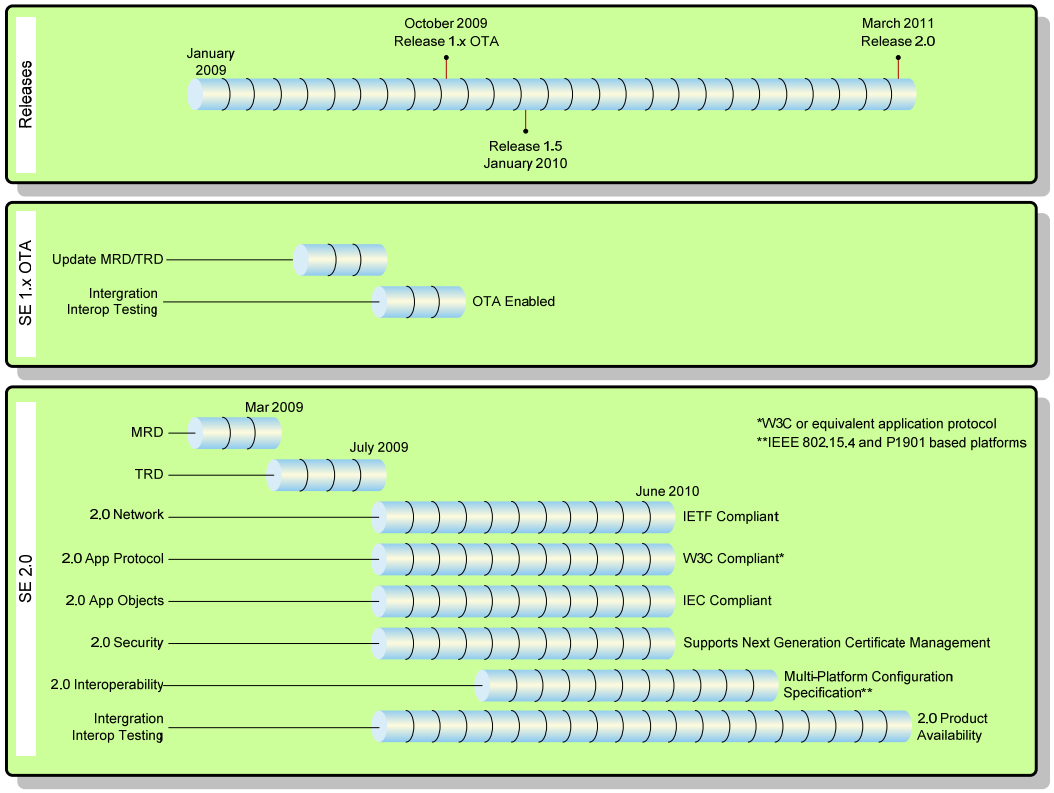

Figure 2 Timeline for SE 2.0[17] (Source: Smart Energy Council Alliance Workgroup)

[17] SmartGrid Update – SAE and SE 2.0 Working Group Meeting June 2009

CERTIFICATE OF SERVICE

Pursuant to Rule 3.2 of the Commission's Rules, I hereby certify that I have this day served a copy of the foregoing **OPENING COMMENTS OF SAN DIEGO GAS & ELECTRIC COMPANY (U 902 M) AND SOUTHERN CALIFORNIA GAS COMPANY (U 904 G) IN RESPONSE TO THE COMMISSION'S ORDER INSTITUTING RULEMAKING TO CONSIDER ALTERNATIVE-FUELED VEHICLE TARIFFS ("OIR"), INFRASTRUCTURE AND POLICIES TO SUPPORT CALIFORNIA'S GREENHOUSE GAS ("GHG") EMISSIONS REDUCTION GOALS** on all parties of record in **R.09-08-009** by electronic mail and by U.S. mail to those parties who have not provided an electronic address to the Commission.

Copies were also sent via Federal Express to Administrative Law Judge Regina DeAngelis and Commissioner Rachelle B. Chong.

Dated at Los Angeles, California, this 5th day of October, 2009.

/s/ Marivel Munoz
Marivel Munoz

CALIFORNIA PUBLIC UTILITIES COMMISSION
Service Lists: R.09-08-009 - Last changed: October 2, 2009

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