

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to Consider  
Alternative-Fueled Vehicle Programs, Tariffs, and  
Policies

Rulemaking 13-11-007  
(Filed November 22nd, 2013)

**COMMENTS OF EV GRID, INC.  
ON ORDER INSTITUTIN RULEMAKING TO CONSIDER ALTERNATIVE-FUELED  
VEHICLE PROGRAMS, TARRIFFS, AND POLICIES**

December 13, 2013

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On November 22nd, 2013, the California Public Utilities Commission issued the Order Instituting Rulemaking (OIR) to Consider Alternative -Fuel Vehicle Programs, Tariffs, and Policies R.13-11-007. We support the Commission's efforts in the Alternative -Fuel Vehicle Proceeding and wish to provide comments on Order Instituting Rulemaking.

**INTRODUCTION:**

EV Grid, Inc. is a California based company developing and deploying Grid Integrated Vehicle (GIV) technology and stationery distributed energy storage systems engineered with second life electric vehicle battery systems and technology advancements shared with electric vehicle propulsion.

In this proceeding, EV Grid focuses on the effects and opportunities represented by the 1.5 million electric vehicles targeted to be on the road in California by 2025 under the Governor's ZEV Action Plan. We project that the one million vehicles will, in aggregate, possess energy storage of between

15 GWh and 45 GWh (10 kWh to 30 kWh per vehicle), and will present as much as 4.5 GW to 22.5 GW of load (or capacity) to the grid (3 kW to 15kW charging power per vehicle). The ability to control the time, rate, and direction (charge or discharge) of electric vehicle charging allows the EV fleet to represent a significant, reliable, and low-cost energy storage resource by itself. If the potential capability to communicate, control, and make use of vehicle-based energy storage is not developed adequately, then the fleet will only represent an additional load that may require additional grid resources, including purchase of other storage, to offset its effects on grid operation. It is vital for California to adopt policies for integration of electric vehicles and the grid that reduce the ownership cost of the vehicles and reduce the cost of the infrastructure required to support them.

## **COMMENTS:**

### **VEHICLE-GRID INTEGRATION**

1) *Is the VGI framework proposed in the White Paper a reasonable way to organize VGI activities and scenarios?* Our work as part of the “Grid on Wheels” team<sup>1</sup> delivering the first in the country project to collect grid revenue from electric vehicles<sup>2</sup> provides EV Grid with real-world insight into the challenges and opportunities associate with VGI. We feel that the staff prepared White Paper does an admirable job of organizing the many interrelated topics key to the success of Grid-Integrated Vehicles.

2) *Do you agree with Energy Division’s prioritization of the VGI scenarios?*

Generally, with the exception of V2G scenario. Please see discussion below.

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<sup>1</sup> Energy Storage North America, September 11, 2013 – Innovation Award “Grid on Wheels” Project by University of Delaware, BMW, EV Grid, NRG, PJM, Milbank & AutoPort <http://www.esnaexpo.com/awards#grid> | <http://grid-on-wheels.com/>

<sup>2</sup> New York Times, April 25<sup>th</sup>, 2013 – “In Two-Way Charging, Electric Cars Begin to Earn Money From the Grid” <http://www.nytimes.com/2013/04/26/business/energy-environment/electric-vehicles-begin-to-earn-money-from-the-grid.html?>

3) *Does the White Paper capture all the utility regulatory barriers to VGI?*

EV Grid believes that the White Paper does good job of outlining the utility regulatory barriers to VGI. We wish to stress, uni-directional and bi-directional Vehicle-Grid integration share common needs such as Rule 24. To the degree that bi-directional energy flow differs from uni-directional, it shares many common needs with distributed energy storage and generation. As such, and in the interest of leveraging work already being done in other proceedings, we ask the Commission to assist in the process of helping coordinate and align complementary efforts in Storage, Demand Response, Interconnection, Net Energy Metering and other relevant proceedings. Put another way, complexity and resources required to navigate all the proceedings is in effect its own barrier. We believe that periodic cross-proceeding-cutting Stakeholder workshops would be of exceptional value in breaking down the “regulatory maze” barrier. We expect that this opinion is shared by many Stakeholders (especially Automotive OEMs), who’s exposure to CPUC activities are likely limited to the Alternative Fuel Vehicle proceeding.

4) *How should we address any potential safety and reliability concerns associated with VGI?*

It goes without question that safety is equally important as it pertains vehicle charging and discharging. As alluded to above, in the realm of policy, reverse energy flow also shares common safety factors with distributed energy generation and storage. As such, we do not believe other than by reference to applicable safety measures incorporated that the AVF proceeding should consume its time on safety concerns.

It is worth documenting that the full spectrum of Vehicle to “X” possibilities are unlocked by the very same technologies as Vehicle to Grid. Thus, the same product development cycles

will deliver energy management and safety benefits including: Vehicle to Building, Vehicle to Home<sup>3</sup>, Vehicle to Vehicle and Vehicle to Disaster Response<sup>4</sup>.

With regard to reliability we strongly feel that VGI has tremendous value to support grid reliability which is much of what the VGI track will be exploring.

## **ALTERNATIVE FUEL VEHICLE RATE DESIGN POLICY**

### *General comments on Rate Design Policy – Items 1-7.*

EV Grid supports rate policies that are easy for consumers and commercial customers to understand and take advantage of to support wide scale adoption of electric vehicles. We strongly believe rates and education about available rates are key factors to realizing the potential of electric transportation. Understanding that changes to peak demand and intermittent supply of renewables will create challenges for traditional rate design in the not too distant future, we ask the Commission to continue pursuit of enabling a market where solutions that can be flexible and deliver on the promise of electric vehicles as a solution rather than a liability to the grid.

### **VGI Scenario Prioritization Discussion**

EV Grid agrees with the intent of CPUC Staff to prioritize scenarios, however, feels strongly that de-prioritizing the bi-directional energy flow use case is detrimental to the development of electric vehicle inclusive energy market products that are exponentially more valuable than uni-directional. We suggest that policy and rulemaking for V1G and V2G move forward in parallel given they share many of the same needs. Where possible, we ask that the reverse energy flow of V2G capable vehicles leverage and benefit from the same rulemaking efforts as distributed energy storage and or

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<sup>3</sup> Nissan Build a Post-Fukushima Neighborhood Around the LEAF – Wired, October 5<sup>th</sup>, 2011 - <http://www.wired.com/autopia/2011/10/nissan-builds-a-post-fukushima-neighborhood-around-the-leaf/>

<sup>4</sup> Mitsubishi i-MEV Turns Their EVs Into Portable Power Supplies – Wired, March 19, 2012 <http://www.wired.com/autopia/2012/03/mitsubishi-turns-their-evs-into-portable-power-supplies/>

generation. Further, that grid services provided by Electric Vehicles with bi-directional capabilities may be fact very similar to existing Demand Response programs.

At the same time, we wish the commission to understand that in addition to sharing many aspects of policy, V2G capable vehicles share V1G infrastructure using the same J1772 plug and DC connectors. As a result, a V2G vehicle should be able to follow V1G signals while connected to a V1G EVSE. It is also reasonable to expect that V2G infrastructure and EVSEs will support V1G capable vehicles and associated services. Therefore, V2G by definition will also enable V1G legacy vehicles. For illustration, a similar paradigm exists with regard to compatibility among cellular networks and devices. Over time, the networks evolve to support newer faster devices yet you are still able to use the network to make calls and access data services with the slower devices.

Vehicle development programs can take four, five or more years. Considering this and given that existing production vehicles and many EVSEs already have capabilities that are capable of uni-directional “smart charging” we encourage the Commission to insure Automotive OEMs receive the proper market opportunity signals to develop Electric Vehicles with bi-directional capabilities that will ultimately bring greater value to their customers, fleet operators, the grid and society at large.

To clarify this important point: The technical challenges of “smart charging” are largely already solved and do not require design changes to existing production vehicles. In contrast, the most efficient, cost effective power train designs that incorporate bi-directional functionality into the vehicle electronics are not yet common and are only just beginning to reach the market in early forms of on-board inverters.

EV Grid is encouraged to see technology innovation and developments to study charging infrastructure with integrated bi-directional features<sup>5</sup> and commercialize bi-directional energy flow are under way as evidenced by recent press coverage including Honda<sup>6</sup>, Nissan<sup>7</sup>. EV Grid is a participant in the Clinton Global Initiative's V2G School Bus Project<sup>8</sup> along with California based Transpower and are aware of several other commercial and military projects<sup>9</sup> <sup>10</sup>using production vehicles to address a variety of vehicle needs utilizing AC or DC energy transfer. We are also seeing more readily available components from multiple suppliers in the market to supporting a growing number of paths to build V2G capable vehicles.

In reviewing the recently approved Energy Storage Mandate we are pleased to see Electric Vehicles are a potentially qualified energy storage resource in the behind the meter domain and received support from the Investor Owned Utilities. We see a conflict, however, in that although called out as a storage resource, the path to utilize this low cost form of energy storage is not a priority use case in the Staff White Paper on VGI. As a result it is at risk of not being a priority within the AFV proceeding and as such, becomes a self-fulfilling on-going barrier. See "regulatory maze" barrier above.

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<sup>5</sup> Fast-Charging Electric Vehicles using AC - Joachim Skov Johansen, Technical University of Denmark, September 2013  
<http://udel.edu/~jsj/JSJ-EV-AC-Fast-Charging-Thesis.pdf>

<sup>6</sup> Honda Joins Vehicle-to-Grid Technology Demonstration, Honda Press Release, December 5<sup>th</sup>, 2013  
<http://www.honda.com/newsandviews/article.aspx?id=7502-en>

<sup>7</sup> Six Nissan LEAFs power office building in Japan to test "Vehicle-to-building" technology – Tree Hugger, December 12, 2013 <http://www.treehugger.com/cars/6-nissan-leafs-power-office-building-japan-test-vehicle-building-technology.html>

<sup>8</sup> CGI's Electric School Bus Project – School Transportation News – September 24<sup>th</sup>, 2013  
<http://www.stnonline.com/home/latest-news/5626-clinton-initiatives-electric-school-bus-project-plugging-along->

<sup>9</sup> Green Car Congress - Boulder Electric Vehicle demonstrates V2G electric trucks in three locations; 60 kW bi-directional - <http://www.greencarcongress.com/2013/09/20130913-boulder.html>

U.S. Army Testing Bi-Directional Charging System- EV World, September 1<sup>st</sup>, 2013  
<http://evworld.com/news.cfm?newsid=31161>

<sup>10</sup> Los Angeles Air Force Base Vehicle to Grid Pilot Project – Lawrence Berkeley National Laboratory Paper, June 2013 - <http://der.lbl.gov/sites/der.lbl.gov/files/lbnl-6154e.pdf>

## **OUTSTANDING ISSUES FROM R.09-08-009**

### **SUBMETERING PROTOCOL**

EV Grid supports the Commission's efforts to develop a submetering protocol and subtractive billing. We believe the ability to isolate energy use from the main meter for purposes of fueling electric vehicle in a low cost manner unlocks many opportunities including new business models, access to EV specific tariffs and the ability to accurately administer powerful policy tools such as Low Carbon Fuel Standards (LCFS) credits, virtual submetering, warrant performance participation in demand response programs and potentially other energy management applications within residential and commercial service locations.

With regard to the topic of Vehicle-Grid Integration, we request the Commission continue to assess the value of adding bi-directional energy flow use cases being investigated under the proposed pilot project or another similar pilot that leverages the same mechanisms established by the pilot.

We see great potential for convergence of submetering and low cost Telemetry technologies that may enable the path to energy market participation and feel it is worth recording this in the AFV proceeding for future reference.

### **CONCLUSION:**

With the rest of the country and world watching it is our belief that this OIR represents an opportunity for the State of California to lead the way in defining a path that unlocks and maximizes electric vehicle's potential to provide considerable value to rate payers and society. By leveraging electric vehicle storage systems for zero emission transportation and perform as a low cost fast,



responding distributed energy storage resource, California will achieve its Green House Gas reduction goals at an accelerated pace.

EV Grid thanks you for the opportunity to participate in this proceeding and welcomes discussion with other Parties to share our expertise and joint goals of clean energy and transportation.

Respectfully submitted,

/s/

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