

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

Order Instituting Rulemaking Pursuant to Assembly  
Bill 2514 to Consider the Adoption of Procurement  
Targets for Viable and Cost-Effective Energy  
Storage Systems.

Rulemaking 10-12-007  
(Filed December 16, 2010)

**COMMENTS OF EV GRID, INC.  
ON PROPOSED DECISION OF PROPOSED DECISION OF COMMISSIONER CARLA  
PETERMAN OF 09/03/2013 IN THE ENERGY STORAGE RULEMAKING**

September 23, 2013

Paul Stith  
Director, Business Development & Regulatory Affairs  
EV Grid, Inc.  
809 San Antonia Road  
Palo Alto, CA 94303  
408.384.9455  
pstith@evgrid.com  
www.evgrid.com

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In accordance with California Public Utilities Commission (“Commission”) Rule of Practice and Procedure 14.3, EV Grid, Inc. respectfully submits these comments on the September 3, 2013 Proposed Decision of Commissioner Peterman Adopting Energy Storage Procurement Framework and Design Program (the “PD”).

**Introduction:**

EV Grid, Inc. is a California based company developing and deploying Grid Integrated Vehicle (GIV) technology and stationary distributed energy storage systems. We support the Commissioner’s efforts in the Storage Proceeding and wish to provide comments on the framework Viable and Cost-Effective Energy Storage Systems procurement.

We focus 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 represent an additional load that may require additional grid resources, including 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.

We believe the PD should include specific language that recognizes the potential for electric vehicles to participate as a distributed energy storage resource, and provides for the development of language, practices, standards, and regulations governing the fundamental integration of electric vehicles and the power grid.

## **Background**

In 2012, EV Grid entered into relationships with BMW, NRG, and the University of Delaware to expand ongoing work the University was conducting in the field of integration of grid-connected vehicles. The University was using electric vehicles to respond to grid commands and deliver grid regulation service to the PJM grid. The availability of MINI E electric vehicles from BMW and NRG's participation as an aggregator of the vehicles allowed the University's program, Grid on Wheels, to successfully participate in PJM's grid regulation market and generate ancillary services revenue starting in March 2013.

One key to the Grid on Wheels project is the 17 kW bi-directional charger installed in each MINI E. This allows the vehicle to respond to both reg-up and reg-down commands thus evening output energy demands on the battery and maintaining, battery state-of charge within a narrow window. Bi-directional power can be provided by both onboard (AC) and off-board (DC) chargers. The ability to utilize EV batteries as both load and capacity means that fundamentally, an aggregate of electric vehicles can appear the same as other battery storage resources on the grid. Grid on Wheels represents the first time in the world that vehicles are serving as an official market resource on a

power grid. The project, called “Grid on Wheels” was recently recognized by the Energy Storage North America conference as the most innovative mobility project of 2013.

## **Technology Status**

In many respects, vehicles as a storage resource have the same attributes as stationary behind-the-meter resources. In the PJM demonstration, the MINI Es are in the same frequency regulation market as all other battery projects. Although the storage resource is mobile, there are ways to make the resource predictable – either because the vehicles are in a fleet with a predictable route, because there are enough electric cars on the system that a statistical sample can be used for determining availability in a given hour. The success of Grid on Wheels so far does not mean that all challenges have been met. PJM is a particularly EV-friendly grid area. Other markets operate under rules that do not allow straight forward EV participation in ancillary services markets without changes to rules and tariffs.

We believe it is important to change institutional barriers to allow vehicle batteries to participate. Vehicles may be a cheaper storage resource than other technologies. The vehicle battery and charger and grid connection are all paid for by the vehicle operator for their transportation value. Sharing these resources with the grid should allow both the vehicle operator and, ultimately the electric ratepayer to save money.

We recognize that the technology for using vehicles as a grid storage resource is emerging, and several questions need to be addressed prior to declaring the technology ready for playing a role in the storage requirements of the California grid. Will enough electric vehicles be on the road to provide meaningful energy storage? Who will take responsibility for battery cost? What are the incremental infrastructure costs of bi-directional charging? There are also product fit questions – what works in PJM (aggregation of behind-the-meter resources providing frequency regulation) may not be the right product in California. It is important that the PD not prevent demonstrations such as Grid on Wheels from taking place and answering these questions in California.

## Summary

We ask that the CPUC – as it moves forward in supporting the development of energy storage in California – encourage the development of emerging storage technologies, especially one with as much potential as vehicle-based energy storage. The potential is two-fold – 1) it can reduce the cost of EVs and energy storage in California, and 2) it can reduce the cost of accommodating millions of EVs on California’s power grid.

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,

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Director, Business Development & Regulatory Affairs  
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