

Vehicle-Grid Integration in California Using the ISO 15118 Global Interoperability Standard

Quick Facts

- **Prime Contractor:** Center for Sustainable Energy
- **Partners:** UC San Diego, Strategen Consulting, Energy Solutions, et al.
- **Supporters:** SDG&E, Siemens, CAISO, BMW of North America
- **Commission Award:** \$1,499,999
- **Term:** July 2015 – June 2018

Background

Since the passage of AB 32 in 2006, California has established ambitious and comprehensive statutory goals to decarbonize the electric power and transportation sectors. California investor-owned utilities (IOUs) are currently working to reach the state's renewables portfolio standard of 50% by 2030, while simultaneously the state is working toward a goal of 1.5 million zero-emission vehicles by 2025. The state's vision to achieve crosscutting benefits from these two separate yet interconnected efforts, however, requires new thinking on precisely how electric system operators can leverage and utilize plug-in electric vehicles (PEVs) as beneficial distributed energy resources (DERs) without compromising safety, data security, consumer simplicity or the mobility needs of PEV owners.

The California Vehicle-Grid Integration (VGI) Roadmap states, “Vehicle electrification presents an unprecedented opportunity, through charging strategies and aggregation, to contribute to the reliable management of the power grid, without impacting consumer driving habits.”¹ In order to realize this opportunity, common standards for communications, data collection and resource dispatch are essential to allow utilities and automakers to establish and scale a viable, robust, secure and highly functional marketplace for VGI.

Project Description

The Center for Sustainable Energy (CSE), in partnership with global experts on advanced VGI practices, is developing the world's first standards-based communications platform that directly incorporates the internationally recognized ISO 15118 standard.² The platform, defined in ISO 15118 as a “demand clearing house” (DCH),³ provides electric system operators, balancing authorities and others the mechanism necessary to manage successfully millions of PEVs. The DCH will collect all required information from all parts of the power grid, such as current or forecasted load of local transformers and distribution grid power plants (including renewable resources) as well as the predicted charging schedules submitted by grid-connected PEVs. The DCH consolidates data from these multiple inputs and generates grid profiles based on pricing and system constraints that optimize the needs of both grid operators and vehicle owners. Though the establishment of a standards-based DCH is essential, one has yet to be developed.

The proposed DCH will be designed and developed to monitor published energy pricing from the California Independent System Operator (CAISO) Fifteen Minute Market (i.e., Energy Imbalance Market) as well as load forecasts from San Diego Gas & Electric (SDG&E) and other

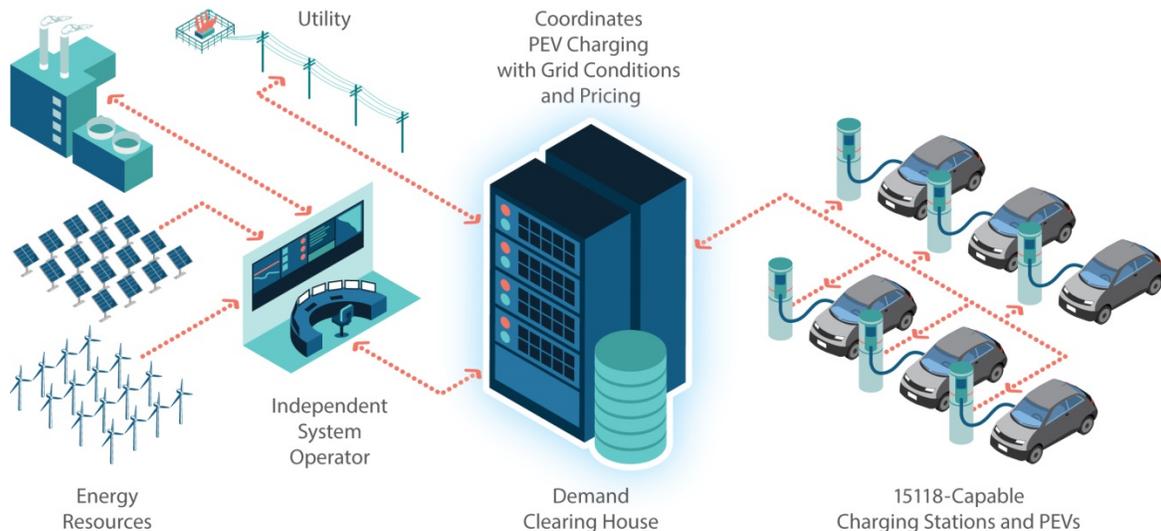
¹ <http://www.caiso.com/Documents/Vehicle-GridIntegrationRoadmap.pdf>.

² International Organization for Standardization (ISO).

³ <https://www.iso.org/obp/ui/#iso:std:iso:15118:-1:ed-1:v2:en>.

participating utilities through an API translation from OpenADR 2.0b, a demand response protocol used by California IOUs. The DCH will then use algorithms that convert grid conditions into ISO 15118 grid profiles, or tariff tables, which in turn will be communicated to 15118-capable charging stations and 15118 vehicles.

The project will measure the DCH and control system's effectiveness in allowing utilities to potentially provide a viable and scalable pathway toward using PEVs to manage variable grid conditions, solar oversupply and other systemwide challenges associated with the state's goals to decarbonize its electricity sector with variable renewable resources, while simultaneously responding to supplemental energy market prices.



Anticipated Benefits for California

This project directly supports the Electric Program Investment Charge (EPIC) goals of greater reliability, lower costs and increased safety for California IOU ratepayers. It utilizes historic investments in existing infrastructure and standards as well as outside investments in PEVs to generate a tremendous cost benefit to ratepayers. The project will provide California with an open protocol that enables large amounts of new, low-cost flexible capacity on the grid. It will minimize potential stranded investments in less cost-effective forms of flexible grid resources, maximize renewable resources and PEV integration, and promote a safer, more reliable low-carbon future.

Importantly, the project is substantially different from a proprietary VGI platform, as its objective is to develop an open DCH based on the ISO 15118 standard. Ratepayers will see benefits from an open standard far beyond what would be seen from funding a closed platform.