

California Vehicle-Grid Integration Roadmap

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The ZEV Action Plan: Framing the Timeline

By 2015

- The state's major metropolitan areas will be able to accommodate ZEVs through infrastructure plans and streamlined permitting
- Private investment and manufacturing in the ZEV sector will be growing
- The state's academic and research institutions will contribute to ZEV market expansion by building understanding of how ZEVs are used

By 2020

- The state's ZEV infrastructure will be able to support up to 1 million vehicles
- The costs of ZEVs will be competitive with conventional combustion vehicles
- ZEVs will be accessible to mainstream consumers
- There will be widespread use of ZEVs for public transportation and freight transport

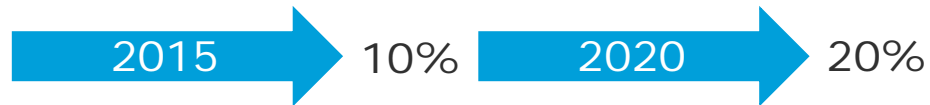
By 2025

- Over 1.5 million ZEVs will be on California roadways and their market share will be expanding
- Californians will have easy access to ZEV infrastructure
- The ZEV industry will be a strong and sustainable part of California's economy
- California's clean, efficient ZEVs will annually displace at least 1.5 billion gallons of petroleum fuels

Executive Order

ZEV Procurement

Light Duty Fleet



The ZEV Action Plan: Framing the Timeline

Vehicle to Grid Integration

Revenue Potential
(on going)

Medium and Heavy PEV Fleet

Smart Charging
2013-2015

Technology Demonstrations

Vehicle to Grid
Second markets
(2013 – 2015)

Position California to be an EV leader

The Vehicle-Grid Integration (VGI) Roadmap is One Element

Four broad goals for state government to advance ZEVs

1. Complete needed infrastructure and planning

2. Expand consumer awareness and demand

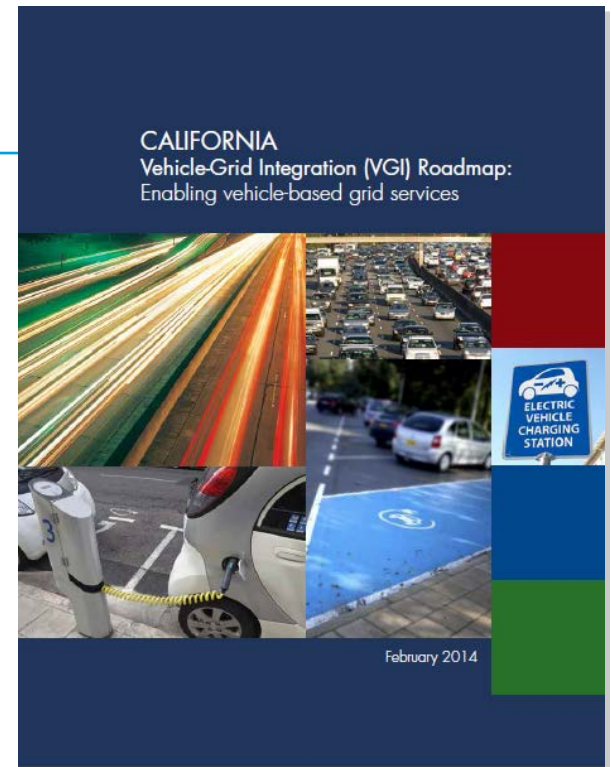
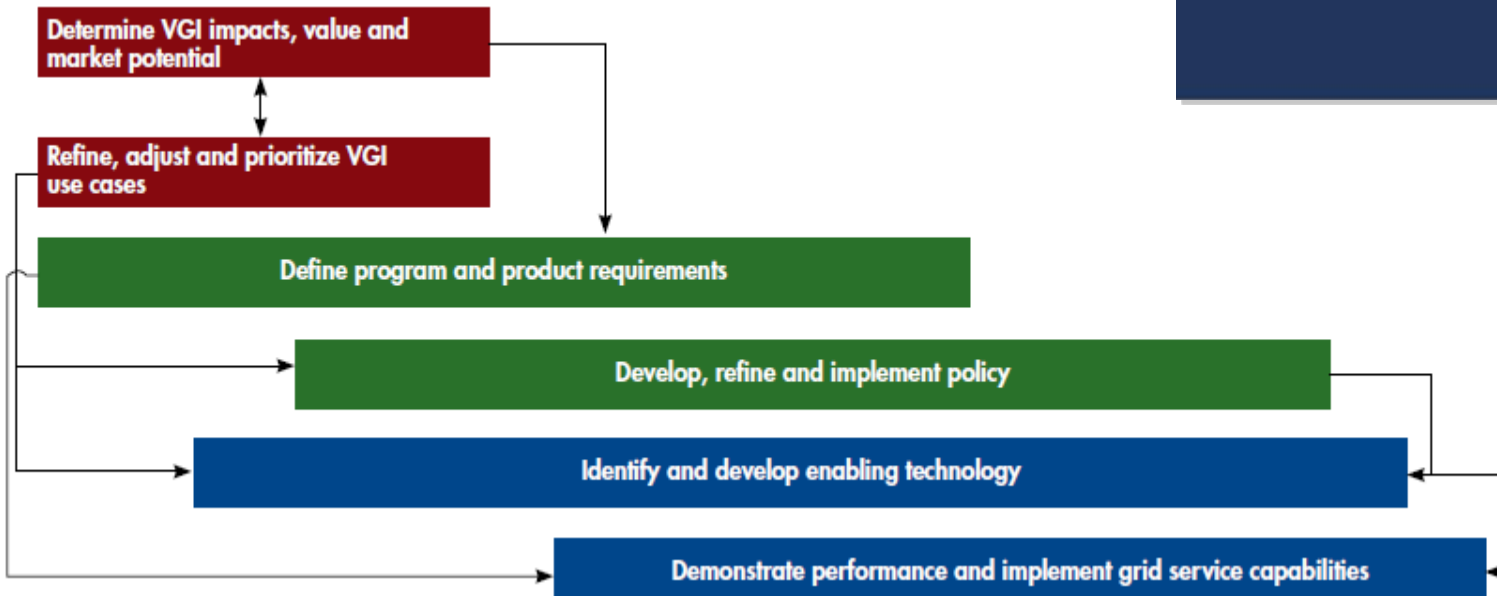
3. Transform fleets

4. Grow jobs and investment in the private sector

Develop roadmap to commercialize vehicle to grid (V2G) services provided by PEV batteries. The roadmap will explore economic value of aggregated PEV storage and ancillary services to the California grid, and describe the technology, policy and regulatory environment that must be developed to deploy smart charging and V2G, including CAISO rules to enable energy services market. The roadmap should lay out a pathway for partners to help accelerate development, including research projects and pilot programs.

California VGI Roadmap Released 2/2014

- The intent of the roadmap was to support the governor's 2013 Zero-Emission Vehicles (ZEV) Action Plan. The plan calls for 1.5 million zero-emission vehicles on California roads by 2025.
- The roadmap consists of 3 tracks:
 - 1. determine VGI value
 - 2. develop enabling policy, and
 - 3. support enabling technology development



Next Steps

- In support of its rulemaking on alternative fuel vehicles (R.13-11-007) the CPUC has started to define VGI use cases.
 1. Unidirectional power flow (V1G) with one resource and unified actors
 2. V1G with aggregated resources
 3. V1G with fragmented actor objectives
 4. Bidirectional power flow (V2G)
- Additional work is being done now to define the scope of the proceedings.
- The Energy Commission will schedule annual workshops starting in 2014 to review progress on R&D projects relating to VGI (e.g., V2G pilots with DOD and VGI research under EPIC)
- VGI activities will also be discussed in workshops for the Statewide Plug-in Electric Vehicle Infrastructure Plan
- Additional outreach will be conducted by the CPUC related to its alternative fuel vehicle rulemaking.

Policy Initiatives Relevant to VGI

- VGI corresponds with several initiatives within the State, including policies related to demand response, interconnection, and wholesale access.

Policy	Entity	Description & Relevance
Federal Energy Regulatory Commission Order No. 784 (Issued July 18, 2013)	FERC	<ul style="list-style-type: none"> • Expands FERC 755 pay-for-performance requirements to account for speed and accuracy • Potentially affects payment for VGI services, depending on VGI capabilities
Federal Energy Regulatory Commission Order No. 792 (Issued November 22, 2013)	FERC	<ul style="list-style-type: none"> • Adjusts the Small Generator Interconnection Procedures (SGIP) and Small Generator Interconnection Agreement (SGIA) for generating facilities no larger than 20 MW • Will shape interconnection associated with storage devices
Standard ISO/IEC 15118 (Stage 60.60: International Standard published as of April 16, 2013)	ISO/IEC	<ul style="list-style-type: none"> • Creates a global standardization of communication interface • Will likely shape VGI enabling technologies
Standard SAE J1772 (Most recent revision is October 15, 2012)	SAE	<ul style="list-style-type: none"> • Establishes a recommended practice for EVSE • Will likely shape VGI enabling technologies
Assembly Bill (AB) 2514 and CPUC Storage Proceeding Docket No. R. 10-12-007	CPUC	<ul style="list-style-type: none"> • Sets targets for the procurement of storage • States that EV capacity can contribute to the storage procurement targets • Potentially creates demand for VGI services, depending on how VGI compares to other options
Resource Adequacy (RA) Proceeding	CPUC	<ul style="list-style-type: none"> • Guides the resource procurement process and promotes infrastructure investment by requiring LSEs to provide capacity as needed by California ISO • Potentially influences demand for VGI services, depending on VGI capability to meet RA needs.
Demand Response (DR) Proceedings Docket No. R.07-01-041	CPUC	<ul style="list-style-type: none"> • Reviews and analyzes demand response to assess its potential role in meeting the state's energy needs • Potentially serves as a platform for clarifying rules about how EV may participate in DR
Rule 24 DR Direct Participation	CPUC	<ul style="list-style-type: none"> • Determines how customers might "directly participate" in, or bid services directly into, the wholesale market. • Potentially influences the process by which VGI services can offer wholesale market services.
Rule 21 Interconnection and Net-metering (Docket No. R.11-09-011)	CPUC	<ul style="list-style-type: none"> • Describes the interconnection, operating and metering requirements for generation facilities of various sizes to be connected to a utility's distribution system, over which the CPUC has jurisdiction. • May influence the interconnection requirements around VGI, where two-way power flows are possible
Wholesale Distribution Access Tariff (Docket No. ER11-2977-000)	CPUC	<ul style="list-style-type: none"> • Defines the tariffs architecture of energy transfer between California ISO and utilities or customers • Guides a portion of VGI payment processes
EV Proceedings	CPUC	<ul style="list-style-type: none"> • Addresses barriers to widespread EV adoption, on which the VGI market is dependent • Promotes communication among EV stakeholders, including those involved in VGI • Addresses EV sub-metering issues, which could influence VGI payment processes
Smart Grid Proceeding (Docket No. R.08-12-009)	CPUC	<ul style="list-style-type: none"> • Establishes standards, protocols, and policies which will affect Smart Grid programs and strategies, such as VGI



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