

Applied Research & Development

Targeted Research Category:	1. Smart and efficient charging of plug-in electric vehicles 2. Advanced Vehicle-Grid Integration technologies and methods 3. Advanced technologies for plug-in electric vehicle batteries (Based on Strategic Objective S9 “Advance Electric Vehicle Infrastructure to Provide Electricity System Benefits” from the 2015-2017 Triennial EPIC Investment Plan)
Total Funding Amount:	Up to \$4,000,000
Minimum Funding Request per Proposal:	\$500,000
Maximum Funding Request per Proposal:	\$1,500,000
Match Funding Requirement:	Not required but applications that include match funding will receive additional points during the scoring phase.

The intent of these targeted research categories is to fund applied research projects that effectively integrate plug-in electric vehicles (PEVs) into the electricity grid by enabling a higher mix of renewable resources, advancing the capabilities of PEVs, and improving the commercial viability of PEVs.

Projects within the targeted research categories will research, develop, and advance technologies that optimize the benefits of plug-in electric vehicles to the electricity system through the following:

- Developing advanced tools and methods of smart and efficient charging of PEVs with a focus on addressing intermittency issues associated with renewable generation, allowing for a higher mix of renewable resources.
- Developing communication and protocols to enable bidirectional power flow to perform vehicle-to-grid and vehicle-to-building strategies expanding into home and private/public fleet applications.
- Further developing and evaluating advanced technologies and methods for safe and efficient recycling of PEV batteries.

Project goals include the following:

- Test and validate the developed smart charging technology and related systems to ensure that PEVs help address intermittency issues associated with renewable generation allowing for a higher mix of renewable resources.

- Research into opportunities to use the distributed battery capacity of an EV fleet as grid storage, and creating opportunities for rapid response and operational flexibility to provide regulation and load-following capabilities.
- Research and development cost-effective and environmentally-friendly method for reclaiming and reusing the valuable components of spent Li-ion battery packs. The recycle process research and development will demonstrate a process that expands beyond lab scale with the goal of producing a functional PEV battery pack with recycled material.
- Research the development into integrating PEV chargers into existing streetlights that targets infrastructure cost reduction and minimizing California Environmental Quality Act (CEQA) impacts.

Other requirements:

- Projects must fall within the “Applied Research and Development” (AR&D) stage, which includes activities that support pre-commercial technologies and approaches that are designed to solve specific problems in the electricity sector.
- All demonstration projects must be located in IOU service territory (PG&E, SDG&E, or SCE).
- Proposed projects must include a Measurement and Verification Plan that describes how actual project benefits will be measured and quantified, such as by pre- and post-project energy use and cost.

Technology Demonstration & Deployment

Targeted Research Category:	Advanced Vehicle-Grid Integration for Fleets (Based on Strategic Objective S16 “Expand Smart Charging and Vehicle-to-Grid Power Transfer for Electric Vehicles” from the 2015-2017 Triennial EPIC Investment Plan)
Total Funding Amount:	Up to \$12,000,000
Minimum Funding Request per Proposal:	\$1,500,000
Maximum Funding Request per Proposal:	\$5,000,000
Match Funding Requirement:	At least 25% of the requested amount

The intent of this targeted research category is to fund demonstration projects that provide and quantify multiple real-world benefits of advanced vehicle-grid integration (VGI) applications for electric vehicle fleets.

Projects within this targeted research category will advance the integration of plug-in electric vehicles (PEVs) with the electric grid and with customer sites, and must validate the economics and operating characteristics of any one or combination of the following technologies:

- actively managed "smart" one-way charging (SC)
- vehicle-to-building (V2B)
- vehicle-to-grid (V2G)

Project goals include the following:

- Quantify the costs and benefits of advancing smart or bidirectional charging systems for PEV fleets.
- Develop clear and compelling use cases to demonstrate the daily operating value of SC, V2G, and/or V2B, including electricity delivery from PEVs to buildings in times of high prices, emergencies, or grid outages. The focus will be on proving enhanced functionality, resilience, and cost savings to PEV fleet owners, PEV owners, and/or facilities by enabling SC, V2G, and/or V2B.
- Identify and evaluate, from a fleet owner’s, PEV owner’s, and/or facility’s perspective, the impacts of PEV integration systems.
- Provide recommendations for improvements to the grid, or for accelerated deployment of PEV charging infrastructure and related systems.
- Identify challenges and recommend solutions to commercializing SC, V2G, and/or V2B technologies.
- Identify the barriers and solutions to deployment of advanced VGI for PEV fleets, including but not limited to financing options, permitting requirements, and regulatory activities.

Proposed projects will address any or all of the following services:

- Wholesale market services: ancillary services, demand response, absorption of excess renewable generation
- Distribution infrastructure services: volt/VAR support, distribution upgrade deferral
- Customer facing services: energy time shift, demand charge mitigation, power quality and reliability, potential islanding capabilities

Other requirements:

- Projects must fall within the “Technology Demonstration & Deployment” (TD&D) stage, which involves the installation and operation of pre-commercial technologies or strategies at a scale sufficiently large and in conditions sufficiently reflective of anticipated actual operating environments to enable appraisal of operational and performance characteristics, and of financial risks.
- All demonstration projects must be located in IOU service territory (PG&E, SDG&E, or SCE).
- Proposed projects must include a Measurement and Verification Plan that describes how actual project benefits will be measured and quantified, such as by pre- and post-project energy use and cost.