

**Proposed Agreement between California Energy Commission
and
Transportation Power, Inc.**

Title: Grid-Saver Fast Energy Storage Demonstration
Amount: \$2,000,000.00
Term: 42 months
Contact: Abolghasem Edalati
Committee Meeting: 3/16/2011

Funding

FY	Program	Area	Initiative	Budget	This Project	Remaining Balance	
09	Electric	Renewables	Utility-Scale Renewables	\$4,800,000	\$1,343,355	\$0	0%
09	Electric	EPAG	CCHP	\$3,500,000	\$68,140	\$0	0%
09	Natural Gas	Renewables	Develop Low-Cost and Thermally Efficient Energy Storage System for CSP	\$1,036,147	\$588,505	\$0	0%

Recommendation

Approve this agreement with Transportation Power for \$2,000,000.00. Staff recommends placing this item on the discussion agenda of the Commission Business Meeting.

Issue

According to Governor Jerry Brown's new energy plan, by 2020, California should produce 20,000 new megawatts (MW) of renewable electricity. Furthermore the Governor calls for the Legislature to codify a requirement that 33% of the state's electricity be derived from renewable sources. This step builds upon Governor Arnold Schwarzenegger's Executive Order S-14-08 that directed state government agencies to take actions to help achieve California's Renewable Portfolio Standard (RPS) goal, which requires electricity retail sellers to serve 33 percent of their load with renewable energy by 2020.

Governor Brown's energy plan builds even further upon these goals, adding the additional goal of 12,000 megawatts of Localized Electricity Generation; 8,000 Megawatts of Large Scale Renewables; and increasing combined heat and power production by 6,500 megawatts. Localized energy is onsite or small energy systems located close to where energy is consumed that can be constructed quickly (without new transmission lines) and typically with relatively low environmental impact. Combined heat and power projects (also known as cogeneration) use the excess heat or electricity generated by power plants or industrial facilities and are much more efficient than traditional power plants and many industrial plants.

Solar development and particularly utility scale solar development is a crucial part of achieving these various goals in Governor Brown's energy plan. The California Public Utilities Commission (CPUC) suggests that the technology mix, for the baseline scenario to reach 33 percent by 2020, will primarily rely on wind, solar thermal, geothermal, solar photovoltaics (PV) (at generation of 44 percent, 24

percent, 15 percent, 9 percent respectively) and the rest from low levels of biomass, biogas and small hydro (generation of 4 percent, 3 percent and <1 percent respectively).

Integrating utility-scale renewable energy projects into the electric remains a significant problem. Effective solutions would require the ability to smooth the variable energy output of renewable energy resources, reduce transmission line needs, increase peak on-line availability of renewable energy, increase system flexibility, and maximize transmission line use. Traditional methods of storing energy for grid balancing, such as pumped hydroelectric power and keeping natural gas turbines on spinning reserves, have inadequate capacity or response time to meet the future needs. Furthermore, new energy sources that can be located closer to renewable sources and customers, and that can be standardized while still addressing the varying needs of different sites are needed. These are among the drivers for the development of battery-based grid energy storage systems. The prevalent form of battery energy storage, phased into use over the past decade, relies on sodium sulfur batteries. However, these batteries are expensive and present potential safety hazards if exposed to water. Another battery technology, the lithium batteries are emerging as potential grid storage solutions, supported by fast-moving developments in the market. Lithium-based batteries integrated with advanced systems and control methods offer a low cost alternative for energy storage that needs to be demonstrated and validated.

Background

On November 2, 2010 the California Energy Commission (Energy Commission) PIER Renewable Program released a Request for Proposals (RFP) for research needs of utility-scale renewable energy. The RFP announced that up to \$7.3 million was available from the PIER Program to fund initiatives that will help meet research, development and demonstration (RD&D) needs related to more rapid and environmentally responsible deployment of Utility-Scale Renewable Energy (USRE) to the California electricity grid. The goal of the RFP was to support increased market penetration of multiple renewable energy technologies; reduction of impacts on land use, water consumption, and ecosystem resources; and mitigation of technical and economic barriers to the increased injection of non-baseload renewable energy sources into the transmission system.

Outreach to expand awareness of the RFP included pre-proposal workshops on November 9, 2010 held in the Energy Commission's Hearing Room A, in Sacramento, California and on November 16, 2010 held in the George T. Booker Conference Room in the University of California San Diego. The workshop covered in detail the application process, and provided a forum for questions and answers. The workshops, RFP, and questions and answers were advertised and published on the Energy Commission website.

On the proposal due date of December 21, 2010, the Energy Commission received 28 proposals. In accordance with the 2010 RFP Package, each proposal was screened for completeness, and reviewed by Energy Commission staff. Nine proposals were rejected from the administrative screening process. The Technical Advisory Committee reviewed, evaluated, and scored the proposals using the criteria prescribed in the Application Package.

Proposed Work

The project has an overarching goal of demonstrating a new, lower cost fast energy storage technology that can help facilitate acceptance of utility-scale renewable energy projects in California and nationwide. Specifically, the project will evaluate the feasibility of designing a lower cost fast energy storage system based on innovative design concepts and, following analysis and validation of the concepts, proceed to prototype demonstration to provide further validation and establish a basis for

widespread commercial adoption of such a system. The system approach, trademarked as Grid-Saver, is based on modular building blocks with advanced system integration and control methods. The Grid-Saver program aims to demonstrate the viability of the concept by building, testing, and deploying a 5 MW fast energy system comprised of interchangeable lithium battery modules and high-power inverter modules.

Justification and Goals

This project "[will develop, and help bring to market] advanced electricity technologies that reduce or eliminate consumption of water or other finite resources, increase use of renewable energy resources, or improve transmission or distribution of electricity generated from renewable energy resources" (Public Resources Code 25620.1.(b)(4)), (Chapter 512, Statutes of 2006)).

This will be accomplished by:

- demonstrating and deploying a new fast energy storage system based on lithium batteries and modular building blocks that can be produced at relatively low cost and integrated with advanced control technology
- validating the performance and establishing a basis for widespread commercial adoption of such a system