County of Alameda

Project Title: Santa Rita Jail Smart Grid Project

Project Duration / Date of Completion: 3 years / August 1, 2012

Amount of PIER Funding Requested: $1,983,555 (Integration Implementation Phase)

Project Description: Utilizing a state-of-the-art Smart Grid, this project will powerfully integrate new onsite Wind Power, Advanced Energy Storage System, Demand Response, and Solar Thermal with existing onsite Solar Photovoltaics, Fuel Cell Cogeneration, and Energy Efficiency to help to usher in a new era of energy independence, reliability, security, and energy management.

The project's public/private partnership has assembled a most experienced and capable project team to support and ensure a successful integration of multiple renewables, energy storage, and distributed generation systems within the CERTS Smart Grid environment. The project team's broad and deep experience commercializing energy technologies, coupled with participation from every significant stakeholder, will ensure a strong and effective focus on commercialization that will lead to ultimate market success.

The Santa Rita Jail Smart Grid project is the culmination of a renewable energy and energy efficiency journey by Alameda County beginning in 1993. The journey began a large scale lighting retrofit project and high efficiency motor retrofit project. Then in 2002, Alameda County installed one of the largest photovoltaic deployments on a facility in the United States, 1.2 MW of solar capacity located on the rooftops of one of the largest county correctional facilities in the United States. A Chilled Water Retrofit project and cool roof installation were integrated into the solar project and effectively reduced the peak electrical demand at the jail by 35%. In 2005, this renewable energy capacity was augmented by another clean energy source, 1MW generated by a natural gas Fuel Cell, which now provides 50% of the jails electrical needs. During 2008, an extensive number of energy efficiency and water conservation measures was implemented at the Santa Rita Jail facility to even further reduce its consumption of electricity and water.

The next step in this evolution will provide pathways to truly leading-edge integration and optimum utilization of renewable energy technologies. Furthermore, with the addition of small wind turbines, solar thermal, and a new 2MW battery storage capability, the Santa Rita Jail will have many of the key elements to create a real-life working model for renewable energy integration in a very high-demanding 24/7 community - a large 4000-inmate jail. This project also offers elements relating to the next steps to strengthen both national and local grid stability and security.

Objectives of the Project:

Working in close collaboration with Alameda and numerous expert industry partners, the objectives of the Santa Rita Jail Smart Grid project include the following:

- Create a real-life functional local Smart Grid incorporating the use of multiple renewable energy sources
- Incorporate large-scale energy storage
- Create functioning subcomponents and technology relating to CERTS-compatibility of the various distributed energy resources
- Deliver to the end-user (Alameda County Santa Rita Jail) and by extension, other current and future RESCO entities, the system and component technology and associated research data to deliver the benefits relating to the successful integration and optimization of distributed energy resources.

Goals of the Project: The Santa Rita Jail Smart Grid project specific goals are as follows:

1. ***Demonstrate the commercial implementation*** of a CERTS Smart Grid combined with renewables and large-scale distributed energy storage to enable future applications, such as Renewable-Based Energy Secure Communities (RESCOs) as well as to provide an effective interface to local utility grids.	• Demonstrate distributed energy resources (DER) "plug-and-play" capability of CERTS Smart Grid at a commercial site, while effectively integrating the various renewable energy resources and energy storage. • Demonstrate large commercialization potential to future target customers with demand for reliable power • Perform cost-benefit analysis to quantify value streams and develop measurement and verification protocols • Minimize interconnection and administrative hurdles
2. ***Reduce peak load*** of utility distribution feeder by increasing utilization of significant and diverse distributed energy resources to intelligently supply peak power	• Integrate large-scale storage with pre-existing and new DER: – 2 MW (12 MWh) battery – 1.2MW PV – 200kW wind – 1MW fuel cell – Two 1MW diesel generators • Reduce demand on distribution feeder by 15%
3. ***Improve grid reliability*** by providing dispatchable renewable energy and other ancillary services to support electric distribution systems	• Integrate battery storage and controls with existing DER • Provide supervisory controls for long-term performance • Provide spinning reserve to improve reliability and enable demand response/economic dispatch • Enable seamless islanding and reconnection
4. ***Increase grid efficiency and security*** through the development of monitoring, diagnostic, and automation capabilities and research of communications and control technologies, including SCADA	• Research advanced SCADA system to improve communications & controls and monitor power quality • Develop alarming & reporting software for battery and Supergrid to enhance diagnostics & automation • Develop technology for two-way communication with LSE (policy protocol to be determined later with CEC)
5. ***Meet critical customer reliability requirements*** to ensure secure operation and reduce costs	• Enable seamless islanding and reconnection • Create autonomous distributed resources to provide local system stability • Track performance with 12-24 months of operational data; provide reliability improvement statistics to SRJ

Project success will be judged by both internal project metrics as well as metrics as conceived and measured by well-known and reputable independent organizations such as the National Renewable Energy Laboratories, the Lawrence Berkeley National Laboratories, the California ISO, the local utility Pacific Gas & Electric, the Consortium for Electric Reliability Technology Solutions (CERTS), and the University of Wisconsin.

Many of these metrics are those that these respective organizations already use to measure and evaluate grid-connected and off-grid islanded system effectiveness, capability, reliability, and performance (a comprehensive listing of these metrics can be provided upon request). These expert development and study partners will be integral to evaluating, from their respective perspectives, the performance and results of this project.

As a final higher level metric, the United States Department of Energy - Office of Electricity Delivery and Energy Reliability has an additional goal pertaining to a verified 15% peak load reduction on PG&E's feeder circuit that supplies the jail.