



February 13, 2014

Laurie ten Hope
Deputy Director
Energy Research and Development Division
California Energy Commission

California Energy Commission

DOCKETED

12-EPIC-01

TN 72603

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RE: Docket 12-EPIC-01: QUESTIONNAIRE for 2015-2017 Triennial Investment Plan for the Electric Program Investment Charge

Dear Director ten Hope,

Please find attached our responses to the California Energy Commission's questionnaire regarding the 2015-2017 Triennial Investment Plan for the Electric Program Investment Charge (EPIC).

We look forward to working with you and your staff in demonstrating the use and deployment of more microgrid pilot projects across California that can operate when utility gas and electricity resources are threatened while using clean resources like solar power resources. We believe our existing efforts to create a green campus at SCU matched with the opportunity to work with the state to deploy new microgrid technology will provide a useful model for other campuses, hospitals, prisons and businesses to replicate quickly and cost effectively.

Thank you for the opportunity to share our thinking on this topic.

Sincerely,

Joe Sugg
Assistant Vice President
University Operations
Santa Clara University

EPIC TRIENNIAL INVESTMENT PLAN 2015-17
Proposed Energy Research Initiative
Questionnaire

Title of Proposed Initiative: Santa Clara University Microgrid and Solar Pilot Project

Investment Areas (Check one or more) – *For definitions, see First Triennial Investment Plan, page 12:*

- Applied Research and Development
- Technology Demonstration and Deployment
- Market Facilitation

Electricity System Value Chain (Check only one): *See CPUC Decision 12-05-037, Ordering Paragraph 12.a. http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF.*

- Grid operations/market design
- Generation
- Transmission
- Distribution
- Demand-side management

Issues and Barriers:

Current microgrid technologies provide California an opportunity to ensure hospitals, prisons, schools, businesses and other key infrastructure can operate independently (“island”) during emergencies such as floods and earthquakes while using low carbon fuels and storage technologies. Microgrids also provide utilities demand response opportunities to shed load during peak energy use periods. Unfortunately, no microgrid system in California can “island” for longer than 24 hours or depend solely on on-site renewable resources (such as solar) if gas and electricity resources stop. California microgrid customers are also susceptible to cyber security attacks. New microgrid technologies are being tested and deployed, but not at a scale that will assist the state’s critical resources or help in relieving peak power periods. This is due to a number of factors including lack of investment in pilot microgrid technologies, inability of individual customers to cost effectively purchase without outside assistance, as well as a lack of information regarding the benefits of microgrid technologies.

Initiative Description and Purpose:

The Santa Clara University (SCU) Microgrid and Solar Pilot Project would build the first microgrid system in California that could island for at least 4 days, enable the existing 1 megawatt (MW) solar installation to operate during disasters, utilize a new low cost “smart” microgrid system that is scalable, and reduce cyber security risk to SCU.

SCU has already invested over \$15 million of its own finances to build the *foundation* for overlaying a smart microgrid system that could serve as a public testing facility to benefit schools, hospitals and critical infrastructure both within investor-owned utility (IOU) territories and across the entire state. SCU has 1.1 MW’s of installed solar power and has installed smart meter technology and extensive energy efficiency measures across 41 buildings. SCU also has 1.5 MW’s of standby generator capacity installed with an additional 3 MW of state-of-the-art generation currently in development. The on-site traditional and renewable generation can fully cover SCU’s existing power load. SCU solar panel energy generation reduce the power load from the electric grid while backup generators

remain idle. Finally, SCU has over 30 stations for plug-in electric vehicles (PEV's) across the campus with the hope to provide more public charging stations for local Caltrain customers.

The CEC portion of the Santa Clara University (SCU) Microgrid and Solar Pilot Project would build a microgrid system using proven design elements from a number of bases and island locations that are in operation around the globe. The system would have several unique qualities that would expand island times and allow solar generation to operate during disaster periods. This includes: (1) Ensure power availability while maximizing efficiency: During normal and islanded operations, the microgrid system would continuously monitor power systems and quality. The system will turn loads and sources on and off automatically to maintain the best balance of sources, sheds and restore loads, and even island preemptively if an outage is expected or at the request of the serving utility. (2) Provide unprecedented microgrid cyber security protection: The microgrid will address cyber security by using advanced techniques to encrypt and validate data, detect intrusions, control user access, and more. The system will secure off-campus energy system communications for operational monitoring, data aggregation, utility communications, and ancillary services. And (3) Regulate solar output: The microgrid will allow solar generation to continue when external power supply is unexpectedly unavailable.

Combining SCU's innovative energy supplies with their ability to manage the energy use of its entire campus, and the addition of Honeywell and PowerSecure's unique energy innovations, SCU is developing a model microgrid system that could be replicated across California and the United States.

The estimated cost for this project is \$5-8 million dollars.

Stakeholders:

- Santa Clara University
- Silicon Valley Leadership Group
- Honeywell, Inc.
- PowerSecure, Inc.

Background and the State-of-the-Art:

- *What research development and demonstration has been done or is currently being done to advance this technology or strategy (cite past research as applicable)?* The technology used for this project has evolved over 4 years from modeling and has been tested through small (kW) and large (100's kW) scale demonstration projects. This would be the first installation of its kind at the MW scale. In short, the technology is low risk and ready for its first full deployment.
- *Describe any public and/or private successes and failures the technology or strategy has encountered in its path through the energy innovation pipeline: lab-scale testing, pilot-scale testing, pre-commercial demonstration, commercial scale deployment, market research, workforce development.* Prior pilot projects have been successfully demonstrated through the US Army Smart Charging Microgrid at Wheeler Army Airfield with a fully integrated enclave of solar, distributed generation, demand response, auto-islanding, and battery storage technologies.
- *Identify other related programs and initiatives that deal with the proposed technology or strategy, such as state and federal programs or funding initiatives (DOE, ARPA-E, etc.).* Prior pilots have been fully funded by the U.S. Office of the Secretary of Defense through the Environmental Security Technology Certification Program (ESTCP) program at Fort Bragg, North Carolina.

STATE OF CALIFORNIA
EPIC TRIENNIAL INVESTMENT PLAN 2015-17
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CALIFORNIA ENERGY COMMISSION

Justification:

The Santa Clara University Microgrid and Solar Pilot Project will provide benefits to California IOU electric ratepayers in a number of ways.

1. Provide a successful, replicable energy management model for schools, hospitals, businesses and government entities to operate during emergency periods while using energy efficiency and renewable resources.
2. Prove solar resources can be safely utilized when utility gas and electricity supplies are not available.
3. Demonstrate a multi-building operation with multiple power meters can balance demand response without disrupting utility operations. SCU, and other universities in California, are unique in being able to manage their total power on campus across multiple buildings.
4. Demonstrate the use of electric power vehicles' ability to link into a microgrid project to shed load or provide storage during emergency or demand response periods.
5. Help achieve the goals outlined in the 2013 "Safeguarding California Plan: Reducing Climate Risk" report highlighting microgrid's ability to assist during extreme climate events.

Ratepayer Benefits (Check one or more):

- Promote greater reliability
- Potential energy and cost savings
- Increased safety
- Societal benefits
- Environmental benefits - specify
- GHG emissions mitigation/adaptation in the electricity sector at the lowest possible cost
- Low emission vehicles/transportation
- Waste reduction
- Economic development

The direct benefits of the SCU project will reduce energy demand during peak load periods and provide certainty to ratepayers to have access to a safe island during emergency periods ensuring safety and health needs are provided. The project will also help ratepayers meet the state's energy efficiency and renewable energy goals with cutting edge smart grid technology. Finally, the project will add jobs to the local economy.

Public Utilities Code Sections 740.1 and 8360:

Please describe how this technology or strategy addresses the principles articulated in California Public Utilities Code Sections 740.1 and 8360. The California Public Utilities Code is available online at www.leginfo.ca.gov/cgi-bin/calawquery?codesection=puc. The SCU project will meet all the criteria outlined in the CPUC code.