Scaling Solar+ for Small and Medium Commercial Buildings

The Issue

Accommodating future growth in distributed solar power will require integration between generation technology, storage technology, and controllable loads in order to meet electric grid needs while maximizing the value to ratepayers and host sites. Some of these needs can be met with "Solar+" systems, which combine solar PV, energy storage and advanced controls. Small to medium size commercial buildings (SMB) are a prime target due to their substantial technical potential. However, SMBs are too small to justify the custom engineering typically necessary for Solar+ installations. This project aims to address key market barriers to deploying Solar+ technology in the SMB sector.

Project Innovation + Advantages

We will develop and pilot test a set of currently-missing hardware and software elements that will enable multiple vendors to provide Solar+ technology that can serve the SMB market sector. Our research goal is to develop an integrated design and operations strategy for Solar+ that improves on the status quo and leads to rapid market scaling in the SMB sector with: 1) reduced overall cost compared to isolated solar, battery, and building commissioning and control projects, 2) increased capabilities to offer distribution and bulk power system support by coordinating on-site operations between distributed generation, batteries and thermal storage, and 3) cost-effective targeting of investments using AMI data to identify suitable candidate Solar+ host sites. Figure 1 illustrates the Solar+ model that we will pilot at the Blue Lake Rancheria gas station and convenience store in Blue Lake, CA.

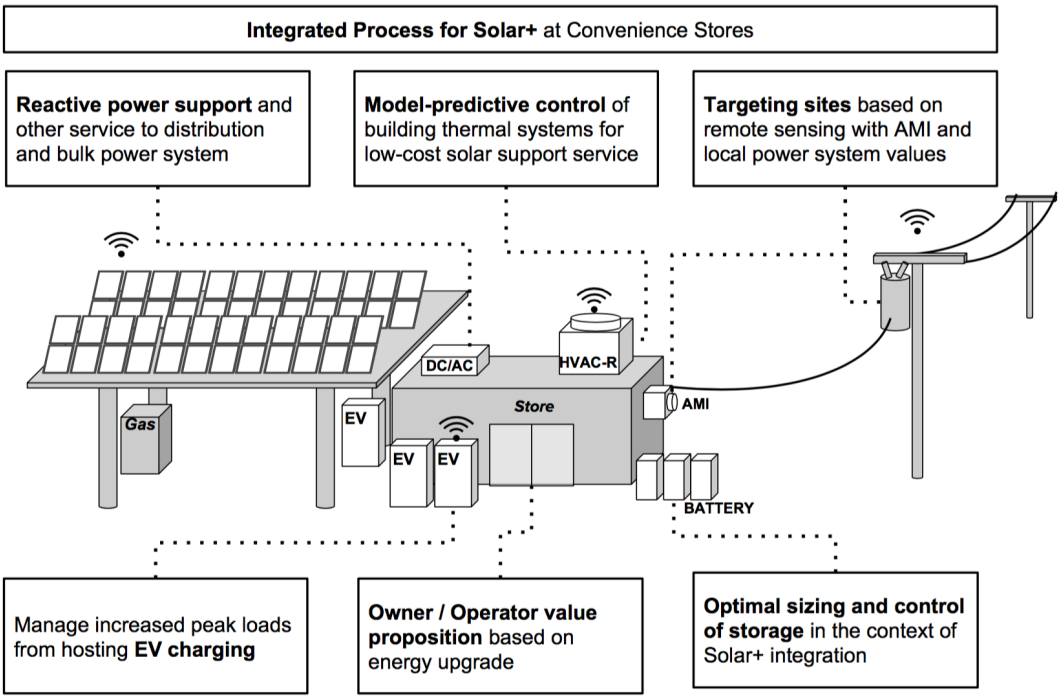

Figure 1: Illustration of integrated research objectives for Solar+ at convenience stores

Anticipated Benefits for California

General Benefits:

The tools developed by this project will help overcome barriers to achieving the State's energy goals, including the Renewable Portfolio Standard, Demand Response, Climate Stabilization, and others. This will be accomplished by reducing the cost of Solar+, improving performance capabilities, and catalyzing markets for distributed energy resources.

Specific Benefits:

Lower costs

In addition to energy savings from added solar capacity, this project will also promote load stabilization and reduced peak demand with optimized sets of distributed energy resources. Load stabilization will reduce the need for expensive peaker and fast-response power plants. The thermal energy shifting we enable will amplify the capabilities of onsite storage, lowering the effective cost of stabilizing the grid with a decentralized and integrated approach.

Greater reliability

The system will provide the pilot site with resilient electricity service in the event of a power outage, and by supporting the distribution and bulk power system will contribute to operational stability and ancillary services for the broader power system.

Environmental benefits

This project will reduce the need for fossil fuel energy capacity, avoid peaker power plant operation, and support a broad clean energy transition consistent with widespread distributed solar.

Energy security

Added solar capacity increases the production of reliable, locally-sourced energy. The software tools developed by this project will reduce peak loads and system stress and help grid resiliency. The integrated system we develop will also provide local energy security through islanded operation.

Key Project Partners

- Blue Lake Rancheria/Serraga Energy
- Lawrence Berkeley National Laboratory
- Tesla
- CITRIS Sustainable Infrastructures Initiative
- Southern California Edison
- Pacific Gas and Electric Company

Contacts

Agreement Number: EPC-17-002
Recipient: Humboldt State University Sponsored Programs Foundation / Schatz Energy Research Center
Principal Investigator: Dr. Peter Alstone
Phone: (707) 826-4345
Email: peter.alstone@humboldt.edu

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