



Smart Grid Distributed Energy Storage Demonstration for National Grid and Sacramento Municipal Utility District

Presented to:

ENERGY STORAGE SYSTEMS PROGRAM

Update Conference - 2010

Presented by:

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Project Objectives



- **Demonstrate** competitively-priced, multi-megawatt, long-duration advanced batteries for utility grid applications.
- **Improve** load management, including peak shaving and time shifting from low - to high - value periods
- **Develop** and verify creative control algorithms to manage storage systems used in micro-grid applications and fleet operations
- **Validate** the economic benefits of stored energy into multiple Independent System Operator/Control Areas with distinct pricing
- **Share** the lessons learned from these demonstrations with the wider community
- **Increase** the acceptance of renewable energy systems by eliminating the effects of intermittency
- **Generate** jobs in the states where materials and supporting systems are assembled

Team Members



Premium Power Corporation is the prime applicant, and will provide project management, engineering, manufacturing and assembly of the energy storage units.

National Grid will be responsible for the deployment, operation, and monitoring of the ESS Fleet in Syracuse, NY.

SMUD will be responsible for the deployment, operation and monitoring of the ESS Fleet in the Sacramento, CA.

SAIC will provide project assistance to all project partners, cyber security and engineering support, data collection and cost/benefit analysis

Syracuse University, already a partner in National Grid's Smart Grid efforts, will provide assistance in monitoring, curriculum development, research, and outreach

NREL, already involved with SMUD's PV projects, will provide distribution system monitoring and data analysis on storage and PV impacts to the distribution system

Project Overview



Install 5 TransFlow 2000 500kW Energy Storage Devices at locations within the National Grid and SMUD Utility Districts as follows:

- **2 units at the Rock Cut Road Substation in Syracuse**
- **1 Unit at the Syracuse University Feeder**
- **1 Unit at the SMUD Headquarters Micro-Grid**
- **1 Unit at the SMUD Anatolia SolarSmart Homes Project**



Technology - TransFlow 2000



- **500 kW Power**
- **3.0 MWh Storage**
- **Modular & Scalable**
- **Minimal Maintenance**
- **Environmentally Friendly**
- **Size: 53'L x 9.5'W x 13.5'H**
- **Integrated Chiller & PCU**
- **Fully autonomous – remote operation**



Site 1 – National Grid Rock Cut Road Substation

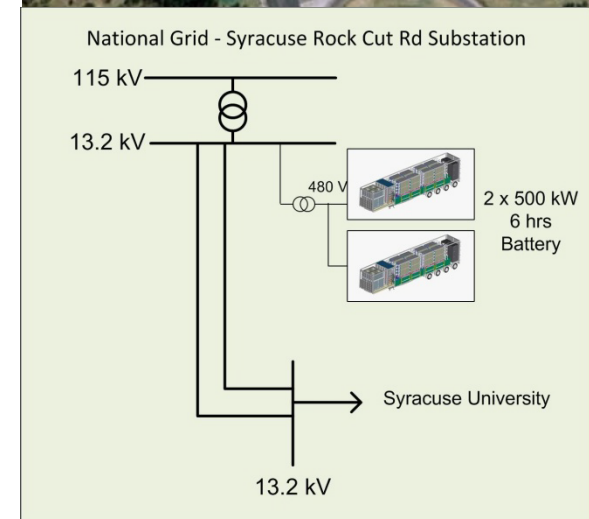


Objective

- Determine value of storage at substation
- Explore substation-feeder storage control methods
- Improve transmission capacity
- Defer substation equipment upgrades

Benefit

- Energy efficiency improvement
- Reliability Improvement
- Reduced air emissions
- Reduce capital expenditures



Site 2 – National Grid Syracuse University

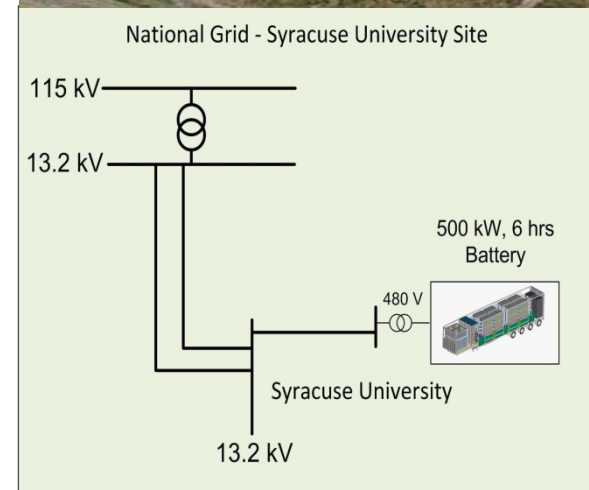


Objective

- Explore substation-feeder storage control methods
- Defer feeder upgrade requirements
- Improve campus peak shaving and load management
- Manage PV and CHP integration on campus microgrid

Benefit

- Electricity cost savings
- Reliability improvement
- Emergency response
- Reduced air emissions
- Reduce capital expenditures



Site 3 - SMUD

Anatolia SolarSmart Homes

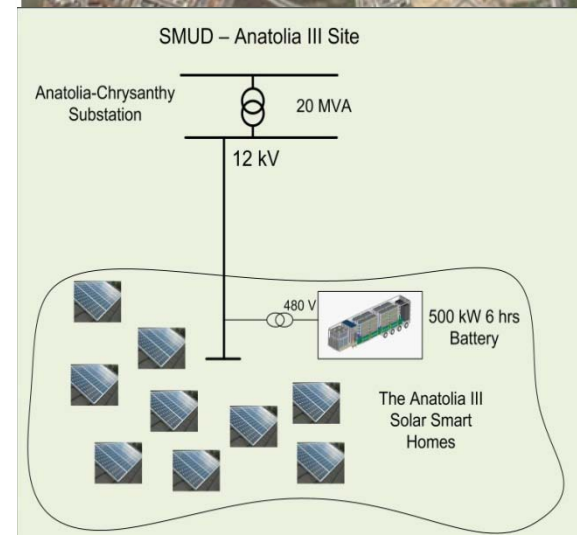


Objective

- Determine value of energy storage on a feeder
- Evaluate energy storage for home and business load management
- Determine procedures to optimize residential PV, demand response, and energy storage

Benefit

- Energy efficiency improvement
- Renewable energy integration
- Peak load shaving
- Energy arbitrage
- Reduced air emissions



Site 4 - SMUD SMUD HQ Microgrid

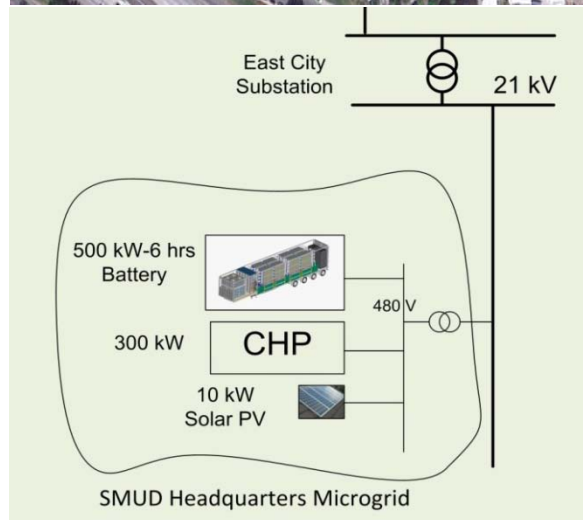


Objective

- Determine value of energy storage in a microgrid
- Evaluate use during emergency operations
- Optimize PV and CHP assets in a microgrid environment
- Peak shaving and load shifting

Benefit

- Improve energy efficiency
- Improved microgrid stability and Islanding
- Reduce outage impact
- Reduced air emissions



Status to Date



- **Deliverables Submitted:**
 - Updated Program Management Plan
 - Updated Environmental Forms
 - Interoperability and Cyber Security Plan
 - ARRA Reports
 - Monthly Progress Reports
- **Meetings Held with NETL:**
 - Kick-Off Meeting
 - Metrics and Benefits Planning Meeting
- **Next Milestone Due:**
 - Metrics and Benefits Reporting Plan

Future Tasks



- **Submit Metrics and Benefits Plan** Nov 2010
- **Go/No Go Stage 1** Nov 2010
- **Final Project Design and Commissioning Plan** Feb 2011
- **Manufacture and Deliver – All Units** Sep 2011 – Jan 2012
- **Complete Site Prep – All Units** Oct 2011 – Jan 2012
- **Install & Integrate – All Units** Nov 2011 – Jan 2012
- **Operational Acceptance – All units** Feb 2012
- **Operational Go/No Go – All Units** Dec 2011 – Mar 2012
- **Commissioning & Operation** Jan 2012 – Dec 2013
- **Final Project Report** Dec 2013
- **Project Closeout** Dec 2013

Summary - Benefits



- **Demonstrate Energy Storage as an enabler of the SMART GRID**
- **Validate the economic benefits of stored energy**
- **Increase the acceptance of renewable energy systems**
- **Advance SMART GRID controls technology**
- **Create Jobs**
 - **Represents 31 FTE's over the life of the project**



Thank You

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