

Mesa del Sol Microgrid

The “Microgrid Demonstration at Mesa del Sol” demonstrates how variable renewable energy resources, storage, demand response and other distributed energy resources (DER) can be managed locally with controls to produce value to both the DER owner and the utility.

The Mesa Del Sol microgrid is one of two large-scale smart grid demonstration projects in New Mexico sponsored by Japan’s New Energy and Industrial Technology Development Organization (NEDO). After commissioning in 2012, Sandia National Laboratories collaborated with the University of New Mexico (UNM), Public Service Company of New Mexico (PNM), the Mesa del Sol community developer and several Japanese companies to demonstrate several aspects of renewable energy integration and microgrid operation. These included intentional islanding of a commercial building, control of net demand, mitigation of PV output variability at the feeder level via supervisory controls. Currently, the Mesa del Sol microgrid is owned and operated by UNM.

The project demonstrated full integration of microgrid technology into an existing building. In addition to validating building-scale microgrid technology, the project demonstrated flexibility to manage net demand profile through electricity and thermal self-supply. The project also demonstrated the ability to island on demand, which increases community resilience during utility outages. The building energy management system (BEMS) optimally dispatches generators, including a combined heat and power (CHP) plant and PV system, as well as storage elements and building demand. The CHP plant significantly increases efficiency, and maximizes the consumer’s opportunity to lower the cost of energy.

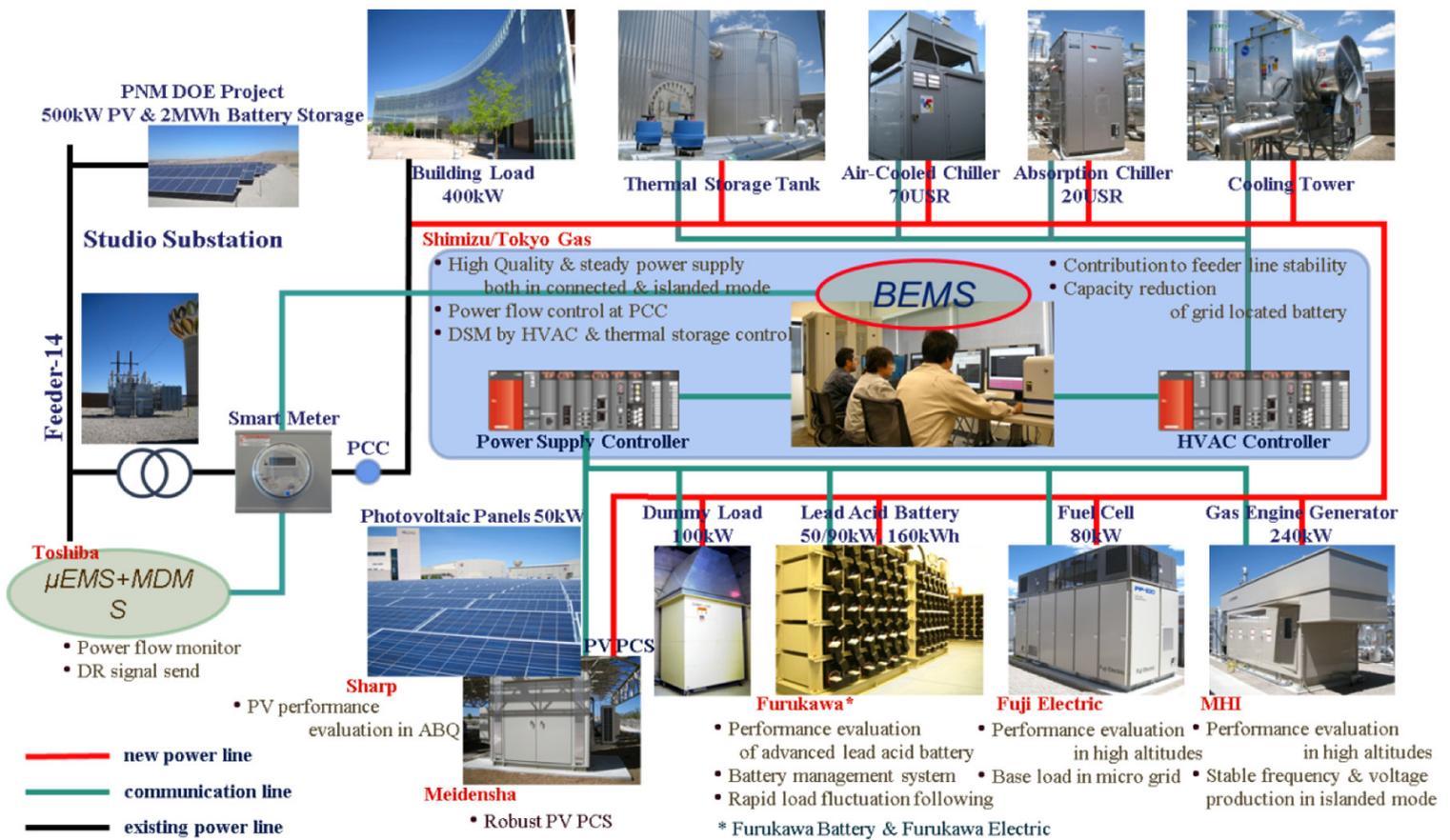


Aperture Building at Mesa del Sol

Microgrid Assets

The microgrid consists of a 50 kW PV system with smart inverter, CHP plant consisting of a 240 kW natural gas generator with thermal storage and two types of absorption chillers, an 80 kW fuel cell, and two types of energy storage systems. The building energy management system (BEMS) also controls part of the 400 kW building load (Mesa del Sol's Aperture Center), as well as a 100 kW load bank.

The PNM's Studio 14 feeder that serves Aperture Center also hosts PNM's Prosperity demonstration project, which consists of a 500 kW PV system and 2 MW-hour battery. As part of the series of demonstrations Sandia developed and field-validated supervisory controls to dispatch the Mesa del Sol microgrid resources in conjunction with energy storage at the Prosperity site to optimally manage voltage and power flow at the feeder level. Various control objectives were successfully demonstrated, including reduction of PV ramp rate while minimizing the energy storage capacity required¹. The supervisory control also allows the utility and customer owned assets to operate as a virtual power plant, providing voltage or frequency regulation.



¹ Experimental Comparison of PV-Smoothing Controllers using Distributed Generators, Authors: Jay Johnson, Abraham Ellis, Atsushi Denda, Kimio Morino, John Hawkins, Brian Arellano, Takao Shinji, Takao Ogata, and Masayuki Tadokoro

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