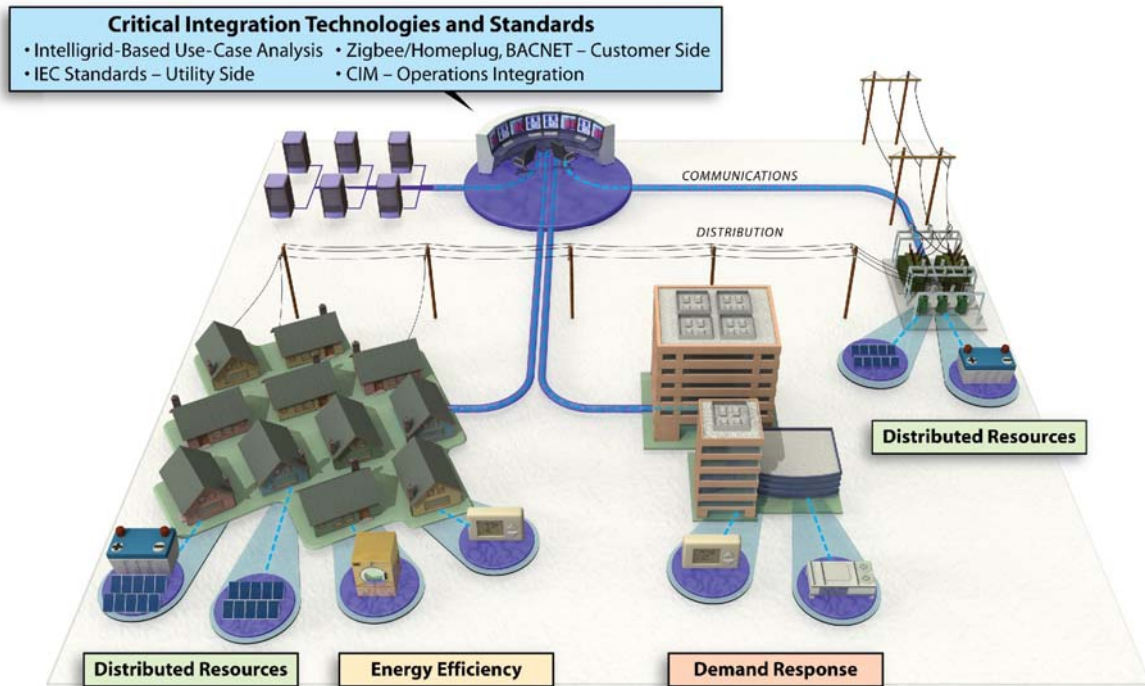


PNM Smart Grid Demonstration Project

“High-Penetration PV thru Grid Automation and Demand Response”



PNM Project Overview

This project will develop and deploy an advanced distributed control and communication infrastructure with the goal of optimizing renewable resource utilization and system benefits. The project will integrate high-penetration distributed Photovoltaic (PV) systems, local storage, and substation-sited PV and storage with both local distribution system management and overall load management at the system level. At the local level, the project will evaluate smart inverter interface technologies to enhance system benefits, applying previous work in the area of smart inverter interface software to residential and substation-based PV. This project aims to match local loads with rate structures to identify and resolve technical issues related to high penetration of renewable generation at the utility distribution level. The project will investigate and analyze additional consumer-based demand response opportunities using a modern communication infrastructure integrated with a Home Area Network (HAN), commercial building control systems and smart devices.

EPRI Smart Grid Demonstration Project Overview

EPRI Smart Grid Demonstration Host-Site projects are part of a five-year collaborative initiative with 19 utility members focused on integrating large-scale distributed energy resources (DER) like demand response, storage, distributed generation, and distributed renewable generation into a “virtual power plant” to advance widespread, efficient, and cost-effective deployment of utility and customer side technologies in the distribution and overall power system operations. Host-Site projects apply EPRI’s IntelliGridSM methodology to define requirements for the technologies and communication, information, and control infrastructures that support integration of DER.

Operations experience, integration issues, and lessons learned will reveal the full range of standards and interoperability requirements for these technologies to support the industry. Gaps revealed will identify critical areas of future smart grid research. Public updates are available on www.smartgrid.epri.com.

Project Criteria: 6 Critical Elements

PNM's Smart Grid Project aligns with the six critical elements that EPRI has identified as key criteria to achieve the goals of our five-year Smart Grid initiative.

Integration of multiple distributed resource types

To further expose issues that need to be addressed and enable widespread integration of DER.

The project will integrate distribution substation-level PV and storage, customer-level PV and storage, and demand response to reduce peak loading on a feeder by 1.5%. It will also investigate residential battery storage to relieve the intermittency of the PV and provide the ability to dispatch the PV power at the system peak rather than the solar peak. The Greenfield development will include residences that are PV-ready with Home Area Networks (HANs) allowing the project to take advantage of residential resources through an advanced metering infrastructure.

Application of critical integration technologies and standards

To identify gaps associated with standards, harden critical integration technologies and advance adoption.

The project will test the integration of high-penetration PV combined with battery storage, as well as evaluate Utility-to-PV communication standards. End-to-End integration will be evaluated for utility systems (at Substation) and customer systems (behind the meter). Communication Standards, Protocols and Specifications Evaluated include:

- IEC 61850, IEC 61850-7-420, DNP 3.0
- ZigBee® Smart Energy Profile (SEP), BACnet
- ANSI C12.19 and C12.22,
- Common Information Model (CIM) (IEC 61968 & 61970)

Incorporation of Dynamic Rates or other approaches to link wholesale conditions to customers

To evaluate integration issues and incentives associated with customer response and linking supply with demand.

The project will integrate, validate and test pricing and control signals communicated via AMI system to HAN. This will enable the study of advanced rate structures and customer behavior, possibly including real-time pricing.

Integration into system planning and operations

Demonstrate integration tools and techniques to achieve full integration into system operations and planning.

Integration with PNM's distribution operations system using the Common Information Model will be evaluated with the requisite information accessed via PNM's TIBCO Enterprise Service Bus (ESB). The ESB allows the Distribution Operations Center to access only the information needed while other systems benefit from information via the common information bus. Potential benefits include access to more timely planning data at shorter intervals.

Compatibility with initiative goals and approach

Enable high-penetration of DER and advance interoperability and integration for the electric power industry.

The goals of this demonstration are to enable high-penetration of PV and to firm those resources with storage and controls thereby making renewables more valuable, useful and prevalent. Application of EPRI's IntelliGridsm methodology to develop requirements and select technologies will lead to an architecture that minimizes the risk of technology obsolescence. The project will directly support a nationwide effort to develop the next-generation utility system.

Leverage of additional funding sources

Secure required participation, commitment and funding for a successful project.

This project will leverage efforts from various research projects including DOE proposals and vendor sponsored research. Proposal have been submitted with numerous project partners including Sandia National Laboratories, Sharp Electronics, Mesa Del Sol/Forest City Covington, and the University of New Mexico.

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