EPRI | ELECTRIC POWER RESEARCH INSTITUTE

Exelon Smart Grid Demonstration Project

Exelon Project Overview

The Exelon project is a collaborative effort bringing together ComEd and Philadelphia Electric Company (PECO) technologies and applications to further the industry in regards to integration of Distributed Energy Resources (DER). The ComEd Customer Application Pilot (CAP) is a comprehensive customer behavior study that will provide research to understand consumer responses to varying types of pricing programs in various combinations with enabling technology and education in an opt-out format. The project will enhance the assessment of ComEd's automated metering infrastructure (AMI) options and support other utilities' experienced-based data on engaging customers via technology, education, and time-based pricing. The PECO demonstration is a project with Drexel University that will develop and deploy an advanced distributed energy management system to demonstrate economic and environmental value of integrating and optimizing DER through a "Smart Campus" micro-grid capable of aggregating dispatchable demand reduction resources to the regional grid.

EPRI Smart Grid Demonstration Project Overview

Electric Power Research Institute (EPRI) Smart Grid Demonstration Host-Site projects are part of a five-year collaborative initiative with 19 utility members focused on integrating DER like demand response, storage, distributed generation, and distributed renewable generation to advance widespread, efficient, and cost-effective deployment of utility and customer-side technologies in the distribution and to enhance overall power system operations. Host-site projects apply EPRI's IntelliGrid methodology to define requirements for technologies, 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 needed 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

Exelon'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 PECO project combines and co-optimizes second generation demand response (DR), renewable generation resources, and energy storage. The project includes software for next day schedules for the distributed resources, and enables the combined resources to participate in wholesale markets. The project will enable participation through virtual generation and dispatchable load reductions based upon dynamic forecasts of load, generation, and prices. The technology will allow load curtailment to be viewed as predictable, reliable grid resources that regional transmission operators (RTOs) can dispatch to maintain load/generation balance, and compensate for the variability of renewable generation. The ComEd study will evaluate various technologies and rates to understand optimum scenarios to achieve the most effective customer demand response. A unique aspect of this study is that it is in an opt-out format; meaning customers will be placed on one of the dynamic rates and must proactively decide if they do not want to be on the program. This is different than most other programs where customers must choose to enroll.

Application of critical integration technologies and standards

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

The PECO project will develop interfaces with Pennsylvania-Jersey-Maryland (PJM) market and settlements interfaces via a secure internet protocol (IP) connection, and building interfaces featuring ModBus and BACnet. The ComEd CAP project in-home technology will include ZigBee communications for "Basic" in-home displays (IHD), "Advanced" IHDs with more feedback channels via internet connection, and WiFi communications to programmable communicating thermostats (PCT).

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

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

The PECO project segment will demonstrate how an institutional level customer participates in the RTO level markets (PJM) for capacity and energy storage by predicting the availability of distributed resources such as photovoltaic PV, wind, and storage as well as demand response including building thermal storage. The ComEd CAP project will evaluate various technologies including smart meters, a web portal, basic and advanced IHDs and PCTs combined with various dynamic rates including increasing block rate (IBR), critical peak price (CPP), peak time rebate (PTR), day-ahead real-time pricing (DA-RTP), and time-of-use (TOU) to test the optimum combination of rates and technology to understand customer behavior and also customer acceptance to an opt-out program.

Integration into system planning and operations

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

The analysis of the ComEd CAP project will be performed by Electric Power Research Institute (EPRI) and will be used and extrapolated to understand the customer behavior impacts of wide-scale deployment of various combinations of rates and technologies. The PECO project will identify next day optimization of DER, DER participation in wholesale markets as virtual generation, and dispatch load based on dynamic forecasts of load, generation, and prices. The PECO project will also specifically identify the day-ahead energy requirements into the RTO market as a virtual power plant and will be included in the operation studies for generation and transmission operations.

Compatibility with initiative goals and approach

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

The project complies with EPRI's initiatives and goals through the sharing of information, use cases, and lessons learned. The project is a collaborative effort and integrates activities that support advancement of DER integration for Exelon and the industry.

Leverage of additional funding sources

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

The customer behavior study is funded by the ComEd CAP project and the PECO project includes partners Drexel University and Veridity Energy as part of PECO's Smart Grid Investment Grant Project awarded by the U.S. Department of Energy (DOE).

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