

Indianapolis Power & Light Company

Smart Energy Project

Abstract

Indianapolis Power & Light Company's (IPL) Smart Energy project is deploying distribution automation, advanced metering infrastructure (AMI), and customer systems assets to improve the operational efficiency of its distribution systems. Distribution automation assets include automated controls, relays, and reclosers, which are used to reduce operations and maintenance costs and restoration times. AMI assets include 10,400 smart meters, and customer systems include programmable communicating thermostats. Through pilot programs, IPL is determining best practices for peak demand management through pricing and the impacts of new technologies including electric vehicles and charging stations.

Smart Grid Features

Communications infrastructure includes the implementation of a radio frequency mesh network to provide the backbone for collecting smart meter data. Receivers located at key substations transfer meter data to a fiber optic network, which transmits the data to the head end system. An additional 60 miles of fiber optic circuits provides the necessary infrastructure for AMI and distribution automation. Home area networks are integrated with the smart meters for communications with other devices such as smart appliances and programmable communicating thermostats.

Advanced metering infrastructure includes the deployment of 4,000 meters to residential locations and 6,400 meters to commercial and industrial locations. The smart meters provide energy use information to IPL as well as outage detection that is being integrated into the outage management system.

Advanced electricity service options offered through the project include a Web portal for customers with smart meters and older automatic meter reading devices. The Web portal offers customers a way to view their energy use information and tips to save on electricity. The Web portal facilitates two-way information exchange and enables customers to better manage their electricity use and bills.

At-A-Glance

Recipient: Indianapolis Power & Light

State: Indiana

NERC Region: ReliabilityFirst Corporation

Total Budget: \$48,782,341

Federal Share: \$20,000,000

Project Type: Integrated and/or Crosscutting Systems

Equipment

- 10,400 Smart Meters
- AMI Communication Systems
 - Meter Communications Network
 - Backhaul Communications
- Meter Data Management System
- Customer Systems for 10,400 customers
 - 4,000 Home Area Networks
 - 1,900 Programmable Communicating Thermostats
 - Customer Web Portal Access for Customers with Both Existing and New Meters
- Distribution Automation Equipment for 400 out of 400 Circuits
 - Distribution Management System
 - Distribution Automation Communications Network
 - Automated Distribution Circuit Switches
 - Automated Capacitors
 - Automated Regulators
 - Equipment Health Sensors
- 200 Electric Vehicle Charging Stations

Time-Based Rate Programs (Pilot Test Group)

- Time of Use
- Critical Peak Pricing

Key Targeted Benefits

- Improved Electric Service Reliability and Power Quality
- Reduced Operating and Maintenance Costs
- Deferred Investment in Distribution Capacity Expansion
- Reduced Costs from Equipment Failures
- Reduced Electricity Costs for Customers
- Reduced Ancillary Service Cost
- Reduced Truck Fleet Fuel Usage
- Reduced Greenhouse Gas and Criteria Pollutant Emissions

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Direct load control devices deployed by the project include a pilot program of approximately 1,900 programmable communicating thermostats, which connect to the customer’s home area network and offer direct load control during peak demand periods in exchange for rebates or bill credits.

Time-based rate programs include time-of-use pricing and critical peak pricing. These rates are aimed at lowering peak electricity use. IPL expects these programs to lower peak demand and defer investments in distribution capacity expansion.

Distribution automation systems include the deployment of automated and network relays, automatic reclosers, and substation and transformer monitoring systems. This equipment improves system reliability and operational efficiency through reduced restoration times and a reduction in the number of truck rolls required for performing field operations. The combination of automated relays and automatic reclosers help isolate faults or resume operations in the event of a transient fault. Substation and transformer monitoring inform IPL of irregularities with distribution assets before problems occur, thus reducing equipment failures and operation and maintenance costs.

Distribution system energy efficiency improvements involve improved voltage management through the automation of capacitor controls on approximately 400 circuits. The automated controls combined with distribution management systems and supervisory control and data acquisition (SCADA) provide enhanced voltage control and enable a more efficient distribution of power, thus improving distribution power factors.

Electric vehicle charging stations are being deployed in homes, fleet locations, and public stations. Time-based rate programs are offered as part of the pilot program and IPL is collecting the usage data from the charging stations to help determine the potential impacts of electric vehicles on the distribution system.

Timeline

Key Milestones	Target Dates
AMI asset deployment begins	Q1 2011
Distribution automation asset deployment begins	Q2 2010
AMI asset deployment ends	Q3 2011
Distribution automation asset deployment ends	Q2 2013

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