

## Florida Power & Light Company

### *Energy Smart Florida*

#### Scope of Work

The Florida Power & Light Company (FPL) project, known as Energy Smart Florida (ESF), deployed advanced smart meters, distribution automation, an electricity pricing pilot, and advanced monitoring equipment for the utility's transmission system. As part of the Smart Grid Investment Grant (SGIG) effort, over three million FPL consumers received smart meters.

#### Objectives

Smart meters are supported by a mesh network that provides two-way communication between FPL and consumers, providing the utility with detailed electricity usage information and the ability to improve efficiency and system reliability. New distribution automation devices expand the functionality of FPL's distribution system to increase reliability, analyze energy losses, and reduce operations and maintenance costs. Synchrophasor and line monitoring devices also help increase transmission system reliability.

#### Deployed Smart Grid Technologies

- **Communications infrastructure:** A 900-megahertz (MHz) wireless mesh network supports two-way communication between smart meters and access points on the grid. Distribution automation devices use the same communications networks as smart meters. FPL's smart meters include 2.4-gigahertz (GHz) radios, which support ZigBee®-based communications with future in-home energy management devices.
- **Smart meter infrastructure:** The SGIG project provided over three million customers with smart meters. The advanced network supports automated meter reading, enhanced outage response, and improved theft-of-service detection. With more detailed and timely data on peak electricity usage, FPL can improve its load research, analysis, and forecasting capabilities.
- **Advanced electricity service options:** FPL conducted a pilot to test emerging in-home technologies. Technologies were deployed in the homes of 500 volunteers—at no cost to those customers—comprising 250 in-home displays and 250 home area networks, including home energy controllers. One segment

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#### At-A-Glance

**Recipient:** Florida Power & Light Company

**State:** Florida

**NERC Region:** Reliability Coordinating Council

**Total Project Cost:** \$578,973,324

**Total Federal Share:** \$200,000,000

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**Project Type:** Advanced Metering Infrastructure  
Customer Systems  
Electric Distribution Systems  
Electric Transmission Systems

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#### Equipment

- 3,068,136 Smart Meters
  - 228 Home Area Networks
  - 226 In-Home Displays
  - Distribution Automation Equipment for 15% of 3,124 Circuits
    - Automated Distribution Circuit Switches
    - Automated Capacitors
    - Automated Voltage Regulators
  - Equipment Condition Monitors
  - 45 Phasor Measurement Units
  - 65 Distributed Energy Resource Interfaces
  - Transmission Line Monitoring System
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#### Advanced Transmission Applications

- Angle and Frequency Monitoring
  - Post-Mortem Analysis
  - Wide-Area Monitoring
  - Voltage Stability Monitoring
  - Event Detection
  - Disturbance Analysis
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#### Time-Based Rate Programs

- Critical Peak Pricing Pilot
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#### Key Benefits

- Reduced Meter Reading Costs
  - Improved Electric Service Reliability and Power Quality
  - Improved System and Equipment Monitoring
  - Reduced Vehicle Usage
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of home area network participants (10 customers) also received smart appliances: washers, dryers, dishwashers, water heaters, and refrigerators.

- **Time-based rate programs:** FPL conducted a pilot implementation of critical peak pricing.
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- **Distribution automation systems:** The project installed 230 automated feeder switches, capacitor automation equipment, voltage regulator automation equipment, and transformer condition sensors. These improvements enhance distribution system reliability, reduce outage restoration time, improve circuit voltage regulation, and improve the distribution system's operational efficiency.
- **Transmission system enhancements:** FPL deployed digital disturbance recorders (DDRs), phasor measurement units (PMUs), interoperability and analysis infrastructure, intelligent electronic devices (IEDs) on the electric transmission/substation system to strengthen overall reliability, monitoring devices on throw-over switches, communicating fault indicators, voltage and current sensors on feeders and large transformers, and automated switches that isolate faults and restore service more quickly.
- **Diagnostic centers:** The project built enhanced predictive diagnostic centers to collect and interpret data from equipment deployed as part of advanced metering infrastructure, distribution, and transmission system upgrades.
- **A wide-area transmission monitoring system:** Synchrophasor technologies provided improved real-time information on transmission system operation and reliability.

### Benefits Realized

- **Reduced meter reading costs:** Since meters can now be read remotely, FPL has been able to significantly reduce meter reading staff and costs associated with this activity. Smart meters also reduced expenditures through efficiency improvements in operations and maintenance activities. A related intangible benefit is improved customer satisfaction through elimination of estimated bills, which previously had been a key driver of complaints.
- **Improved electric service reliability and power quality:** The automation associated with distribution and transmission system upgrades has reduced the number of customer outages and improved the outage restoration process.
- **Improved system and equipment monitoring:** FPL's predictive diagnostic centers use smart grid devices to bring myriad information back from sensors, display it to operators, and use analytical tools to produce predictive analysis. Remote monitoring has thus enabled FPL to focus on repairs rather than inspection and to accurately predict when equipment will require replacement, allowing advance planning and leading to competitive bidding and cost savings.
- **Greater visibility into system performance and accelerated system restoration:** Synchrophasors enabled FPL to implement a wide area monitoring system that improved system reliability by providing real-time information on transmission system status and enabling faster system restoration.

### Lessons Learned

- In developing applications to utilize meter data, work closely with field personnel to confirm they are getting the right data in the right format to ensure better operational success. FPL's efforts in this regard have been very effective in improving the way FPL crews operate.
- Recognize that the communications infrastructure must be as resilient as the power delivery infrastructure.

- Begin with a coordinated deployment strategy for all phases of the project, including meter deployment, communications infrastructure deployment, diagnostic center development, and equipment installation. Having a realistic time-sequenced plan in place allowed for significantly more efficient deployment for FPL's project.

#### Future Plans

- Smart meters will make it possible for FPL to offer future products and services that will help customers better manage their energy usage.
- Smart grid technologies will help FPL more safely, reliably, and efficiently integrate variable renewable power sources, such as solar energy, into the power grid.

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