KCP&L SmartGrid Demonstration
Overview

Missouri Public Service Commission Smart Grid Workshop

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Jefferson City, Missouri
November 29, 2011
Agenda

- SmartGrid Vision and Strategic Objectives
- Project Overview & Objectives
- Project Area – Green Impact Zone Overlay
- Customer Engagement and Education
- Project Components
- Project Timeline and Milestones
- Near Term System Enhancements
SmartGrid Pilot Vision and Strategic Objectives

**Project Vision**

Deliver next generation smart grid technologies to enhance Kansas City’s urban core, engage customers, and to evaluate technical, operational and business model feasibility for KCP&L and its customers.

**Community Engagement**
Support sustainable revitalization of our urban core through community collaboration, education, training and investment.

**Customer Solutions**
Enable customers to better manage energy use and expenditures.

**Clean Energy**
Accommodate new sources of renewable and distributed energy supply.

**Grid Operations**
Automated grid analysis, management and control adapting to condition changes, meeting safety, cyber security, and service needs.
Project Overview & Objectives

- KCP&L received a $24M ARRA grant for a DOE smart grid “regional demonstration” project.
  - Total project about $50M over 5 years

- There are over 14,000+ customers (meters) in the project area, located in midtown Kansas City, MO, just east of the Country Club Plaza.
  - Much of the project area is challenged with high unemployment, low income and education levels, lack of internet access and inefficient homes

- KCP&L is partnering with several organizations, including Landis+Gyr, Siemens, EPRI, Exergonix, Green Impact Zone, OATI, Intergraph, Tendril, Siemens/eMeter and Burns & McDonnell
Combine commercial innovation with a unique approach to smart grid development with a heavy focus on **customer engagement & value**:

- Provides **information and enabling technologies for customers**.
- Creates a **complete, end-to-end smart grid** — from smart generation to end-use — that will deliver improved performance focused on a major urban substation.

**Introduces new technologies, applications, protocols**, communications and business models that will be evaluated, demonstrated and refined.

**Best-in-class approach to technology integration**, application development and partnership collaboration, allowing progression of complete smart grid solutions — with interoperability standards — rather than singular, packaged applications.

- KCP&L’s demonstration project will provide the critical energy infrastructure required to **support a targeted urban revitalization effort** in Kansas City’s Green Impact Zone and support a more **sustainable future**.
KCP&L’s SmartGrid project in midtown Kansas City, Missouri includes the 150-block Green Impact Zone and surrounding neighborhoods, shown here in blue.

The Green Impact Zone is a cooperative effort to focus federal stimulus funding on projects in a targeted area of Kansas City, Missouri.
Education & Outreach – Part of the “Software”

In addition to traditional communications efforts, KCP&L is focusing on new approaches to increase awareness and engage customers:

- Neighborhood Association & Faith-based Outreach
  - KCP&L Reps matched with each neighborhood
  - Various Community Partnerships, including Green Impact Zone

- Community Outreach Events

- Demonstration house (Project Living Proof)
  - Touch, feel, learn about and experience new, energy efficient and smart grid products first-hand
  - Partnering with the Metropolitan Energy Center
  - Open to the Public

- SmartGrid Support Team

- Stakeholder Updates (MO & KS)

- Internal Education and Change Management
KCP&L Demonstration – True End-to-End Smart Grid

- 140 MVA
- Relays
- DMS
- DER
- SiCAM
- Monitors
- IEC 61850
- Reclosers
- Capacitors
- FCIs
- Sensors
- IEC 61850
- AMI Comm
- Interoperability
- Security
- System Integration
- System Architecture
- Emerging Standards

- KCP&L Demonstration – True End-to-End Smart Grid

- SmartGeneration
- 180 kW
- Solar
- Biofuel
- Electric Storage
- Demand Response
- 1 MWhr

- 14 Circuits
- Back Office
- Grid Management

- Office Building
- School
- Smart Building
- DER (Distributed Energy Resources)
- Roof Top Solar Panel
- TOU (Time-of-Use) Pricing
- Building EMS (Energy Management Systems)

- Smart Distribution
- Commercial Building
- Public Charging Station
- Electric Vehicle
- HAN (Home Area Network)

- Smart End Use
- Digital Thermostat
- In-Home Display
- 1600
- 14,000

- Web Portal
- Smart Meter
- 14,000

- Roof Top Solar Panel
- 1600
- 10

- 400

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Customer Products and Tools

- **Web Portal**: helps customers understand the impact of electricity use and encourages decisions that conserve energy, help the environment and save money.

- **In-Home Display**: real-time information that increases awareness of electric use and identifies opportunities to reduce consumption and save money.

- **Programmable Thermostat**: automatically set temperatures based on season, resulting in savings in heating and cooling bills. 2-way communications.

- **Home Area Network (HAN)**: communications to in-home devices for “set-it and forget-it” convenience.

- **Electric Vehicle Charging**

- **Time of Use rate (TOU)**
Technical Components

- **Distributed Energy Resource Management (DERM):**
  - Solar
  - Electric Vehicle Charging
  - Demand Response
  - Voltage Control
  - Utility-Scale Battery (1 MWhr)
  - Prediction and program calls

- **Smart Substation**
  - Fiber Optic IEC 61850 Communications
  - Substation Integration Control Automation Monitoring (SICAM)
  - Relay upgrades and equipment monitoring

- **Distribution Management System**
  - Distribution SCADA
  - First Responder functions, Outage Management
  - Network Analysis

- **Distribution Automation**
  - Reclosers, Capacitors, Faulted Circuit Indicators
  - Leverages AMI Communications

- **Coordination with National Institute of Standards and Technology (NIST)**
  - Cyber security
  - Interoperability (electric utility “plug-n-play”)
### SmartGrid Pilot Timeline

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<tr>
<th>Phase 1 Project Definition and Compliance</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
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<td>• Outreach and education</td>
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<td>• Plan Project</td>
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<td>• Increase EE awareness and adoption</td>
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<th>Phase 2 Project Design and Performance Baseline</th>
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<td>• Install AMI</td>
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<td>• Detailed system design</td>
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<td>• Baseline outages and usage</td>
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<td>• Online home energy portals</td>
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<td>• Customer In-Home Displays</td>
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**Key Deployment Period**

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<th>Phase 3 Smart Grid Infrastructure Deployment</th>
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<td>• Smart Substation</td>
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<td>• Advanced Distribution Automation</td>
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<td>• Smart End-Use customer devices</td>
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<td>• Smart Gen. (Solar, Battery, PHEV)</td>
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<td>• DERMS</td>
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<td>• Introduce TOU rate pilots</td>
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<th>Data Collection, Reporting, and Project Conclusions</th>
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<td>• Evaluate system</td>
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<td>• Analyze performance</td>
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<td>• Evaluate business models</td>
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This material is based upon work supported by the Department of Energy under Award Number DE-OE0000221
Major Milestone Timeline

2010

- Planning and organization
- Neighborhood Meetings
- Educational Meetings
- DOE Contract
- SmartMeter Launch (Oct. 18)
- Distribution of In-Home Displays
- Access to Customized Web Portal
- Demonstration House

2011

- Bill Prediction
- Begin Smart Substation Upgrades
- Solar Installations begin
- Home Area Networks (HAN)
- Smart Thermostats (in HAN)
- Time of Use Rates
- Web Portal & AMI Upgrades
- Interoperability Testing
- Security Risk Assessment
- System, Interface & Back Office Design
- $10.6M Reimbursement through Oct 2011

2012

- Standalone Thermostats
- EV Charging
- Complete Smart Substation Upgrades
- Smart Distribution Upgrades
- Battery Storage System
- Complete End-Use Installation
- Full Integration & Cyber Security Acceptance Testing
- Final System Interoperability Testing
- Fully Operational SmartGrid
- Begin Measurement Phase (2 years. 2012 – 2014)
Near Term Product Launch & Enhancements

4th Quarter

- 100kW Rooftop Solar (Paseo H.S.)
- Web Portal Upgrade for HAN
- Home Area Network (HAN)
- TOU Pilot Rates
- Meter Data Management (Ph 1)
- Security Risk Assessment
Questions

Learn more at www.kcplsmartgrid.com.

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