City of Naperville
Smart Grid Initiative Project

- Complete automation of its electric grid
- Add 57,323 smart meters
- Install infrastructure necessary to support 2-way information flow between the utility and customer

Project's Purpose

- Offer customers tools to control their energy consumption and costs using real-time feedback
- Enable greater reliability and demand response
- Provide peak/off-peak differentiated electric rates

Elements Will Create Savings Associated With

- Direct Load Control
- 2-way customer feedback
- Demand Side Management
- Time of Use and Critical Peak Pricing Rates

Naperville Energy Smart Programs For Low-Cost, Reliable Electric Service

- Provide Customers with tools to control their energy expenditures
- Reduce environmental impact through reduced demand and energy use
- Improve the efficiency of the distribution system
- Increase the reliability of service provided to customers

Naperville will accomplish this by

- Expanding its communications network
- Installing digital technology including Advanced Metering Infrastructure (AMI) and smart meters
- Automating its distribution grid
- Implementing Volt/VAR optimization to increase power quality
- Prepare the grid to support Plug-In Hybrid Vehicle (PHEV) intelligent charging
- Dynamic home energy consumption reduction, and customer feedback portals

Existing Smart Grid Infrastructure Systems

- Substation Automation (SA) by Siemens
- Distribution Automation (DA) by S&C
- System Control & Data Acquisition (SCADA) by ACS
- Service Request (SR) by Cityworks Azteca
- Customer Information System (GIS) by ESRI/Miner&Miner
- Workflow Technical Analysis Software by SynerGee Stoner and others
- File & Application Servers (FS/AS) by Microsoft and others

Proposed Smart Grid Infrastructure Systems

- Advanced Metering Infrastructure (AMI infrastructure, MDMS, HAN, and smart meters for all DPU-E customers)
- Asset/Workflow/Project Management System (AMS)
- Resource (Workforce) Management System (WFMS)
- Outage Management System (OMS)
- Energy/power quality Management Systems (EMS/PQ)

Naperville Project

Plans to Complete Smart Grid

- Full AMI selection and deployment system wide
- 13 of 16 substations are already fully automated, with the remaining substations to be completed
- Fiber optic connectivity architected in a redundant ring between major distribution points
- Enabling Volt/VAR optimization to minimize power loss due to distribution inefficiency

Naperville Project

Plans to Complete Smart Grid

cont'd

- Implementing Customer portals for usage monitoring and timely access to service information
- Promotion of customer energy usage awareness programs
- Creation of voluntary in-home real-time energy consumption meter programs
- Engaging in substantial compliance with FERC energy standards, accepted accounting principles, OSHA safety regulations, and regular compliance monitoring

Project will Reach all Electric Consumers in Naperville's Service Area

- Integrating 16 substations and 60 miles of distribution lines
- Purchasing $11,651,000 of infrastructure and metering equipment
- Installing the latest electric grid software capable of engaging smart grid functions

During the
Three Year Development Phase

- Naperville is requesting a 50% matching grant totaling $10,994,000
- Over the course of 15 years, Naperville expects to spend $1.81 for every $1.00 requested from the DOE
- Estimates benefits of $102,057,000 resulting in an overall $80,698,000 in positive net cost/benefits
- Much of the project is "Shovel Ready" and approximately 90% of the funds will be expended by the end of 2011

Benefits of the Smart Grid Initiative

- Reduced meter data acquisition costs
- Streamlined customer billing and more advanced billing structures, including implementation time-of-use (TOU) and demand rates
- Remote disconnects/reconnects
- Increased billing accuracy
- Outage and/or emergency notifications to the in-home display
- Home area network (HAN), including smart thermostats, in-home displays, smart appliances, etc.

Benefits of the Smart Grid Initiative

cont'd

- Decreased outage response with instant, relevant information from the smart meters
- Power quality optimization for individual customers and system voltage adjustments to optimize efficiency and reduce losses
- Decrease outage times with deployment of Distribution Automation (DA) automated switches
- Implementation of a uniform asset management system as utility transitions from new deployment to maintenance

Benefits of the Smart Grid Initiative

cont'd

- Implementation of a workflow/project management system to tie into the asset management system for streamlining of workflow practices and reduction in paperwork and redundancy

- Upgrade of the fiber optic nodes (JungleMux) to cover today's needs and future applications such as VOIP, substation and Citywide security, etc.

- Upgrade of the SCADA system with the provision of more data, securely, with less delay.

- Additional data for engineering studies and projects to modify and/or upgrade the electric grid.

Conclusions on Smart Grid Technology

- Allows Naperville to keep its reliability of electrical service
- Self-heals electric grid and optimizes use of human recourses. Linemen are dispatched only to area where automation can not help resolve the problem
- Allows real-time access to substation and distribution infrastructure for operational efficiency and infrastructure security
- Completion of AMI will allow real time access to customer connection point that will support future energy conservation effort, real-time pricing, time-of-use rates and enables smart home controls
- Robust, scalable, and secure communication network supports present and future steps in Smart Grid technology