



Naperville
Great Service - All the Time

City of Naperville: Department of Public Utilities Electric
City of Naperville Smart Grid Initiative
Synopsis
09/01/2009

Background on the US Department of Energy Smart Grid Grant

The American Recovery and Reinvestment Act of 2009 (ARRA 2009), authorized, among other funds, the release of approximately \$3.4 billion to grants authorized under the existing Energy Independence and Security Act of 2007 (EISA 2007). This specific fund is managed by the US Department of Energy with their Smart Grid Investment Grant (DOE SGIG). It became open to public solicitation on June 25, 2009 via Funding Opportunity Announcement DE-FOA-0000058.

The deadline for the grant submission was August 06, 2009. Approved projects would have matching dollars provided through the grant. "Small" projects as defined as those requesting \$300,000 to \$20 million of Federal matching dollars. "Large" projects are those requesting \$20 million to \$200 million. Projects are to be initiated immediately after award, completed by the end of calendar year 2011, and closed out by mid 2012.

The City of Naperville's Department of Public Utilities – Electric (DPU-E) determined that it was beneficial to apply for funding under the available grant in efforts to further the advancement of the City's strategic goals.

DPU-E acquired the consulting services of West Monroe Partners, LLC (WMP) of Chicago in early May 2009. DPU, IT, and HR staff worked diligently with WMP in order to provide various data to formulate into the three (3) major deliverables – 1: Smart Grid Assessment (from interviews and data), 2: City of Naperville: Smart Grid Initiative Business Case (for internal use). 3: City of Naperville: Smart Grid Initiative Grant Application (for external use). All of the deliverables were provided on schedule.

The City Manager signed off on a letter of intent that was submitted to the DOE via email by Olga Geynisman, DPU-E Engineering Manager, on July 14, 2009. Other letters of endorsement were obtained, including one signed by the Mayor, City Manager, and Director of Public Utilities, another from Congresswoman Judy Biggert's office, and one from IBEW Local 9. Various manufacturers' letters were also included in the submitted application. The complete Grant Application, including the required and optional attachments, was submitted on August 05, 2009 – beating the deadline.

The first round of responses is anticipated to be released in October 2009. It is expected that viable applicants will be contacted for further information sometime prior to the release.

Existing DPU-E Smart Grid Infrastructure Systems

The following are the main components of the existing smart grid as developed by DPU-E. These systems have been deployed and are, on average, within 80% of completion. With the proper funding, the incomplete systems will be finished. Other systems will be upgraded to more advanced/efficient technologies, and all systems will be integrated with the any new component of the smart grid infrastructure.

- Substation Automation (SA) by Siemens
- Distribution Automation (DA) by S&C

- System Control & Data Acquisition (SCADA) by ACS
- Service Request (SR) by Cityworks Azetca
- Customer Information System (CIS) by Sungard HTE
- Geographical Information System (GIS) by Esri/Miner&Miner
- Electrical Technical Analysis Software by SynerGee Stoner and others
- File & Application Servers (FS/AS) by Microsoft and others

Proposed New DPU-E Smart Grid Infrastructure Systems

The following are new systems to be added and appropriately integrated to the above systems through the Naperville Smart Grid Initiative.

- Advanced Metering Infrastructure (communication infrastructure, meter data management system (MDMS), home area network (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)

AMI Pilot Project

In 2006, the City of Naperville, Department of Public Utilities - Electric initiated a small-scale fixed network two-way advanced metering infrastructure (AMI) pilot project in order to evaluate the effectiveness of the current technology and assess its potential use towards a mass-market AMI initiative. It was decided to utilize Elster's AMI solution based on a defined historical background and technological advancement after internal evaluation of it and other AMI systems from established electric meter vendors.

Approximately 150 total Elster electric AMI meters have since been installed. 30 REX residential single-phase meters and 20 A3 node commercial poly-phase meters were deployed in a radial geographical boundary around each of three (3) electric substations, with GE JungleMux fiber optic TCP/IP backbone to a centralized network. An external antenna and an A3 collector were installed at each of these substations to receive the radio frequency (RF) signals from the field-installed meters. A serial-ethernet converter translates the RS-232 serial data out of the collector meters to TCP/IP.

During the pilot phase, Ethernet-enabled cellular modems were temporarily placed to allow an outsourced Elster EnergyAxis meter data management system (MDMS) server to have direct access to the collector meters on an interim basis. After success in the pilot phase, and if Elster wins the RFP for the mass-market AMI, the collector meters will be connected to the GE JungleMux network and an EnergyAxis server would be purchased

and managed by the utility in conjunction with the city's IT department. A similar field meter/collector (access point)/MDMS server setup will likely be deployed if another competing system is selected.

The final phase and fourth location of the pilot project involves the installation of approximately 40 REX residential single-phase meters with remote disconnects on several apartment buildings. This will allow testing of the functionality of the remote disconnect option of the Elster meters. Additionally, the viability of adding water meters in the future to any new electric AMI system was analyzed. Water meter transmitters are battery-powered and require a nearby electric AMI infrastructure to wirelessly communicate to the greater AMI system.

In general, the results from this project have been successful. The customer meters communicate effectively with the collector meters, which are interrogated by the outsourced server and the data returned to the utility for analysis. As expected with a mesh network, there are connection issues with some of the meters due to blocking and interference of the RF signal. As is the nature of a mesh network, a dense deployment of meters will alleviate most of these problems as the field meters will have the potential of following a different hop pattern to the collector meters. It is expected that approximately 200 collector meters will have to be installed in the City's 46 square-mile boundary to encompass the area and provide for a redundant and reliable mesh network.

It is expected that the pilot project will be completed and analyzed in the calendar year 2009. The City's existing customer information (billing) system (CIS) is also being evaluated for compatibility with the potential MDMS. The results and technical details obtained from the pilot project will enable the utility to specify better requirements in the RFP, for which Elster will be an approved responder, but who will be evaluated along with other qualified vendors.

Benefits of the Smart Grid Initiative

The transition of a traditional electric grid to a smart grid benefits all of the involved parties in one way or the other. Below is an incomplete listing of some of the additional benefits that will be obtained with this initiative.

- Reduced meter data acquisition costs.
- Streamlined customer billing and more advanced billing structures, including potential 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.
- Decreased outage response with instant, relevant information from the smart meters, combined with existing grid information from SCADA and SAS. Virtually real-time outage notifications from each customer location.
- Power quality optimization for individual customers as well as system voltage adjustments to optimize efficiency and reduce losses.

- Decreased outage times due to the deployment of additional Distribution Automation (DA) automated switches.
- Implementation of a uniform asset management system as utility transitions from new deployment to maintenance.
- 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 and its associated benefits such as the provision of more data, securely, with less delay.
- Upgrade of the SAS system and its associated benefits such as the provision of more data, securely, with less delay.
- Additional data for use in engineering studies and related decisions and projects to modify and/or upgrade the electric grid.

Costs

The total cost of the project is approximately \$22 million. The DOE grant is matching and therefore, if awarded, the City's obligation will be approximately \$11 million. The 5-year DPU-E CIP includes approximately \$2 million of associated projects that have been approved for implementation by City Council. Therefore, the additional funds to be approved will be \$9 million. As this project is to immediately start upon approval (late 2009), and completed by the end of 2011, additional revenue sources will have to be authorized.

Attachments

1. Letter of Intent to File for DE-FOA-000058
2. Letter of Endorsement from Mayor/City Manager/Director of Public Utilities
3. Letter of Endorsement from Congresswoman Judy Biggert's Office
4. Letter of Endorsement from IBEW Local 9
5. City of Naperville: Smart Grid Initiative Business Case

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From: Geynisman, Olga

Sent: Wednesday, August 05, 2009 4:42 PM

To: 'DOESGIGApplications@HQ.DOE.GOV'

Cc: Poole, Allan; Curran, Mark; Ashrafi, Cyrus; Tom Hulsebosch; Daniel Belmont; Krieger, Doug

Subject: City of Naperville, IL- Application for DE-FOA-0000058



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To whom it may concern,

Attached, please find the application for the **City of Naperville, Illinois** to file for the funding proposed by opportunity announcement **DE-FOA-0000058**, Smart Grid Investment Grant Program (SGIG), as administered by the United States Department of Energy. If possible, please respond to this email with acknowledgement of receipt.

Thank you for your consideration.

Regards,

Olga Geynisman, P.E.
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