

City of Naperville Case Study

***At the Forefront of the Smart Grid:
Empowering Consumers in Naperville, Illinois***

Naperville, Illinois, is a suburban community located outside of Chicago. Typical in many ways, Naperville is the fifth largest city in Illinois and an active, engaged citizenry that is environmentally conscious and technically savvy. In fact, the National Renewable Energy Laboratory's recent assessment of leading utility green power programs ranks Naperville as No. 5 in the nation in percentage of customer participation.¹ Additionally, about one-quarter of Naperville's electricity customers pay their bills on-line, which is about twice the national average.

With community interest and know-how, the City of Naperville (Naperville) – a municipal electric utility – has been investing in distribution automation (DA) systems for more than a decade. DA is a term that describes sensors and automated switches on distribution systems that provide real-time information of system conditions permitting faster and more immediate response times leading to more efficient and reliable operations. Naperville has recently launched efforts to engage consumers to take on a bigger role in managing their power consumption, which will help lower peak demands and electricity costs. These investments, which have been augmented by Recovery Act funding from the U.S. Department of Energy's Smart Grid Investment Grant (SGIG) program, include automating the City's entire electric distribution grid and deploying smart meters City-wide.

Distribution Automation

Naperville began its grid modernization in the late 1990s with a series of upgrades: (1) installing supervisory control and data acquisition (SCADA) systems in all substations which provide greater information for system operators, (2) deploying automated switches at strategic points along the grid which allow the system to respond to disturbances more precisely, and (3) burying underground more than 90 percent of its overhead power lines. Concurrent with these DA improvements, the City's system grew substantially during this same period to accommodate large population growth. The number of miles of electric lines maintained by Naperville almost doubled, and the number of customers grew by more than 14 percent. These increased system needs are being addressed with a modernized distribution system that has been shown to be more reliable.



The DA investments have resulted in measurable decreases in the length of service interruptions as measured by the System Average Interruption Duration Index (SAIDI). Every year since 2001,

¹ <http://www.nrel.gov/news/press/2010/838.html>

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Naperville’s annual SAIDI values have shown improvements ranging from 14 to 55 percent, depending on weather conditions and other factors. In addition, automatic restoration process decreases the number of trucks and repair crews being deployed in the field for maintenance and repair services. These benefits translate not only into superior reliability and service but also into savings for the City and its residents.

The DOE’s Smart Grid Investment Grant program came along at an opportune time for Naperville. With a project budget of almost \$22 million – half of which is Recovery Act funds – Naperville has been able to complete deployment of DA equipment.

Investments by Naperville in smarter systems have been accompanied by investments in better trained workers. “Over the years, we have accomplished a complete culture change in our workforce,” says Olga Geynisman, Naperville’s Electrical Engineering Manager. “Today, our crews have computer expertise as well as electrical training, as each smart grid device has software and communications systems to monitor and maintain.” To meet its updated workforce requirements, Naperville has implemented comprehensive training programs that cover all of the departments involved in DA: engineering, power control, operations and maintenance, communications, and administration. The company has also re-aligned existing workforce and created new positions for automation, communication, data management, analysis, and cyber security. Says Ms. Geynisman, “The result is a more flexible and capable workforce with better training to maintain our modernized grid.”

Smart Metering

Recovery Act funding has also positioned Naperville to accelerate a new effort: deployment of more than 57,000 smart meters. This funding allowed Naperville to accelerate its smart metering plans by five to ten years. The project includes City-wide access to a customer web portal that will house information from the smart meters on electricity consumption and costs. According to Ms. Geynisman, “The aim is to empower our customers and provide them with more tools, information, and choices, and create opportunities for them to manage their own electricity consumption and costs.”



Naperville’s five-year plan is to invest in and implement DA, smart meters, and demand-side programs while at the same time keeping overall electric rates flat (no change) for the next two years, and then limiting subsequent rate increases to no more than two percent per year for each of the next three years. This limit on rate increases is an important outcome given the cost of the capital investments undertaken by Naperville and the rising cost of energy.

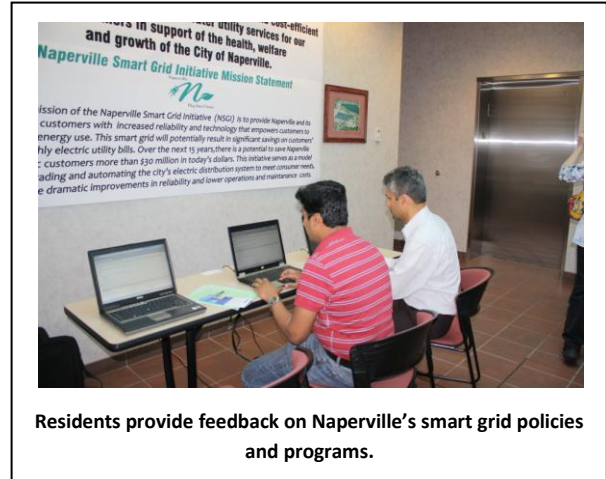
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Naperville Smart Grid Customer Bill of Rights

Naperville is eager to implement smart metering and associated demand-side programs in ways that maximize consumer acceptance and cost effectiveness. Implementation includes consumer programs that address public concerns and familiarize customers through outreach and education activities.

One customer-focused program is the “Naperville Smart Grid Customer Bill of Rights,” which is now an ordinance that has been approved by the City Council. This program was the result of a series of public meetings in which citizens voiced their ideas and concerns. The Bill of Rights establishes, in writing, that Naperville electricity consumers’ have (1) the right to be informed, (2) the right to privacy, (3) the right to options, and (4) the right to data security. Naperville has published a handbook that explains these rights and what consumers can do to ensure they are protected. The handbook is found at

http://naperville.il.us/emplibrary/Smart_Grid/NSGI-CPAHandbook.pdf.



Naperville Smart Grid Ambassadors

The “Naperville Smart Grid Ambassadors” program is an additional effort by the City to inform the community about Naperville’s smart grid technologies, programs, and plans. Ambassadors meet with their neighbors, listen to concerns, and provide suggestions for improving program offerings as part of Naperville’s endeavor to involve its customers in its smart grid implementation. Ms. Nadja Lalvani, Naperville’s Community Relations Manager, says, “Naperville is excited about our smart gridAmbassadors. They are a group of well-educated, informed community leaders that are excited about the new choices, options and devices that will allow them to make decisions on how and when they use energy. This is a great way to further involve our customers in our programs and to ensure consumer benefits are understood and met.”

Future Plans

In the next two years, Naperville expects to have one of the only electric systems in the U.S. with a completely automated distribution system and smart meters installed for all customers. This infrastructure can be the foundation for further grid modernization efforts by the City. One of the opportunities being tracked is supporting the deployment of electric vehicles (EVs). The Naperville SGIG project includes installation of up to ten EV charging stations, and the City plans to offer rates that encourage off-peak charging of EVs. Soon, Naperville consumers will also have access to enhanced billing options, automatic outage notification systems, usage feedback devices, optional demand-side

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programs, and intelligent charging options for electric cars. Naperville Mayor A. George Pradel is currently test driving an electric vehicle, courtesy of a local dealership, to learn firsthand about EVs. The Volt is parked in the municipal parking lot and will be test driven by all members of the City Council.

Ms. Geynisman says, “We have only scratched the surface, and we are planning to offer time-based rate programs and other demand-side measures for greater energy efficiency and lower peak demand. We expect to have a fully integrated and automated grid for our consumers and are looking for new ideas and technologies to implement for our City.” With engaged citizens, forward-thinking community leaders, and a more modern electric distribution grid, Naperville is well positioned to address the challenges and opportunities that lie ahead.

Learn More

The American Recovery and Reinvestment Act of 2009 (Recovery Act) provided DOE with \$4.5 billion to fund projects that modernize the Nation’s energy infrastructure and enhance energy independence. For more information about the status of other Recovery Act projects and how DOE is working with recipients to advance synchrophasor technologies, visit www.smartgrid.gov. To learn about DOE’s Office of Electricity Delivery and Energy Reliability’s national efforts to modernize the electric grid, visit www.oe.energy.gov. For information about the Naperville Smart Grid Initiative, visit <http://www.naperville.il.us/smartgrid.aspx>.



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