guest opinion

Power Line Vision

THE EMERGING SMART GRID

BY AUDREY ZIBELMAN

Audrey Zibelman
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IN THE CURRENT transformation of the electricity industry, a confluence of issues argues for a new, compelling vision of the electric grid—a 21st-century smart grid that not only can enhance reliability and efficiency and benefit the environment, but one that can give consumers a direct role in the power system that serves them.

Confronting the industry are a rising demand for electricity; a growing interest in environmental stewardship and renewable sources; and the need to achieve reliability and economic goals by building needed transmission and generation, modernizing aging grid equipment and integrating demand response fully into the system.

PJM Interconnection recently issued a strategic report that examines the industry's future and PJM's role during the next decade. As the regional transmission organization that manages reliability and wholesale electricity markets for 51 million people in 13 states and the District of Columbia, PJM plays a vital role in meeting the needs of society and the grid community it serves.

Looking to the industry's next decade and beyond, the report explains that the electrical grid in the United States will become a highly automated and interconnected network – a smart grid – in which intelligent systems use information to support the delivery of electricity reliably and at the lowest possible cost.

This thinking meshes with the views of industry research groups, which have identified the need to employ advanced technology not only to modernize the grid to enhance reliability, but to increase efficiency and provide a platform for demand response, renewable energy and broad consumer participation.

These industry experts envision the digital automation of the entire power-supply system, enabling consumers to make real decisions about their electricity use and the prices they pay. With access to real-time price information and household devices that can process that information, consumers will have a direct influence on the electric system—on how the reliability of the grid is maintained and how electricity is provided to them.

In a smart grid world, harnessing the power of the consumer will change the way the power grid operates and electricity markets work. Advances in technology; the use of the Internet; and the quality and quantity of real-time information will transform the current model, in which the consumer is the last link in the chain and has little role in the process, except to use and pay for the product.

The smart grid provides the platform to accelerate the deployment of demand response across the system. A just-released paper by the Brattle Group estimates that demand response could reduce peak electricity demand by 5 percent, saving about $3 billion a year nationally, with a cost-effective technology mix that achieves a realistic penetration rate among consumers.

The digitally enabled smart grid will provide the information to drive the best decisions about electricity supply and use. For example, smart grid technology can deliver a price signal from the electric meter to the air conditioner, triggering a programmed response that's sent back to the meter and on to the grid. In essence, it will provide an instantaneous, seamless flow of energy and information that will transcend many of the barriers of today's grid operations.

A communications network will be required to make possible the two-way flow of information needed to implement the smart grid. Employing a Web-based business approach not only will simplify access for consumers and other participants, it will speed the development of new technology and encourage the industry to upgrade and modernize the existing grid in a coordinated fashion.

As described by the U.S. National Energy Technology Laboratory, this advanced, two-way smart grid responds to 21st-century needs in a number of important ways, including the capacity to detect, analyze and restore itself rapidly from problems; the capability to deliver a higher level of power quality; and the ability to accommodate a wide range of generating technology options, including renewable energy sources.

The industry transformation represented by the 21st-century grid will make two-way communication of power-system information across the electricity value chain, from generator to consumer, an integral part of the industry. Advanced technology will drive higher performance, enhance grid reliability, improve operating efficiency and give the consumer more options and better service.

The smart grid is a 21st-century idea whose time has come.

Audrey A. Zibelman is executive vice president and chief operating officer of PJM.

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