

# GEARING UP FOR THE SMART GRID

The smart grid revolution is coming, whether we're ready or not. **Chris Kardos** of Ecologic Analytics, **Mehrdod Mohseni** of Enspira Solutions and **Brian Kirchman** of Invaluable Technologies sat down to discuss the challenges of moving it forward.

**PE.** There has been considerable focus on the potential of the smart grid to revolutionize the electric utility industry in recent years and, it looks set to become one of the networks of the future. What are your thoughts on this?

**BK.** There is no question on this; smart grids are an integral part of the energy infrastructure for tomorrow. Smart grids are a materialization of logical networking in the energy space, similar to other logical networking architectures over geographically diverse regions in other industries as the proliferation of affordable network infrastructure exponentially grows. The demand for real-time data communication and distributed networks in the energy space is dramatically increasing, and the smart grid, as an implementation of this, is here to stay.

**CK.** According to the Department of Energy, the United States consumes much more energy than it produces domestically. Over the past few years, the leadership on many levels has emerged to develop legislation and regulations to support the modernization of the grid.

Smart grid technologies, including two-way meter communication, otherwise known as advanced metering infrastructure (AMI), are part of the overall solution to ensure our economy, standard of living and national security are not undermined by the fundamental energy challenge facing the country.

From our perspective, smart grid technology-enabled applications such as smart outage management, demand response pricing and appliance load control programs will continue to gain wider acceptance as AMI technology and meter data management system (MDMS) deployments mature over the next few years.

**MM.** The current movement toward the smart grid in the electric utility industry is somewhat analogous to what the telecommunications industry has experienced over the last few decades. Back then the assets were engineered and designed to last – but rarely addressed. Now that is not longer the case. All assets are digital in nature and are upgraded over shorter periods of time. They are interoperable (via IP and other standards) and user friendly. Utilities of the future are starting to see similar revolutionary changes. The 'smart' networks of the future will allow interoperable (via standards such as IPv6, MODBUS, DNP3, C12.22), upgradable (via firmware upgrades) and more user-friendly operations via the web.

The smart grid is indeed a reality, with today's technology and solid system engineering. These intelligent infrastructures combine business

systems with specialized energy distribution automation devices to form an integrated electric and communications network, which bridge and support the interactions between the energy producer and consumers.

**PE.** What are some of the factors driving change? What will be some of the benefits of the smart grid when it comes to such areas as cost, climate change and CO2 issues?

**MM.** The rather remarkable increase in component functionality over the past 18-24 months, as well as the decrease in associated costs, has been a huge lift to the market. This change, as well as the increase in energy costs, increase in consumer consumption (big screen TVs, larger homes, computer equipment), the 'green effect' (CO2 emissions) and the always present NIMBY issues have combined to make a much more compelling business case for smart grid.

Increases in functionality have been particularly evident in AMI. Meters are now 'smart' with data storage, remote disconnect/reconnect, voltage monitoring, net metering, remote firmware upgradeability and full two-way communications. All of which have made building the business case much more compelling in the eyes of utility management and utility commissions.

It's been noted that US electric utilities emit almost 40 percent of the world's greenhouse gases. A smart grid would enhance overall utility energy efficiency and help to keep this number from increasing. This can be achieved via improved reliability by automation of fault location, isolation and service restoration (FLISR), which help lower operating costs by reducing amount of travel time and crew operating time required; supporting volt-VAR optimization (VVO) in 'steady-state' which can improve energy

**“A smart grid would enhance overall utility energy efficiency”**

**Mehrdod Mohseni**

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**Mehrdod Mohseni** is a registered professional engineer and senior IEEE member with over 19 years of energy and utility industry experience with particular emphasis on T&D automation systems. As Senior Vice President at Enspira Solutions Inc., he is responsible for the company's overall business development, as well as management of Enspira's consulting practice across North America.



**Brian Kirchman** is CIO at Invaluable Technologies, LLC. He leads the company's demand side management strategy consulting and solution services organization. His experience has given him a deep understanding of demand response technologies, energy data related software implementations and energy efficiency solutions.



**Chris Kardos** is Director of Product Strategy for Ecologic Analytics. Kardos joined the company in December 2007 as Director of Product Strategy. He is responsible for managing Ecologic Analytics' product road map, consulting with clients and potential clients and supporting sales pursuits.

efficiencies and subsequently lowering CO<sub>2</sub> emissions at power plants supplying data to VVO equipped substations; and providing a wealth of visual and automated aids in the operating control rooms for more effective decision making practices.

**BK.** Drivers range from federal, state and local government policies, to customer expectation, to operational efficiency goals of the energy utility. These three elements are key, as they represent fundamental drivers found in the unique project makeup of a sustained, strategic energy initiative. The realization of distributed connectivity and real time two-way data communication is required to meet the reporting, monitoring, sustainability and measurement aspects required for energy initiatives today.

**“With a smart grid, data quantity, quality and availability will be profound”**

**Brian Kirchman**

The successful implementation of a smart grid should have a key role in many areas of cost for the energy utility. With a smart grid, data quantity, quality and availability will be profound. The successful analysis of this data will enable more precise cost avoidance efforts associated with infrastructure maintenance and growth. It will also be an enabler for more precise demand-side management efforts, further promoting cost avoidance while increasing grid reliability. Increased measurability is another tremendous asset.

Energy entities will be able to measure the success of their climate change initiatives and other key efficiency, related efforts like never before. The enhanced communication available from a smart grid will also enable customer interaction for the energy entity. This will promote the creation of new programs targeted at higher customer satisfaction,

higher bill payment rates and new customer payment options, as well as potential cost recouping initiatives.

**CK.** The cost of energy is biggest the factor driving change; however, as if rising costs aren't significant enough, the situation is complicated by the nation's aging transmission and distribution infrastructure, the consumers' desire for greater service and reliability, and the move, albeit cautiously, toward deregulation.

Beyond any impact technology alone can bring, empowering the consumer with information to make personal decisions about energy consumption trumps many solutions. In recent weeks, the demand for gasoline in the United States has fallen four percent from one year ago. The reason – consumers, armed with information and economic incentives, will reduce consumption.

Likewise, on-demand pricing programs offered by utilities can change consumer habits. Two-way communication, enabled by smart grid/AMI technology, provides the means to communicate important pricing information in near real-time to the consumer.

**PE.** Can you outline what part your company will be playing in driving this sector forward and what you expect will be some of the key characteristics of the smart grid utility?

**CK.** We provide the MDMS for utilities considering smart grid/AMI technology. Today, there are many evolving technologies in a very young market with few standards in place to support interoperability of the products and services available, and we're redefining what meter data management means.

Meter data management systems are evolving into near real-time data analysis and device control platforms that impact and implement many key business processes within a utility. Meter data management systems need to cut across disparate systems for billing, customer service, outage and asset management, mobile workforce management and field service order management to provide end-to-end business process optimization.

Smart grid technology and meter data management systems are providing the foundation to modernize the role of the meter. Much like the retail cash register's metamorphic change to today's point of sale systems that connect the transaction to back office systems, smart meters and meter data management systems provide the link between the utility back office systems and millions of customer end points.

**BK.** Invaluable Technologies' energy consulting, specializing in demand side management technologies of demand response and energy efficiency and price-related programs, has a vital role in ensuring energy entities are maximizing the benefits of an enabling technology such as a smart grid implementation.

Invaluable Technologies energy consulting integrates with our clients' business groups through strategic sourcing to ensure technology-centric projects are executed in a successful manner. Potential vendors are analyzed and assessed thoroughly, and smart grid solution providers architect and implement a solution that will offer maximum benefits and smooth integration to our clients' current environment.

Invaluable Technologies' Energy Solutions group also offers innovative hardware and software solutions that complement and extend the capabilities of a smart grid. These range from Zigbee-enabled hardware/software HAN solutions to demand response and energy efficiency monitoring devices that promote successful project measurement and goal assessments.

**MM.** The future of smart grid is really more of a paradigm shift that is forcing utilities to consider a holistic perspective on their energy generation, transmission, delivery, measurement and ultimately revenue collection processes. At Enspira, we work very closely with our utility clients to help them transform themselves into the digital utility of the future. This requires clearly defining the drivers and associated cost/benefits in support of a strategic roadmap; a roadmap which encompasses all aspects of the utility enterprise, including enterprise asset management efficiencies, operational effectiveness of the utility, distribution automation practices, delivery and demand-side management best practices, the all important 'meter-to-cash' processes, and all the supporting technologies.

We assist our clients through the entire smart grid lifecycle. Our subject matter experts assist in strategy development, business cases, technology/process procurement, contracting, field testing, systems integration, deployment and organizational change management. We help utilities to ensure benefits realization and innovation through business process redesign, integration and deployment of these future technologies.

**PE.** What are some of the obstacles for widespread adoption of the smart grid in the future?

**MM.** For widespread adoption of smart grid, the traditional practice of spending money to increase the rate base no longer applies. The rules of the game need to change to incentivize utilities to change their behavior developed over the last 100 years of business. Investments to improve efficiencies, especially demand response, could decrease utility revenues but would enable them to push investments in future generation off for many years. Distributed generation could be enabled for all consumers through net metering; but new business processes and back office systems would also need to be developed (as well as additional funds invested with a limited standard utility ROI).



**“The cost of energy is biggest the factor driving change”**

**Chris Kardos**

**CK.** Even though the industry is currently in a perfect storm of factors creating the need for change, two of the most significant near-term obstacles for smart grid adoption are separating marketing hype from functional reality and securing the capital needed for the investments.

At times, the noise about the smart grid has made it difficult to effectively evaluate the good technologies available. Nevertheless, the utility industry has benefited from the smart grid hype, as the industry has seen a blistering rate of innovation over the past few years.

The smart grid remains bleeding edge, and the smart grid adopters thus far could be considered the 'innovators' within the technology adoption lifecycle. As the deployments with the market innovators go live and mature, the market will sort out the best and most affordable technologies. As returns on investment are better understood, the capital for the next phase of adopters will become available.

**BK.** If it was easy, everyone would do it, or it would have been done already. Like all great innovations, a smart grid implementation will have its challenges as well. The good news, is the challenges that a smart grid faces are not new, and those with the right experience and success history will be equipped with the approaches to overcome these challenges.

Articulation of all benefits, including operational, infrastructural and customer benefits, for a smart grid business plan will be a challenge. This articulation will be key, however, to secure funding and rate cases. As a smart grid will benefit and impact many areas of a utility and its customers, it will be vital that a proper governance core team is in place for a successful smart grid implementation. Proper data security architecture will also be a challenge for smart grid implementations. New avenues of meter tampering and grid compromising by way of technology threats such as hacking and denial of service attacks will need to be a focus in a properly architected smart grid. ■