

# Two-way conversation

*US Infrastructure* grills the experts on the benefits of smart grid technologies and their power to revolutionize the relationship between utilities and their customers.

As energy demands increase how can smart grid technologies help to optimize the delivery and use of energy?

**Maureen Coveney.** With a smart grid, energy companies can more easily see where energy is going and influence how it is being used, while also giving consumers greater control over their own energy consumption.

The smart grid's 'nervous system' is the IT network that monitors and controls the power grid. Advanced metering infrastructure (AMI) is a crucial piece of this smart grid technology, as it provides the basic infrastructure required to help with the delivery and usage of energy. AMI is the enabler for consumers to assist in the reduction of localized peak capacity that will have a direct and measurable impact on energy consumption.

Utilities are now working to select and implement the required infrastructure, which includes hardware, software, communication networks, customer associated systems and data management software, which will allow consumers to contribute to load reduction. Cyber security is also a mandatory requirement. Equally important is designing end-to-end utility business processes to exploit the capabilities of this new infrastructure so that utility energy portfolio goals can be met.

**Malcolm Unsworth.** The smart grid is creating new ways to understand energy use and behaviors. With this comes the development of new roles – from the utility executive to the end use customer. But what does this all mean?



We have moved from a one-way process to a two-way conversation. No longer will utilities send out energy and then collect data back to be used solely for issuing a bill. The smart grid allows us to deliver not just energy, but also pricing information, load data, and knowledge to help consumers make smart, informed decisions. Utilities will gather not only billing information but also data about patterns of use, consumer preferences, and much more. The information and data being delivered today is moving the needle towards changing behavior and ultimately shifting the way we think about and use energy.



***“Demand management programs will allow utilities to experience lower peak demand fluctuations”***  
***Jack Danahy***

## THE PANEL

**Maureen Coveney** is Executive Industry Director/Senior Principal, Utilities, at SAP. Working with utility customers and industry stakeholders, Coveney leads industry-focused initiatives and promotes SAP’s utility solutions through thought leadership activities.

**Jack Danahy** is a Security Executive at IBM. He holds five patents and has additional patents pending in secure distributed computing, kernel security, software vulnerability analysis, and secure systems management. He currently authors two blogs: Suitable Security and Smart Grid Security.

**Dr. Patrick Kennedy**, is CEO and founder of OS/soft., LLC. Previously Dr. Kennedy worked as an engineer for Shell Development Company and Taylor Instrument Company. Dr. Kennedy attended the University of Kansas where he earned a Bachelor of Science in Chemical Engineering and a Ph.D. in Chemical Engineering.

**Don Troxell** is an Industry Solution Practice Manager supporting both AT&T wireline and wireless accounts and account teams leading the consulting effort and business development for the utilities market.

**Malcolm Unsworth** is a highly respected executive both domestically and internationally, with broad experience throughout the utility industry. He was named Chief Executive Officer of Itron in March 2009. Prior to his post as CEO, he was Itron’s President and Chief Operating Officer. He was elected to its board of directors in December 2008

**Patrick Kennedy.** As prices increase and resources become scarce, the need will increase for optimization of the grid and between the grid and demand. The ideas today are about the use of market prices to control the peak load, permanent load shifting and demand response, but a larger effect could be a more efficient use of resources. The loading order of a grid is generally nukes, base load units, normal power stations with frequency control provided by hydro and peaker units. The efficiency of

these varies – a micro turbine on a building is 22 to 26 percent efficient and the most efficient combined cycle unit made is 60 percent. However, if you can use the heat, a combined heat and power (CHP) can attain as much as 85 percent efficiency. One goal of the smart grid is to use intelligence from the grid (e.g. congestion, peak load) and the demand context (e.g. production flexibility) to balance the load and increase efficiency. The smart grid is the enabler of intelligence at the edge, similar to telecom. This will not only improve our efficiency of fuel use, it will create many new industries and jobs.

**Jack Danahy.** Smart grid technologies provide the necessary enablers to connect a much wider array of devices to the power system. Whether the increasing demand is intended to be compensated for by increasing types and instances of generation, or if it is intended to be mitigated by more efficient use and management of the existing capacity, a new level of intelligence and interactivity is needed.

Similarly, as with all complex systems, there is a need to increase the amount of information that is communicated among the participants if the full value of the interaction is to be achieved. By enabling distributed generation, the core grid will depend less on long distance transport of electricity from centralized generators subject to 10-20 percent line losses.

By giving homeowners more insight into their usage patterns via AMI and smart meters, customers are incentivized to lower demand during expensive high demand periods. These demand management programs will allow utilities to experience lower peak demand fluctuations, meaning they don't have to keep as

much spare capacity on-line in the form of 'peaker' generators.

**Don Troxell.** Most people don't realize that the utility usually does not know you have lost service until you call and report the outage. AT&T will proactively identify outages, collect real time data regarding power load throughout the grid, manage power distribution, and perform rerouting of energy resources to minimize outages. In addition, AT&T will interconnect multiple sources of power to the common energy grid (coal, solar, hydroelectric, nuclear, wind) for availability to consumers. Ultimately, this will create more flexible and customized service plans for consumers and drive customer behavior.

AT&T customer benefits include the option to choose the type of energy you would like to receive, tracking of usage and cost down to the appliance

level, and the ability to manage consumption of energy, balancing energy need with utilization during hours when energy is cheaper. Additional customer benefits include the option to set usage preferences that allow the utility to provide energy to appliances based on user-defined thresholds and priority levels, and shorter energy outage duration and less frequent outages.

#### **How do your solutions enable utilities to improve cost efficiencies and enhance their operational performance?**

**MU.** Smart metering and smart grid technology lowers the cost per read. Having frequent meter readings and on-demand readings can eliminate the need for field service calls and reduce insurance, repair and maintenance costs. This level of data can also speed up resolution of customer service telephone calls.

**PK.** OSIsoft's PI System manages real-time data for metering, operational and external information (e.g. weather) to enable new solutions. Operational performance is a minute to minute, not a daily or monthly phenomenon. Our solutions allow applications to obtain timely high fidelity data directly from the equipment to enable optimization, demand shaping and efficiency. Utilities have used the PI System in all sectors including condition based maintenance, optimization of station operations, reducing cost of turbine startups, meter data management, distribution optimization, management of renewables and carbon footprint, and environmental reporting. AMI Integration with the OSIsoft MDUS product means we will provide timely and accurate data for Customer Support and Maintenance, including billing and event management reducing the cost of operation by communicating from the head-end system directly to SAP.

**JD.** As utilities come to rely increasingly on IT and two-way internet and other communications technologies to conduct their everyday business, they, by definition, open themselves up to a whole new spectrum of potential adversaries and attack vectors. Attackers find themselves with new options for bringing financial pain to utilities, and may even find ways to impact reliability, the success metric against which all other performance measures pale.

IBM Rational's ability to harden new AMI and smart grid applications against attack, as well as to secure the fragile juncture points where IT and operations systems interconnect, saves utilities and their customers time and money helping to ensure that private data remains private and that the lights stay on.

**DT.** AT&T provides enabling, self-healing connectivity to many smart grid solutions throughout the utility enterprise. AT&T may save the utility capital and operational dollars from displacing the need to build additional communications infrastructure while providing reduced maintenance and operational costs from owning their own networks.

**MC.** From the standpoint of cost and operational efficiencies, utilities should not make sacrifices in the area of front or back office integration. The success



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(and total cost of ownership) of future, progressive utility programs will directly correspond to the strength of integration to business platforms and the degree to which a utility can begin with the end in mind.

To help utilities accomplish this, SAP formed the SAP AMI Lighthouse Council – made up of companies that use SAP for Utilities for customer management, energy data management, and billing, as well as SAP ERP – as a forum of co-innovation for the integration of AMI systems with SAP for Utilities. Their conclusions led SAP, the SAP AMI Lighthouse Council, and SAP partners to embark on an extensive development project, the result of which is the new SAP AMI Integration for Utilities software. This software has been available since November 2008.

**One of the main features of a smart grid is its ability to allow a greater level of interaction between utilities and their customers. In what ways do your services enhance this interactivity?**

**PK.** OSIsoft MDUS with SAP for Utilities will allow the customer to do on demand reads directly to their meter. The OSIsoft MDUS will deliver a detailed history of usage for a customer so they can examine time of use data and make decisions about their operation. Industrial customers like Kodak, academic institutions etc. have used real time energy data from the PI System to monitor their operational practices and redesign their energy use. Providing time of use data will facilitate building and utility management whether it is an industrial customer, academic institution, data center or the home user.

OSIsoft customers are pursuing the Microgrid design. Tomorrow's homes and businesses will be generating energy and putting it back on the grid or using it to avoid pulling from the grid. The PI System has already been integrated into products being used to store energy for permanent load shifting. The Microgrid requires a greater level of interaction and access to internal context and knowledge from the grid. OSIsoft is unique, we have substantial installed bases in all parts of the energy supply and use including mining, gas pipeline, generation, transmission, distribution, metering and users.

**JD.** Without security, many of the management, balancing, and billing functions cannot be created or used. Absent the ability to ensure that two-way transactions and other interactions can be conducted in a secure manner, and utilities will have to greatly curtail their aspirations for increased engagement with their customer base, and will be unable to credibly provide the types of configurability and access to information that the smart grid is designed to provide.

By simplifying the process of securing the creation and deployment of the new software that drives the smart grid, Rational provides developers and development teams with the opportunity to create much more secure applications from the start. Build and integration level checking combined with pre-deployment scanning for vulnerabilities can create much more reliable and trustworthy experiences for both customer-to-utility and utility-to-utility communication.

**DT.** With our wire line and wireless networks we provide essential operational connectivity for critical smart grid solutions allowing them to have real-time information which enables the solutions to be of the greatest benefit to the end users (customers) and the utility alike, especially for outage management systems, safety, emergencies, restorations, real time billing and energy purchasing etc.

AT&T also has a long history of staying in touch with its millions of customers, providing detailed usage and billing information down to the number of minutes talked, the number called, determining the customer rate plan instantaneously and applying that data accordingly, and so on. We also offer

web portals providing customers with near real-time data on their usage, and give them the ability to text to get updates on their accounts. We can also text individuals with warnings when they go over their data limit and reach other parameters.

Basically we provide customers with access to near real-time data on their account almost anywhere, anytime, through a variety of mediums. This is an area that may be challenging for utilities and where companies such as AT&T can provide assistance in a number of ways.

**MC.** Many of today's consumers only know that their electricity comes from a socket. They know little about the origins of that energy, or the many processes involved in bringing it to their home or business. To help customers embrace a shift toward energy efficiency, the utility industry must be able to show customers just how reduced energy consumption will save them money.

Enabling energy efficiency through smart grid technology requires an investment by energy companies and a shift in how they have traditionally done business. Cooperation and co-innovation

among energy providers, energy distributors, and all those who touch the energy sales process have become more important than ever. Toward that end, SAP offers SAP AMI Integration for Utilities, along with its robust CRM 7.0 capabilities that include marketing, sales, and billing functionality supporting the delivery of new energy products and services that encourage consumers to save energy. SAP also provides the tools necessary to interact with customers via web portals and integration with interactive voice recognition (IVR) technology.

**MU.** Itron smart grid technologies enable utilities to connect with their customers in new ways to manage energy demand through greater consumer choice and control, as well as by supporting new smart grid applications such



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as distribution automation. The other key component in connecting with consumers is home area network (HAN), which allows real-time usage information to be transmitted wirelessly from the meter to devices in the home. Having the ability to monitor their usage in real time, using a device like an in-home display (IHD), gives the consumer meaningful feedback on how their habits or behavior ultimately impact their electricity bill, and provide them with the opportunity to make more informed decisions about how and when they consume electricity.

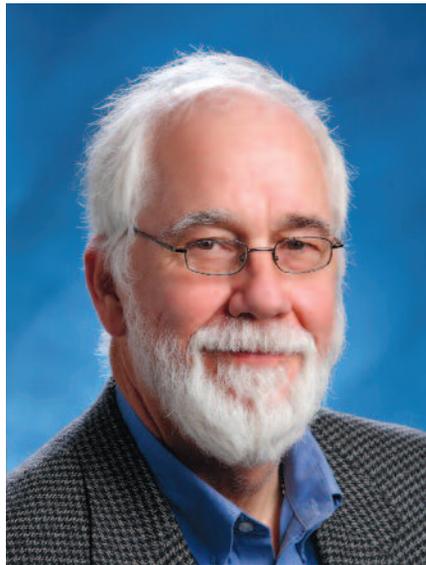
**What are the main developments you envisage for the future of smart grid technology?**

**JD.** Perhaps the biggest development we're all looking to is utility scale electricity storage. Whether it comes in the form of high-tech batteries, fly-wheel farms, or eventually, thousands or millions of electric car batteries in a Vehicle-to-Grid (V2G) topology, mass storage will make the grid safe for renewables and be the clean tech, load balancing icing on the cake that will truly usher in the 21st century smart grid we're all working towards.

Remembering that this ability to store will drive the attractiveness of the ability to generate, security is obviously a key characteristic. Being able to follow the trail of electrical breadcrumbs so as to pay generators, and to bill consumers of stored power is just another enabling feat that security will empower.

**DT.** We envision an explosion of IP addressable smart devices in all areas of our life that will be inclusive of end user, in home, and mobile solutions that will enhance our way of life; such as smart home technologies, plug in hybrid vehicles, and energy saving appliances as an example. This IP enablement will provide an explosion of applications that will be made available to the utility and to the consumer, providing capabilities not even thought of today – similar to the type of application explosion that developed with the advent of the iPhone.

**MC.** As energy companies continue to develop smart grids, certain visions will soon become reality. Smart meters will measure energy consumption electronically and provide a high level of detail about energy usage that can be shared with customers. Customers that reduce energy usage will be rewarded with lower rates. Imminent or current power failures will be identified immediately and the affected area will automatically be pinpointed. Consumers will be able to allow an independent system operator to automatically switch off or reduce the power being used by certain devices that consume a high level of energy. Renewable energy sources – like windmills or solar fields – will be connected to the grid and become part of the overall energy supply system.



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Internet marketplaces will allow private energy producers to trade energy that they generate.

To meet these demands, SAP is in the process of researching and developing new product solutions focused on demand-side management, PHEV support and related infrastructure support, and additional ‘high touch’ customer-focused solutions that will be part of the extended AMI Integration, Analytics and CRM functionality.

**MU.** The 20th century began with mass production and the promise of automobiles. It ended with the mass adoption of cell phones and the internet. The 21st century promises an even more rapid technological evolution. The management of our planet’s most precious resources and stewardship of our environment will be at the center of this transformation. This demands new thinking, new tools and the right partners to ensure success.

Energy efficiency is no longer optional. Investment in renewable energy sources will grow exponentially, water scarcity issues will demand technology-driven conservation and consumers will become empowered in new ways. The means and the speed at which utilities and consumers use data will intensify. The success of the smart grid will be based on its ability to keep pace with these demands and keep pace with rapid change.

**PK.** There are many areas where developments will be taking place for the smart grid. These include standards, security, smart meters, in-home devices and communication networks. However OSIsoft’s specialty is in the area of real-time data collections and storage and our biggest contribution to the challenge is scale of streaming data. The amount of information available is increasing exponentially. AMI programs are collecting as much as 20 points per meter today. In the future HAN, facilities and industrial could provide hundreds of sensors behind every meter and the number of smart meters will have grown. We have now deployed five million point real time systems and we are working to increase both this number and the tools to make multiple systems work within a collective. The systems must be easily managed and self-configurable. The data must be accessible by standard technologies with real-time response over secure networks. ■

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