

more immediate track of our system and the energy that is being used at a much lower cost, and with greater detail than manual reading allowed. As these first steps lead to a smarter grid, there is tremendous potential to benefit the environment through more efficient energy use.

But what happens to the relationship with our customer? A truck with a utility logo or a familiar meter reader in uniform is a tangible reminder that we live and work in the neighborhoods we serve. This connection is a powerful force in having our customers know us as more than an energy provider, but as a community ally. As an example, a PSE meter reader once saved an elderly man's life after discovering him alone and disoriented in his rural cabin. The incident earned PSE an award from the U.S. Commission on Aging and serves as a reminder that we must be creative in building lasting relationships through new technologies. The good news is we can already see progress.

Today's consumers want transparency, and online tools offer many ways to help them understand the services we deliver and the choices they have. Online energy audits that employ the data gathered by our wireless meter reading network have become very popular with our customers. In addition, we're using the data to communicate more quickly during storms through a new online outage map. Consumers now demand better and localized information, and the smart grid can help us meet that expectation by offering personalized tools tailored to each user's needs.

But even as PSE goes digital, we are also building new community customer service offices. Some of our customers still appreciate a face-to-face conversation when they pay their bill. But the main role of these community offices is to be our eyes and ears in the community—to work with municipalities on energy efficiency programs, provide information to customers who are interested in energy conservation, and offer support and restoration information during major storm-related power outages. We want our customers to know the door is open and we're here to help. For some customers, a Web site is perfect, yet others want to pick up the phone or pull up a chair and chat.

The smart grid won't be a success because of technology, but because of what we do with the information it yields. Keeping our customers front and center will keep us on course as we chart a new future for utilities and the customers and communities we serve.

*Bert Valdman is an executive vice president and chief operating officer for Puget Sound Energy.*



▲ Bert Valdman

## AMI REALITY CHECK

The next two articles go beyond just the AMI vision to discuss some practical considerations. Ed Finamore talks about strategies for better leveraging AMI and smart grid technologies across a utility. William Atkinson discusses the strategy and reality of smart meter maintenance, repair and replacement.

VISION

STRATEGY

REALITY

# The AMI centerpiece

+ AMI AND SMART GRID CAN SUPPORT MANY CRITICAL INTELLIGENT UTILITY INITIATIVES  
Edmund P. Finamore, P.E.

➔ WEBSTER TELLS US THAT THE DEFINITION OF intelligence is an ability to learn or understand from experience and to acquire and retain knowledge in order to respond quickly and successfully to a new situation. This definition pretty much characterizes the direction that utilities are taking today as they respond to

increasing regulatory pressures by upgrading or adding new systems capable of acquiring and interpreting information.

Today's intelligent utility is all about gathering and processing large amounts of customer and operating data for improved network diagnosis and customer service. As utilities begin to harness the benefits of new smart grid technologies and automated metering infrastructure (AMI), they will be better able to meet the challenges of containing costs and improving service by increasing operational efficiencies. With many enterprise-level systems—such as geospatial information systems (GIS), customer information systems (CIS) and outage management systems (OMS)—being implemented to take advantage of this growing availability of information, AMI and smart grid technologies are becoming the principal source for acquiring important operating information on customer energy consumption, outage conditions, voltage and power quality issues, circuit loading and other key characteristics affecting network operation. AMI and the smart grid are increasingly becoming the heart and pulse of the intelligent utility.

**THE CENTRAL ROLE OF AMI**

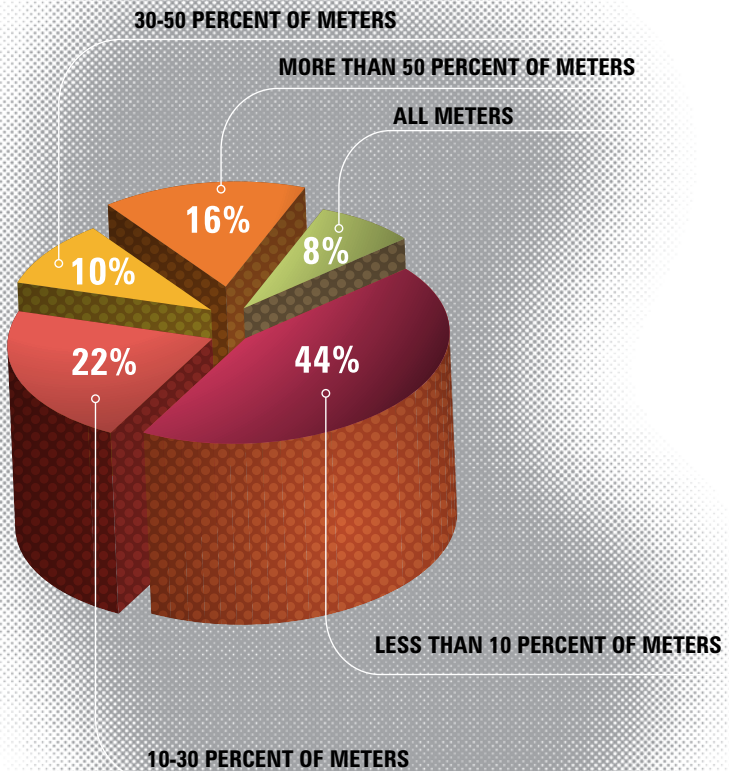
Although the term smart grid covers a wide range of technologies, AMI is often described as the foundation or enabling technology for many technologies comprising the intelligent utility. At the heart of most AMI systems is the use of a two-way standards-based communications system connecting customer meters with the utility's enterprise-level data management systems. Since AMI vendors have been working for years on solutions to communicate with large numbers of smart meters (think millions) for advanced metering purposes, it is not surprising that

utilities have begun to look to their AMI solutions to supply the communications infrastructure needed to support operation of remote network devices such as switches, reclosers, line sensors and capacitor banks.

Cooper Power Systems, for example, has signed an agreement with Sensus Metering to license its FlexNet communications technology for transmission and distribution applications. This agreement will permit Cooper to use the FlexNet licensed frequency band for switching operations while the FlexNet system provides the necessary meter data collection functions. And S&C Electric has begun integrating its IntelliTEAM Automatic Restoration System with Silver Spring Network's Smart Energy Network to provide distributed, fault-tolerant communications over the SSN network to conduct remote switching operations. These and other similar arrangements underscore the potential for utilities to leverage one communications network for combined network operations using open standards and protocols that support a wide range of AMI, distribution network and substation automation functions.

So in a real sense, the many years of AMI development have provided a foundation for what will likely be a much more rapid adoption of smart grid technologies and home area networking solutions that will be needed to improve utility operations and help address projected electric capacity shortages over the next

**FIGURE 1: IOUs reading meters remotely**



Source: Sierra Energy Group, a division of Energy Central

10 to 15 years. Utilities will increasingly rely on an AMI-supported intelligent utility to accommodate the growing and often conflicting demands of customers, regulators and shareholders for improved reliability, operating efficiency and customer service.

### INCREASED AMI DEPLOYMENT

If AMI is expected to play such an important role in future smart grid deployment, what is the state of AMI implementation in North America today? Recent research conducted by Sierra Energy Group points to an increasing number of utilities that are studying, piloting or installing AMI solutions. *Figure 1* provides some insight into the level of AMI penetration that exists in the investor-owned utility (IOU) sector according to a recent survey.

As *Figure 1* indicates, fewer than 25 percent of the surveyed IOUs have 50 percent or greater penetration of automated meters. This is partly attributable to the use of multi-year implementation schedules and extensive reliance on pilot deployments as prerequisites for AMI technology selection. In the next few years, this percentage should substantially increase as a number of large, full system deployments at utilities such as Pacific Gas & Electric, Southern California Edison, Southern Company and Portland General Electric to name a few, begin to make significant progress with their installation programs.

A common theme among these upcoming large deployments is their choice of AMI vendors such as Sensus, Silver Spring Networks and Itron's OpenWay that offer scalable, interoperable solutions capable of accommodating other smart grid technologies. It is clear from their selections that utilities have become aware of the potential that AMI holds for integration with the smart grid, as they are increasingly making open metering and communications standards an important requirement when preparing vendor RFPs.

Leveraging the capabilities of a single communications network is also being looked at by many utilities as a way to implement new smart grid technologies while spreading out a major component of AMI operating cost across many operating departments. As the number of utilities with less than 10 percent AMI penetration decreases, and as their AMI selections become known, it is likely that the trend toward open standards-based solutions using a common communications network will become even more apparent.

### DRIVING OTHER ENTERPRISE SOLUTIONS

While AMI and smart grid systems are receiving much attention, other enterprise solutions being implemented will continue to require their share of increasingly scarce capital dollars. Sierra Energy Group has conducted extensive

research into the relative importance of AMI and smart grid solutions among a wide range of other intelligent utility solutions. AMI/smart grid technologies, which include SCADA, substation and distribution automation, and outage management rank very high among IOU initiatives.

As utilities continue to develop integrated resource plans (IRP) and grapple with regulations requiring increased use of renewable energy sources, new energy efficiency and demand response programs are being developed that will require significant customer participation to achieve desired results. Many of the enterprise solutions highlighted in the Sierra Energy Group research are designed to improve operational efficiency and increase network reliability. However, AMI is increasingly being seen as a technology that can support energy efficiency and demand response programs by providing the advanced metering and communications necessary for load control and time-differentiated rates.

The interval meter data and two-way communications features provided by AMI systems support a growing number of customer-centric energy management functions that will create a new relationship between utilities and their customers. Home area networks (HAN) that integrate AMI with customer equipment over ZigBee, HomePlug and other network protocols are expected to play a prominent role in reducing energy use in the future. Time-based energy rates, thermostat controls, home energy displays and other energy-saving devices supported through HAN will increase the customers' ability to control their energy consumption while helping utilities to shift peak system demand. Utilities' reliance on these shared benefits to achieve their IRP goals will change the relationship between utilities and their customers forever.

### INCREASING CUSTOMER ROLE IN THE INTELLIGENT UTILITY

The growing importance of customer energy management programs will change the utility/customer relationship by acknowledging a shared responsibility for meeting the nation's energy needs in the future. As states like Ohio, Michigan and California adopt renewables targets that require utilities to become increasingly more reliant on customer energy efficiency and demand response programs, customer participation in these programs is essential and cannot be taken for granted. Therefore, utilities must change their historic go-it-alone culture in favor of a more collaborative management philosophy that recognizes the important role of customers in meeting their energy objectives. ■

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