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Electric Energy T&D MAGAZINE

SEPTEMBER-OCTOBER 2008 Issue 5 • Volume 12

In this Issue

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2020 N. Central Avenue
Suite 200, Phoenix, AZ 85004

Publisher:
Steven Desrochers: steven@electricenergyonline.com

Editor:
Gordon McCormick: gordon@jaguar-media.com

Automation/IT Editor:
Mike Marullo: mam@electricenergyonline.com

Account Executive:
Donna Williams: donna@electricenergyonline.com

Advertising Sales Manager:
Jimmy Desjardins: jimmy@electricenergyonline.com

Circulation Manager:
Janet Guay: janet@jaguar-media.com

Art Designers:
Anick Langlois: alanglois@jaguar-media.com
Tarah McCormick: tarah@jaguar-media.com

Internet Programmers:
Johanne Labonte: jlabonte@jaguar-media.com
Sebastien Knap: sknap@jaguar-media.com

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1160 Levis, Suite 100, Terrebonne, QC Canada J6W 5S6
Tel.: (888) 332-3749 • Fax: (888) 243-4562
E-mail: jaguar@jaguar-media.com
Web: www.electricenergyonline.com

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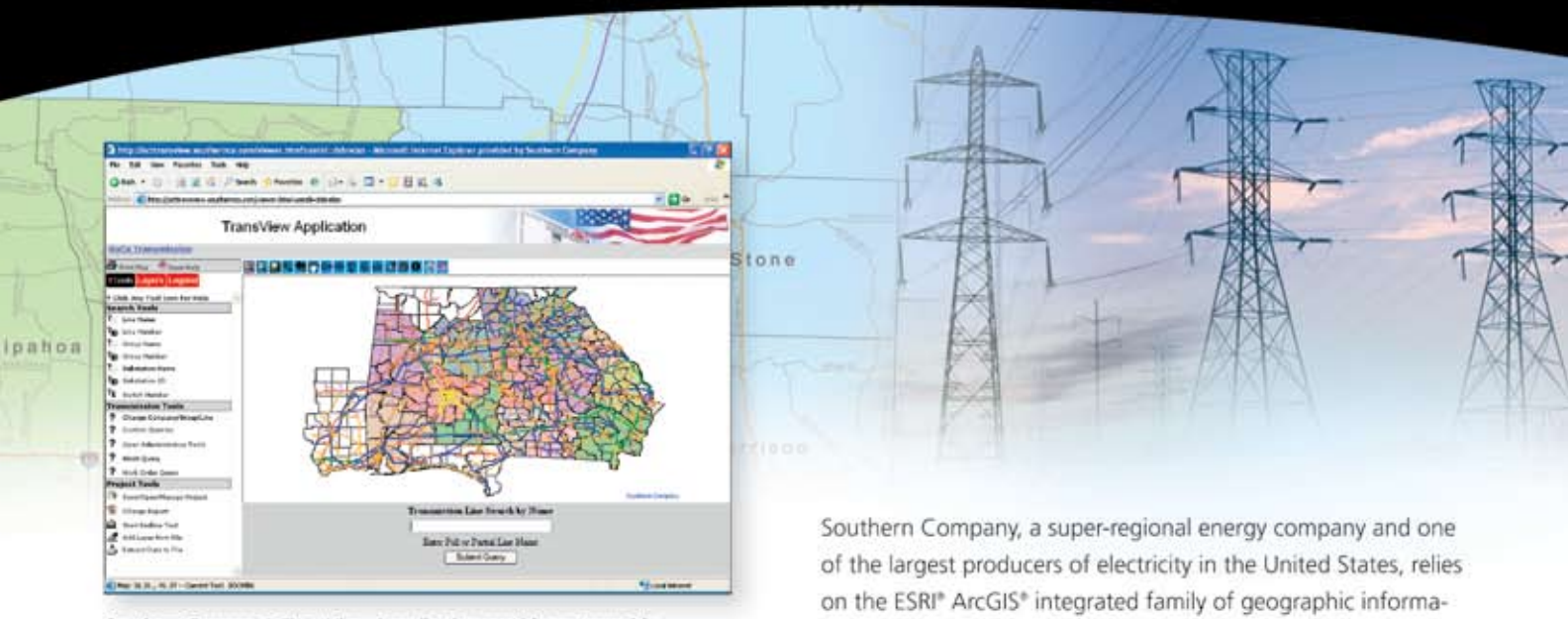
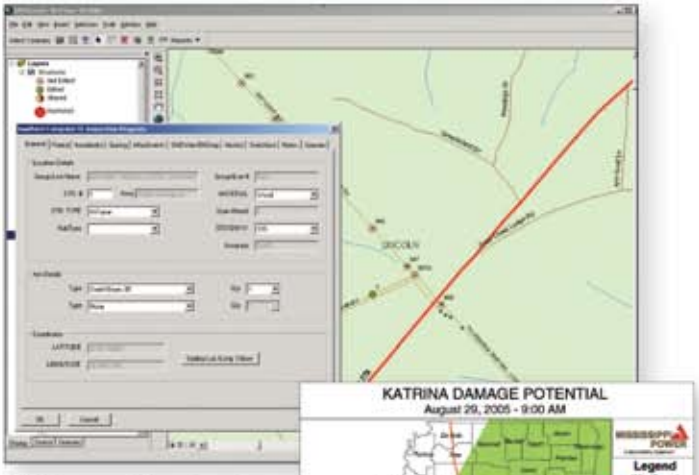
Electric Energy T&D MAGAZINE

IN THIS ISSUE

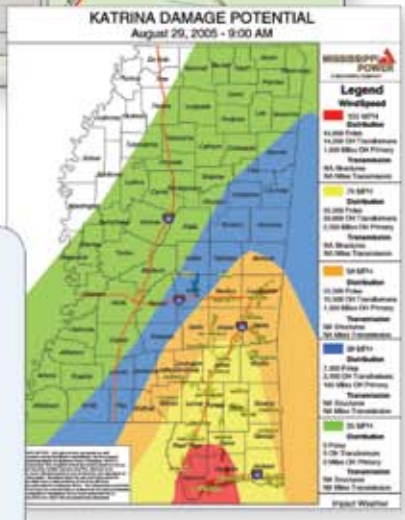
ESRI Helps Southern Company Gain the Geographic Advantage Across the Enterprise



Southern Company's TransView Appplication provides systemwide query and work design for all five operating companies.



GIS shows specific poles, wires, and materials inspection data.



Mississippi Power easily manages important data such as Hurricane Katrina's damage potential in their service territory.

"We used ESRI ArcGIS extensively during the storm. I cannot imagine being able to coordinate the more than 9,000 people we had working without using ArcGIS. We were able to put our staff to work efficiently and provide management-level data virtually on the fly."

Louis H. Occhi,
Mississippi Power

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All four operating companies of Southern Company—Alabama Power, Georgia Power, Gulf Power, and Mississippi Power—use ArcGIS across the enterprise for analysis, visualization, and decision support to improve customer service, cost containment, and profitability. The information is accessible in the office, on the Internet, and in the field.

ESRI's family of ArcGIS software provides Southern Company with the geographic advantage to

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By Michael A. Marullo, Contributing Editor

Sounds like a plan…

The other day I was thinking about high fuel prices – imagine that! Anyway, I got to wondering where this unprecedented run-up of prices was eventually all going and what the end result might be. Will it spell the end of America's longstanding position as a world economic power? Will we all have to just stay home and only drive for absolute necessities, meaning that most vehicles on the highway of the future will be police cars, fire trucks and ambulances? Is there a huge comeback of bicycles on the horizon?

Then, somewhat predictably I suppose, my train of thought shifted to the power industry. Will nuclear power continue its increasingly apparent resurgence, or will the naysayers eventually force us back to a coal-fired future, since that is our most abundant and readily accessible energy resource? And what about all the people up North where they depend on heating oil to keep from freezing in the wintertime? Are they destined to freeze? Or, will all of my friends and relatives eventually decide to come live with me in New Orleans – hurricanes, heat and humidity notwithstanding? (Originally being from Upstate New York, I have a special empathy for their plight, but there are limits!)

After briefly considering the horrifying eventuality of my extended family and friends in sleeping bags in my kitchen, living room, garage and on the lawn, I quickly came back around to reality. That reality is: We are in one hell of a mess from an energy standpoint!

Indeed, with most of our oil coming from countries populated in part by various factions of dislike, distrust or downright hatred of us and/or our way of life, we have a problem that is not being diminished (and which many would argue is only being exacerbated) by our recent political and economic posture. Moreover, very little is being done – at least on the surface – to mitigate the situation anytime soon. It remains to be seen whether or not the incoming president and the accompanying administration will (can?) alter the status quo on those fronts within any reasonable time frame.

With all of these distressing and disconcerting thoughts filling my brain, it occurred to me that somebody, somewhere was probably trying to figure out what we should do. (Or at least, so one would hope!) Then I thought to myself…. Gee, what if I were that person? What if one day someone just walked up to me and said, "Okay, Mike; you need to come up with a plan for getting us out of this mess we're in! And, by the way, you have to do it without destroying the country or the economy or systematically killing off a bunch of people as part of the solution." Well, now that certainly makes things as lot more challenging, doesn't it?

Okay, so one choice might be to tax oil imports at a level that would make domestic sources and alternative energy sources look like a bargain by comparison. However, since we probably don't have the domestic capacity to bring those alternatives up to speed in the kind of expedited time frame that would be necessary to avert a catastrophe, one immediate result would be a huge revenue windfall for the government, at least in the near term. I don't know about you, but my present level of faith that any bureaucracy like ours would invest that kind of unexpected treasure-trove in our future energy independence – assuming they even know how to do that – is currently at an all time low.

Or, perhaps we could just outlaw imported oil and see what happens. We could simply go cold turkey on OPEC crude, and let the market find whatever alternatives are available, whether that be wind, solar, oil sands, natural gas, ethanol, nuclear or perhaps something we haven't necessarily even seen yet. More likely, however, would be some combination of these coupled with some pretty radical conservation and renewable measures. But alas, there's a glitch: We said that destroying the economy wasn't on the list of remedial options. It simply isn't reasonable to think that any industry the size of the vast energy complex could react fast enough to avert almost certain destruction.

Indeed, what would happen to oil companies if they suddenly couldn't get enough oil to maintain their operations and alternative energy displaced them – the oil companies, that is – before they could either switch to other sources or heavily diversify into alternative energy or some other kind of profitable business? What would happen is that we'd have an economic meltdown on our hands in short order, which is, of course, not an acceptable outcome.

So, here we are faced with this huge dilemma with no obviously good options. But, consider this scenario…

First, we allow the futures traders to run up the cost of a barrel of oil based on

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a bunch of thinly plausible "What if" scenarios over a relatively short period and simultaneously get people used to paying the kind of money for energy that people in most other countries have been paying for a long time already. Then, we let the oil companies keep their obscene profits from the artificially high prices so that they have the cushion they'll need to make what still adds up to a very painful transition, but one that will inevitably happen anyway when oil eventually runs out. (And it's not like it would be the first time that taxpayers financed a bailout for an industry whose survival was deemed vital to our economic stability, right?)

Then, there's also the automotive industry and its entire appurtenant support infrastructure – another important pillar of our economy. Why would Detroit ever voluntarily start making vehicles that are smaller, sell for less money and get dramatically better fuel economy? History has shown us that there is ONE – and only one – reason, and that is when fuel prices reach a level that most consumers consider too much to pay; the pain point where we become willing to trade off luxury, utility and perhaps even a little comfort, for economy. This isn't just my opinion; it's a fact: "Money talks, and…" well, you know the rest of the cliché.

Fast forward to now. Never before has energy cost so much and affected virtually every aspect of our lives in such pervasive – and increasingly problematic – ways. And although the government is fond of defining so called "core inflation" as being exclusive of food and energy, what rocket scientist decided that what's left is indicative of actual living costs? Been to the grocery store lately? Filled up your gas tank lately? Oh, wait, I forgot; inflation is under control if you don't count food and energy. Gosh, I feel so much better now!

The essence of what I'm trying to say here is this: If you had to find a way to get past our seemingly insatiable oil habit with the aforementioned restrictions in place, would YOU do?

A. Pass a tax to give the government a giant new pot full of your hard-earned money?

B. Swear off foreign oil entirely, and risk destroying our energy/industrial complex and the economy in one fell swoop?

C. Let the price of oil run up to the point of pain where people are willing – albeit screaming and kicking – to change their energy usage habits and behavior while giving the soon-to-be-reinvented oil and automotive industries a temporary cash cushion that will help them to weather the transition without collapsing and breaking the economy beyond repair?

When you think about it that way, choices A and B have some pretty obvious fatal flaws. But then there's option C… Hmm, sounds like a plan. ■

Behind the Byline

Mike Marullo has been actively involved in the automation, controls and instrumentation field for more than 35 years and is a widely published author of numerous technical articles, industry directories and market research reports. An independent consultant since 1984, he is President and Director of Research & Consulting for InfoNetrix LLC, a New Orleans-based market intelligence firm focused on Utility Automation and IT markets. Inquiries or comments about this column may be directed to Mike at MAM@InfoNetrix.com.

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FERC Approves ITC Midwest Cost Allocation Proposal for Transmission Network Upgrades for Generator Interconnections

Decision benefits renewable and other efficient new generation resources

Cedar Rapids, Iowa, Aug. 8, 2008 – In a decision that will reduce impediments for wind energy development in Iowa and Minnesota, the Federal Energy Regulatory Commission (FERC) has approved a cost allocation proposal from ITC Midwest LLC (ITC Midwest) for connecting generators to the electric grid. The decision makes it easier and reduces a cost barrier for generators -- including wind energy developers -- to connect to the high-voltage electric transmission system operated by ITC Midwest in Iowa and Minnesota.

In a joint application made with the Midwest Independent Transmission System Operator, Inc. (Midwest ISO) on April 4, 2008, ITC Midwest proposed that it provide 100 percent repayment to generators for the network upgrades needed to reliably interconnect the generators to the ITC Midwest transmission system. Connection to the grid is necessary for generators to sell energy to customers located on the system. Previously, generators interconnecting to the ITC Midwest system were required to ultimately bear half the costs of most network upgrades along with other costs of interconnection. Under the newly-approved policy, generators will be fully reimbursed for the costs of network upgrades necessary to enable their interconnection with the ITC Midwest system, provided the generators meet certain eligibility requirements.

FERC approved the application on August 7, 2008, giving it an effective date of December 20, 2007. That is the date that ITC Midwest acquired the electric transmission system from Alliant Energy's Interstate Power and Light Co. subsidiary.

"We are very pleased with the decision and FERC's continued support of competitive open markets," said Doug Collins, ITC Midwest executive director. "The decision is consistent with FERC's direction to invest in the nation's electric transmission system to improve reliability and encourage open access to the grid. Given our strong wind profile in Minnesota and Iowa, this decision further encourages development of renewable electricity sources in the ITC Midwest service area."

The decision can be found in FERC Docket No. ER08-796-000 and ER08-796-001 and can be accessed at FERC's website at *http://www.ferc.gov/*.

For more information, please visit: *http://www.itc-holdings.com/*.

Circle 32 on Reader Service Card

Eka Systems and Landis+Gyr Announce Partnership

AMI –enabled FOCUSTMMeters Deploying in City of San Marcos Smart Network

Germantown, MD, August 12, 2008 – Eka Systems, a global provider of Smart Grid solutions and Advanced Metering Infrastructure (AMI) for electric, gas and water utilities, today announced an agreement with Landis+Gyr to integrate its AMI residential FOCUSTM meter with the EkaNetTM Smart Network AMI solution. Under the terms of the agreement, the companies have addressed the technical, functional, and solution delivery required for utilities to deploy a true mesh, fully supported Smart Network Advanced Metering Infrastructure (AMI) solution.

"With a focus on customer satisfaction, we are committed to providing an advanced AMI solution in terms of capability, technology and affordability," said Steve Schamber, Director Product Management – Landis+Gyr. "By uniting our metering expertise with Eka Systems' technology, we are providing utilities like the City of San Marcos with smart AMI metering solutions that cover all their residential needs."

The FOCUS family of metering products provides the utility industry with a reliable, quality, solid state meter platform that

easily adapts to various AMI technologies. The FOCUS AX and AX-SD meters provide Demand, TOU, and Load Profile information. The FOCUS AX-SD also offers remote connect/disconnect features.

FOCUS™ is a registered trademark of Landis+Gyr, Inc. Smart Networks. Smart Grid.™ and EkaNet™ are trademarks of Eka Systems, Inc.

"We're excited to be partnering with Landis+Gyr. Combining their FOCUS residential meters with our scalable EkaNet AMI infrastructure capabilities will deliver a new level of performance for utilities seeking smart energy solutions," said Chris Irwin, Director of Products at Eka Systems. "Both our companies are driven by strong customer need to prepare for the future and this agreement is in line with our strategy to offer a broad variety of flexible, Smart Network, Smart GridTM solutions to utilities and the end users."

EkaNet Smart Networks provide true, scalable mesh networking of meters and other Smart Grid devices in support of Distribution Automation, Demand Response, Distributed Generation and more, all with the most innovative networking technologies available.

For more information, please visit *www.ekasystems.com*.

For more information about Landis+Gyr Inc., please visit the corporate website at *www.landisgyr.com*.

Circle 33 on Reader Service Card

Hastings Offers Retractable Truck Grounding Reels

Hastings, Mich., Aug. 12, 2008 – Hastings--worldwide manufacturer of hotline tools and equipment--announces the launch of a new spring-retractable truck grounding reel.

Hastings's state-of-the-art truck grounding reels offer a safe and efficient means to ground vehicles when working on or near energized electric lines. The reel features a bolt-down design for easy removal and transfer to new vehicles and durable steel construction allow for heavy field use. All ground reels are tested to guarantee maximum fault current rating.

Hastings grounding reels come with factory installed cables including six feet of ground cable to connect the reel to the truck. A spring rewind drum provides controlled cable payout from the vehicle to a suitable ground. Four way cable guide rollers allow for one man-operation and limits excessive wear on the ground cable.

Hastings offers two different models of ground reels with varying cable lengths to help meet OSHA requirements for vehicle grounding.

For more product information, visit *www.hfgp.com/request_catalog.htm* and enter "truck grounding reel" in the comments field.

Circle 34 on Reader Service Card

UISOL To Implement Next Generation Demand Response Management Application for PJM

Lafayette, CA, August 14, 2008 – Utility Integration Solutions, Inc. (UISOL), the utility industry business integration specialist, announced today that it has entered an agreement to implement a next-generation demand response application for PJM Interconnection (PJM). PJM ensures reliable operation of the high voltage power system that serves more than 51 million people across a 13 state region and the District of Columbia.

PJM currently manages its demand-side response (DSR) programs with an internally developed application – LoadResponse. PJM's DSR activity dates back to 1992 and was significantly expanded with new tariff language in 2006. Working with its stakeholders over the past several years, PJM has evolved market rules to remove barriers to entry for demand-side resources and improve the operational efficiency of DSR in the PJM wholesale markets.

To support the expansion of its DSR programs, PJM will implement a new demand response system based on the Demand Response Business Network (DRBizNet) solution from Utility Integration Solutions, Inc. (UISOL) to replace the LoadResponse application.

The level of PJM DSR activity and the associated opportunities in the various PJM wholesale markets has significantly grown over time. Recent and future market changes will require ongoing DSR system application enhancements. The UISOL project is designed to implement a flexible and robust system to serve PJM DSR stakeholders for the future.

UISOL and its principals built DRBizNet from over a decade of R&D focused on building the future infrastructure for management of demand response resources. In 2006 UISOL successfully demonstrated DRBizNet in California during a field simulation project

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funded by the California Energy Commission (CEC) and managed by the California Institute for Energy Efficiency (CIEE).

California DR market participants who took part in the project included the California ISO, Pacific Gas and Electric, San Diego Gas and Electric, Southern California Edison, and a several representative commercial and residential customers and DR service providers.

UISOL CEO Ali Vojdani concluded. "We're particularly excited about partnering with PJM since they are a world leader in demand response. PJM have recognized the value available from the deployment of a dynamic and flexible DR management system. We look forward to showcasing our solution in the most sophisticated market setting in the world and to leading the DR infrastructure marketplace in partnership with PJM. "

For more information, visit *www.uisol.com*

Circle 35 on Reader Service Card

Federal Government drops on Canadian Energy Efficiency Alliance Energy Efficiency 'Report Card'

Ontario and British Columbia make the most progress in improving overall energy efficiency

Ottawa, ON, August 12, 2008 – On August 12, the Canadian Energy Efficiency Alliance (CEEA) released their National Energy Efficiency Report Card and analysis of the federal, provincial and territorial governments.

"We're pleased that all jurisdictions received passing grades and remain optimistic that the Federal government is beginning to move in the right direction," said Ken Elsey, President of the Canadian Energy Efficiency Alliance. "With a majority of Canadians expecting a more aggressive approach toward energy efficiency technologies and solutions, I remain confident that Ottawa will recognize the value and necessity in supporting energy efficiency in time for the next report card."

Canadian Energy Efficiency Alliance

National Energy Efficiency Report Card on Government Activities

Jurisdiction	Grades 2007	2005	2004	2002	2001	2000	1999
British Columbia	A+	B	B	B	B-	C-	N/A
Manitoba	A+	A	A	B-	C-	C+	C+
Quebec	A	B	B+	A-	A-	B+	B-
Ontario	A	B+	C-	C	D+	C+	C
Saskatchewan	B+	B-	C	D	F	F	D-
Northwest Territories	B+	C	N/A	A-	B+	C+	C
Nova Scotia	B+	B-	B	B	B-	C	B+
Federal Government	B	A	A-	A-	B+	B	B+
New Brunswick	B-	C+	B+	B	B	B-	C-
Yukon	B-	B+	A-	A	A-	A-	C-
Nunavut	C	D	D-	N/A	N/A	N/A	N/A
Newfoundland & Labrador	D+	D	F	D	D+	C	C+
Alberta	D+	D+	D+	C+	C-	C	D
PEI	D	C+	B-	C	C	D	D

The National Energy Efficiency Report Card is completed every two years and scores 14 Canadian jurisdictions on 9 parameters, including how the jurisdiction supported activities such as energy efficiency and public outreach, the existence of public/private partnerships to support energy efficiency and responsiveness to energy efficiency issues in key legislation, such as building codes and energy efficiency acts. The report also examined whether the government led by example and how it regulated the energy market.

This year's highlights include British Columbia, which went from a B+ in 2005 to an A+ in 2007, Ontario from a B+ to an A and the Northwest Territories from a C to a B+.

The evaluation for the report card is done within parameters that continue to evolve as energy market conditions in Canada fluctuate, said Elsey.

"Due to the unpredictability of energy prices and the difficulties associated with supply, many energy efficiency initiatives have spurred the adoption of new policy and regulations among the provinces and territories. Hopefully, governments will soon see the benefit in being more proactive and less reactive when dealing with energy issues."

For more information, please visit *www.energyefficiency.org*

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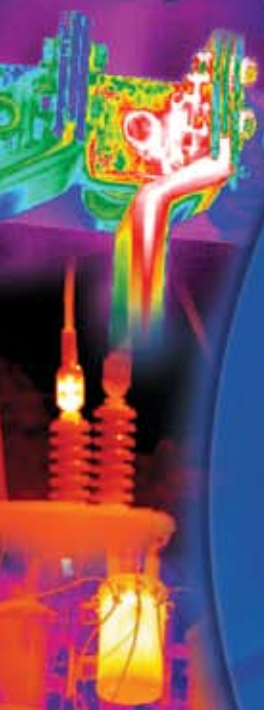

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Since we've had our infrared program in place, the savings have run well into the millions of dollars."

Barry Bowman
Sumter Electric

"FLIR cameras are durable and dependable. It is a cornerstone of our PDM program. Our FLIR cameras pay for themselves each and every month, and the service and support is just top notch and always helpful."

Scott Alford
Predictive Maintenance Coordinator
Arizona Public Service

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Whitewater Valley Selects Tantalus for Smart Grid Communications Network

Vancouver, BC Canada – August 13, 2008– Tantalus announces that Whitewater Valley REMC has selected TUNet® – the Tantalus Utility Network – as the communications network for its advanced metering program and a full range of Smart Grid applications.

Whitewater Valley, which provides electricity to 12,000 meters in eastern Indiana, chose TUNet for full deployment after a rigorous field trial that involved placing TUNet-equipped meters in the Cooperative's toughest and most remote terrain in order to test the performance of Tantalus's two-way, real-time communications network.

"TUNet provides a highly flexible solution that gives us the right combination of functionality, deployment flexibility, and cost effectiveness," said Boyd Huff, the Cooperative's general manager. "We can implement a communications system that meets our core AMI application requirements today – interval meter reading, outage detection, remote disconnect & reconnect, and real-time power quality monitoring – and leverage this network for other Smart Grid applications like demand response or distribution automation as policy and operational needs evolve our business."

"The range and robustness of the TUNet WAN is a key reason for choosing Tantalus," added Huff. "The 220 MHz radio signal provides the coverage and capacity we need to extend command and control functionality to the farthest corners of our service territory, and do so in a very quick and economical manner." TUNet also offers additional Wide Area Network options including wired or wireless broadband technologies like Fiber, WiFi, WiMAX or GSM.

Targeting remote farms and rural communities was Whitewater Valley's first priority. An "outside in" deployment strategy enables the co-op to eliminate high-cost reading routes as well as instantly detect outages, an ever-present threat in a region where the storm season spans late fall through to early spring. Huff added that this approach is paying off in fewer truck rolls, faster repairs and customer service response, and safer working conditions for staff.

"Electric co-ops are pioneering effective use of AMI technology through innovative deployment strategies and by discovering new ways to use the data made available through advanced metering," said Eric Murray, President of Tantalus. " Whitewater Valley realizes how important it is to select a communications system that addresses much more than advanced metering – one that allows it to capture benefits early on in the process and provides a platform on which to evolve into full Smart Grid functionality."

For more information, please visit *www.tantalus.com*

Circle 37 on Reader Service Card

Responder OMS in Production at Gainesville Regional Utilities (GRU)

ArcFM™-based outage management system supports electric service dispatch staff, maintenance managers of large Florida multi-utility

Madrid, August 1, 2008 – Telvent, the IT company for a sustainable and secure world, announced today that Gainesville Regional Utilities (GRU) in Florida has completed the conversion from its legacy OMS (outage management system) to Responder, the OMS extension of ArcFM™ Enterprise GIS Solution developed by Telvent Miner & Miner. Implementation of Responder began on July 1, 2008, after a period of parallel operation with the legacy system and successful performance in simulation challenge.

Community-owned GRU is a multi-service utility providing electric, natural gas, water, wastewater, and telecommunications services to the City of Gainesville and surrounding unincorporated areas. As the 5th largest municipal electric utility in the state of Florida, it serves nearly 90,000 electric customers alone. Responder is now used daily by GRU's electric service dispatch staff, including the system operators responsible for equipment and switching and the operations assistants who interface with customers. The service's construction maintenance managers also interface with Responder, via VPN (virtual private network) connecting laptop PCs to office desktops, to track dispatched crew activity.

Since 2001, GRU – the most comprehensive utility service provider in the state – has taken advantage of its comprehensive ArcFM geodatabase to streamline mapping functions for all of its utilities. Now, with the implementation of Responder, GRU's electric service integrates mapping data with outage management and eliminates the routine and time-consuming data importation that was necessary with the non-integrated legacy OMS. GRU also leverages its open-architecture ArcFM GIS with the implementation of Designer, to support cost estimating and compatible units and make work order design and GIS posting more streamlined, consistent, and accurate.

For more information, *visit www.telvent.com*

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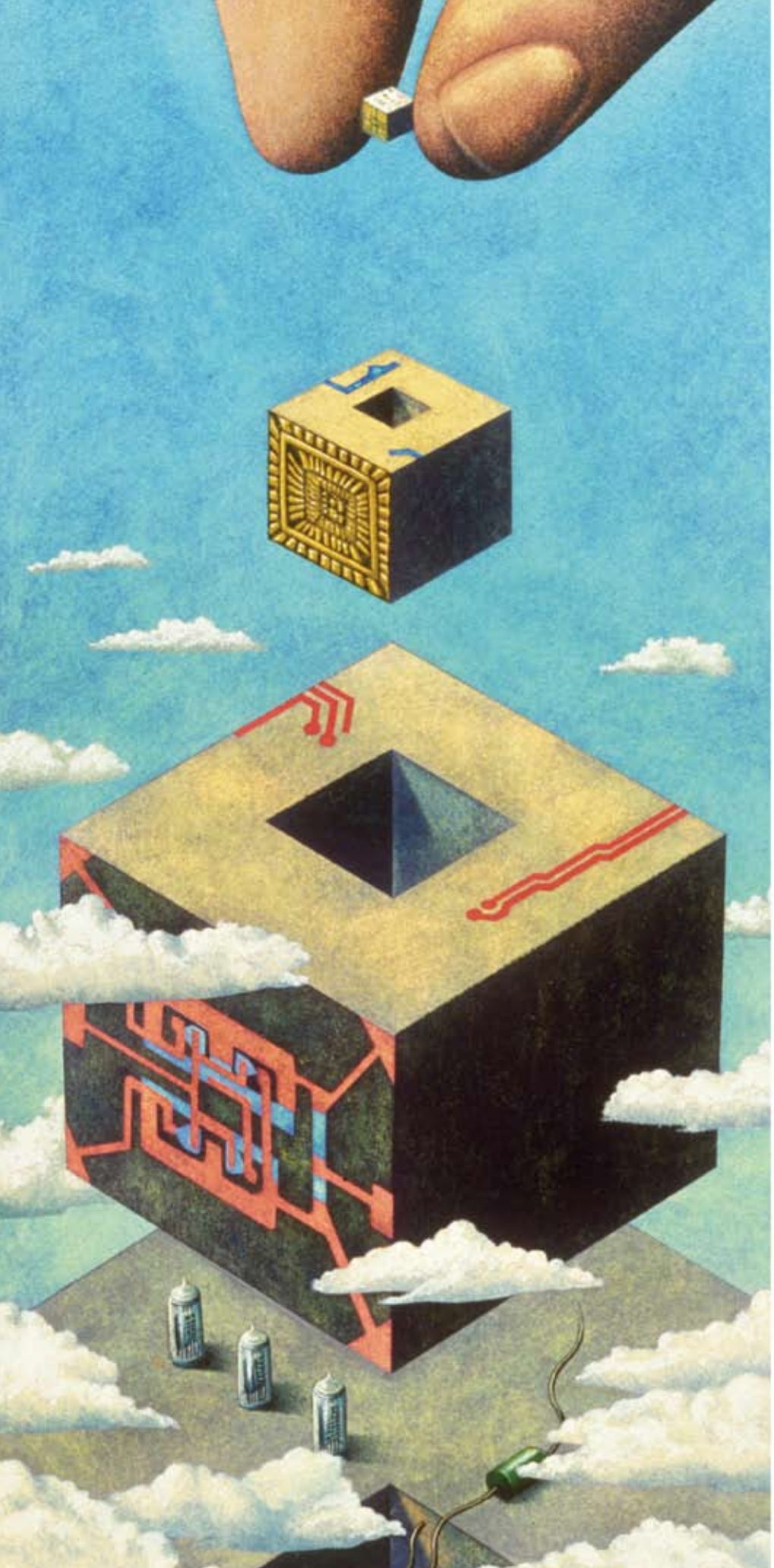

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Radio-Based AMI and Outage Management:
What is Best for You?

By Raymond Kelley and Ron D. Pate
Elster

More than ever, utilities are focusing on distribution system reliability, including outage management and the utility's responsiveness during outage situations. As utilities plan for deployment of advanced metering infrastructure (AMI), outage management benefits often appear as key business drivers behind their investment.

Today, nearly all major AMI systems offer some level of outage management support. Still, not all AMI systems use the same technology, meaning system features differ. When evaluating an AMI system's ability to support a utility's outage management initiatives, there are a number of factors to consider.

Outage 101

First, AMI is an outage management tool, not to be confused with an outage management system (OMS). AMI *supports* the outage management system.

While the AMI system understands the AMI network layout, the OMS typically knows the distribution system model. This includes detailed information on distribution system devices, such as transformers and protective devices including fuses and reclosers. Both systems typically use the same source for device location specifics, the utility's graphical information system (GIS).

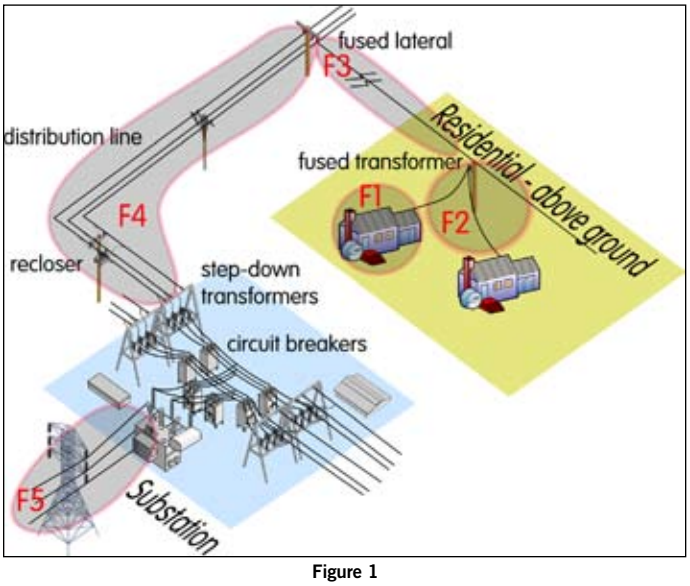

Figure 1

When an outage occurs, the utility wants to quickly figure out what caused it and where to send crews to fix affected equipment so it can quickly restore power to customers. A fault on a line, a typical source of power outage, will cause protective devices ahead of the fault to operate, thus avoiding equipment damage from high fault currents. The OMS is mainly concerned with mapping outage notifications to the distribution network model to infer which protective devices have opened. With this knowledge, the utility can quickly determine the extent of the outage because it knows power downstream of these protective devices has been interrupted.

Figure 1 shows a typical radial distribution circuit and possible fault locations. Outlined below are the clearing mechanism and customer impact.

Fault at F1:

The fault is in the customer's premise, and is cleared by an in-home circuit breaker or main fuse. Only one customer is affected.

Fault at F2:

The fault is on the distribution line between a fused transformer and several customers' premises, and would be cleared by the transformer fuse.

Fault at F3:

The fault is on the distribution-system lateral, and is cleared by a fuse for that lateral line. A hundred or more customers may be affected.

Fault at F4:

The fault is on the distribution line, and would be cleared by a line recloser or station circuit breaker with reclosing relay. Several hundred customers may be affected.

Fault at F5:

The fault is on the transmission line, and would be cleared by a station circuit breaker. More than a thousand customers may be affected.

The value provided by the AMI network varies, depending on the location of the fault in the system. AMI networks offer particularly high value with isolated faults, such as those at F1 and F2. These smaller outages may occur when no one is home to report the outage. Many AMI systems offer endpoints with a "last gasp" transmission capability to tell the utility that the endpoints have lost power. This last-gasp transmission serves as a surrogate for the customer's call, often allowing the problem to be fixed before the customer even becomes aware of the outage. AMI systems also work well in helping the OMS and dispatcher understand and efficiently respond to widespread outage conditions, such as those that would be seen with faults at F3, F4 or F5.

Prior to AMI, an OMS often couldn't see the meter endpoint, the last device on the system before power hits the customer's outlets. Most utilities could only see if power was flowing to devices installed at substations, which is where communication networks for most SCADA systems end.

Beyond that, dispatchers had to wait for customers to call in outage notifications in order to determine the extent of the outage and the location of the cause of the outage. Without AMI, as much as 90 percent of notifications in a large outage may come from call-ins. With AMI, the metering endpoints become a valuable, perhaps even prevalent, additional source of outage notifications feeding into the OMS.

Typically, metering endpoint last-gasp messages are transmitted over the same communications channels used for sending metering data to the utility. These channels include a local area network (LAN) — such as a mesh radio network — that carries information to a data collector, also known as a concentrator or gateway. The collector then links back to the AMI head-end system, which is integrated with the OMS via a wide area network (WAN) such as cellular. The last-gasp messages help the OMS to identify which section of the line is faulted and which protective device has operated.

Just as important to the utility as outage notifications, if not more so, is notification of power restoration, and the ability to verify power restoration to endpoints. The restoration notifications help dispatchers verify that customers in the area are back in service. That way, dispatchers can efficiently manage work crews without having to send them back to a restored area because an isolated outage was missed. Systems that support automatic acknowledgement of restoration messages before reporting a restoration are best, as they help avoid false reports when power returns but quickly goes out again.

AMI systems typically allow the utility to "ping" the meter, thereby verifying whether it's energized. Not only does this allow dispatchers to poll meters and verify restoration strategically, it also eliminates false-outage truck rolls when the outage is really inside the customer premise. According to the late AMI consultant Ed Malemezian, some utilities say that as many as 40 percent of power-out customer calls are

due to problems on the customer's side of the meter. When utilities can ping the meter, they can quit wasting resources on unnecessary trouble calls.

RF-Based AMI Technologies

Recently, RF-based AMI technologies have gained significantly in popularity. The two dominant types of radio AMI networks are mesh networks and tower-based systems. Most field-proven systems use 900 MHz range frequencies for LAN communications. A variety of technologies are in use for communicating with head-end systems over the WAN. Radio signal penetration and propagation are important concerns for the LAN; communications flexibility and adaptability are key concerns for the WAN. In both mesh and tower systems, metering endpoints communicate with collectors and the collectors, in turn, communicate with the AMI head-end system.

Tower-based systems typically use data collectors mounted atop high towers or buildings establishing a direct point-to-point connection to endpoints. Sometimes these systems use supplementary repeaters when certain endpoints cannot "see" the tower. As some tower systems evolved from older one-way technology, they may, depending on the particular system, use endpoints that "bubble" up data, with special algorithms implemented for certain two-way functionality. Tower systems typically use higher power radios than mesh systems and so they often use licensed frequencies. This may result in collisions due to narrower communication bandwidths. As a result it may be difficult to get immediate notification from all reporting endpoints during large-scale outage and restoration conditions through to the head-end. Strategic pinging of meters to confirm power restoration can be done with a direct collector to endpoint communication.

Mesh systems use collectors mounted within the service territory, either in meter based forms or in standalone forms which may be mounted on poles or buildings. Each collector manages a network of endpoints that may have multiple levels of devices forming a mesh network below each collector. This network typically includes meters, repeaters and other devices. To get data through the network, some mesh AMI systems establish and maintain optimized communication paths to endpoints using periodic network polling algorithms. There are also systems that build out communication paths in real time as communications occur. Systems that build out communication paths in real time offer flexible communication paths, but the reliability and uncertain nature of the paths may not yield consistent results. Proactive systems that establish and maintain optimized communication paths are reliable, but the time to establish a new communication path may take longer than in an ad-hoc network. Some mesh networks provide the benefits of a proactive network for normal communications with the benefits of ad-hoc communications for outage reporting.

Outage and Restoration Notifications from Endpoints

A point of debate among utilities when considering an AMI system as an outage management tool is the number of endpoints that need to be heard. With AMI the amount of available devices to report outages is significantly increased from that previously available. Some utilities that adopted AMI early on found that having all devices report in during large scale outages could slow down the fault isolation process. Consequently, AMI system vendors began implementing "storm mode" where outage reporting was either turned off or limited when large outage events were expected to occur. Generally, the OMS wants to know when an outage has occurred for both small and large outages, but doesn't require every home to respond during a large outage in order to isolate the fault.

Both tower and mesh networks can typically get a large percentage of outage notifications back to the head-end system. With tower-based systems, the density of endpoints on the tower needs to be managed so that endpoint notifications don't create a bottleneck. With mesh systems, the ability to configure for multipath broadcast propagation may be important. In general, flexibility in how outage and report notifications are propagated to the head-end system is important as it allows the utility to limit outage notifications in large scale events without worry of false reports or losing the ability to accurately determine the extent of the outage. Due to the distributed architecture of mesh networks, they may inherently provide more configuration options for outage and restoration notification strategies than tower based systems.

When power to parts of the utility's distribution network is restored, there may still be devices in the area that are out, so knowing what is restored is essential. With tower-based systems, since restoration is generally done incrementally across the distribution network, bandwidth overloading is not as large of a concern as during outages. With mesh networks, considering that restoration messages can

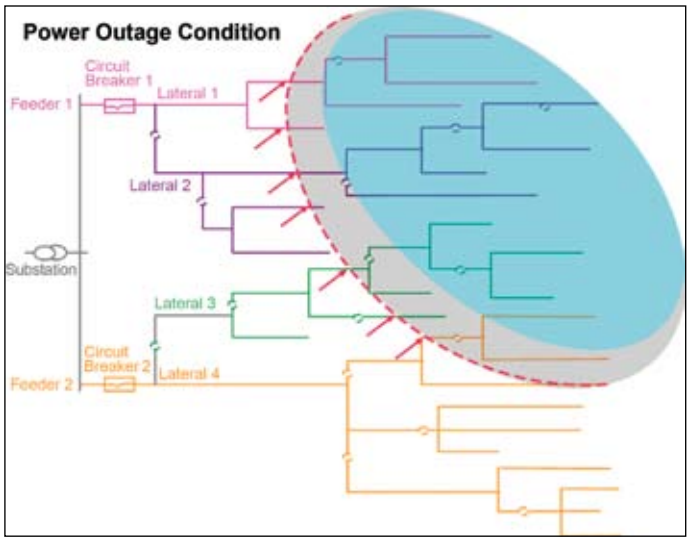

Figure 2: Ideally, an OMS identifies faults with as few notifications as possible so that it can focus on outage mapping, not notification reception. The OMS knows that anything beyond the area shaded in gray also is out of service. Consequently, meters in the gray area – near the outage boundaries – are the ones from which the OMS needs to receive outage notifications.

usually be heard well beyond the normally used communication paths, all restoration messages are also typically able to be processed. This is particularly true if the mesh supports routing of the reports through different network branches and if collectors are battery backed up so they can process reports even when power at the collector itself is still out.

Other Considerations

Other considerations when looking at AMI for outage management support include the following.

Battery back-up:

Battery back-up options can be important in larger scale outages where collectors are more likely to lose power. Leading edge systems may even support supplemental power sources for battery charging, such as solar power, which can be particularly beneficial in extended outages.

Programming flexibility:

Utilities have different outage strategies. Some may want to be notified of every momentary outage. Others may not want to be notified of an outage where the fault clears itself, allowing the recloser to eliminate the outage automatically. Or, a utility might want to wait for several devices to report in to get a better idea of the extent of the outage before forwarding messages from data collectors to the head-end system. To meet these and other strategies, smart grid enabled AMI systems provide configuration options in endpoints and data collectors, allowing utility managers to determine exactly how the AMI system will manage outage and restoration information.

Reliability Indices support:

When choosing an AMI technology, it is important that the technology be able to differentiate between momentary and sustained outages and to filter out momentaries so the OMS does not receive unnecessary outage reports. However, the system must keep track of these outages to allow the utility to calculate important reliability indices such as SAIFI, SAIDI and MAIFI. Advanced AMI endpoints store the information required to calculate these indices in the meter, ensuring that the data is always available and not dependent on system recognition of each event. Reliability indices are useful in categorizing system data to meet the specific needs of the utility on a feeder or system level. If a particular feeder is having problems with frequent interruptions, SAIFI could be most important. SAIDI may be more important where continuity of power is a high priority. MAIFI, which indicates momentary interruptions, can help identify potential areas for proactive asset investment.

Smart Grid or Advanced Grid Infrastructure (AGI) support:

Leading edge AMI systems allow integration of smart grid AGI devices into the AMI network. These include devices such as distribution feeder monitors and line fault current indicators (FCIs). Integrating these devices into the AMI network allows valuable additional information to flow into the OMS. This can be especially important when isolating faults and responding to larger scale outage events. Adding FCI information to the outage management process can enable utilities to narrow down possible fault locations, thereby reducing overall fault investigation time. AGI device information can also lead to greater system reliability allowing the utility to avoid some outages altogether via proactive O&M planning. Some examples include early detection and mitigation of potential vegetation overgrowth, excessive transformer loading, high VAR flow and phase load balancing.

Conclusion

AMI is revolutionizing utility outage management and system reliability strategies. With a well developed AMI and OMS integration, utilities can significantly improve outage responsiveness and workforce utilization during outage conditions. Additionally, AMI systems allowing the use of smart grid AGI devices offer unique opportunities to utilities for improving system reliability and avoiding outages from equipment failure and poor asset utilization. The value realized by properly leveraging the capabilities of well designed AMI systems for outage management support and system reliability initiatives allows utilities to improve their customer service while realizing impressive returns on investment and moves utilities ever closer to realization of the smart grid of the future. ■

About the Authors

Raymond Kelley *is the Vice President of Software Development responsible for the design and development of Elster Integrated Solutions' fixed network and mobile AMI solutions. Raymond joined Elster (formerly ABB) in 1992 as a system architect and lead developer for ABB's distribution and outage management systems. In 1996, he became the development manager for a group that designed and developed a large scale AMR Data Collection and Meter Data Management System. Raymond currently directs the development of Elster's EnergyAxis® MAS System, Route Manager System, and Meridian System. Raymond has 20 years experience in system architecture, design, and development of large scale data collection and control systems including 6 years at AT&T Bell Labs. He holds a B.S. in Electrical Engineering from The Citadel, and an M.S. in Computer Engineering from Clemson University. Raymond is a member of IEEE, Tau Beta Pi and has published several articles and holds multiple US and foreign patents within the AMR/AMI domain.*

Ron D. Pate *is the Sr. Product Manager responsible for the electrical meter based components of Elster's EnergyAxis AMI system. He is an electrical engineering honors graduate of North Carolina State University and has worked for Westinghouse, ABB, Ohio Transformer, Grand Eagle and Elster. He has worked with electric utilities extensively since joining Westinghouse in 1989 and has been involved in the engineering development and marketing of instrument transformers, power transformers, electricity meters, and metering systems.*

William T. Yeates

The 2008 Automation/IT Leadership Series

By Michael A. Marullo, Automation/IT Editor

Sensus Metering Systems

William T. Yeates, Vice President of AMI & Electric
H. Britton Sanderford Jr., Chief Technology Officer

H. Britton Sanderford Jr.

Besides being the world's largest supplier of water meters, Sensus Metering Systems (Raleigh, NC) has long been a dominant force in Advanced Metering Infrastructure (AMI), Automatic Meter Reading (AMR) and other dimensions of the metering business for electric, gas and water utilities globally. However, for many years after being spun off from a large conglomerate, the Company's posture was appropriately cautious when it came to the selection of an advanced metering technology; that is, until its 2006 acquisition of Advanced Metering Data Systems[1] (AMDS). Following a cooperative business relationship between Sensus and AMDS inked shortly after the founding of AMDS in 2002, the merger brought an expanded technology focus to Sensus that was both timely and unique.

Today, Sensus is a leader not only in metering, but also in the burgeoning fixed based network communications market. Besides forming a versatile foundation for AMI, fixed base, 2-way communications is also widely regarded as a critical underpinning of Smart Grid Initiatives, much of which will rely extensively on 2-way communications to/from the customer premise for a variety of beneficial information exchange. Our interview this month is with Sensus executives William Yeates and Britton Sanderford, both of whom are sure to play an instrumental role in the future of both Advanced Metering Infrastructure and Smart Grid Initiatives as these markets continue to evolve.

– Mike Marullo, Automation/IT Editor

EET&D: This will be an especially interesting discussion for me since I've known Britton for many years, but Bill and I have just met during the course of this interview. Moreover, Bill has only recently been appointed to his current post – a study in contrasts I suppose you might say. I'd like to begin by asking Bill to comment on what brought him to Sensus at this point…

Yeates: My arrival at Sensus has been punctuated by the unprecedented level of activity in this vibrant utility market. With my personal penchant for all things technological, it was the Sensus focus on technology and the corresponding research and development commitment that really appealed to me. And, the more I got to know them, the opportunity to work with Britton Sanderford and the AMI team at Sensus also supported my decision to join the company that is arguably the technology leader in AMI. My core expertise is in quality assurance, on-time delivery, volume production in diverse products and local networks. I trust that these skills blended with the solid AMI team in place will assure Sensus a strong position in this explosive growth AMI market environment.

EET&D: The metering portion of the utility market has entered into the most dynamic period in a century or more. At the same time, we have observed a very dynamic period for the supplier community as well, especially among the top-level companies. Do you see this settling down at all, or should we be expecting more of the same over say, the next 3-5 years?

Yeates: As you know, Sensus has been very much a part of that supplier dynamic for over 100 years in water and gas and more recently in electricity. Notably, Sensus entered the electric utility market in the 21st century without legacy systems, providing a timely opportunity to take full advantage of the very latest and most beneficial technology without any artificial limitations. While I can't speak for other suppliers regarding their expansion plans, our entrance to the electric meter market at an advanced technology position has already yielded positive results for Sensus and especially for our customers. Technology is – and will continue to be – an enormously synergistic component of our overall market strategy and our future.

[1] In the spirit of full disclosure, we wish to inform our readers that Mike Marullo, Automation/IT Editor for EET&D, provided professional public relations consulting services to AMDS prior to its June 2006 acquisition by Sensus Metering Systems.

On the utility side, I think there will probably be some fairly aggressive deployments by municipal and rural electric cooperatives during the 3-5 year time frame you mentioned, and we're probably going to see a continuation of very large scale AMI/AMR and metering roll-outs among IOUs for the next several years as well.

EET&D: Obviously, there's an awful lot of press these days about Smart Grid Initiatives, or SGI. I know that a lot of people think that SGI is AMI and vice-versa. What is your position regarding these frequently used – and arguably abused – terms?

Yeates: As you might imagine I have been going to school on these terms and interestingly have found a number of definitions that are not necessarily in agreement. In fact I have found so many that I suspect that no universal industry wide definition exists for AMI or smart grid initiatives. The definitions I have read bring to mind the poem about the six blind men describing the elephant – each predictably having a very different take on what constitutes an elephant, absent the benefit of sight and feeling only the part they are examining.

AMI defines the smart grid as smart meter + communications; the distribution automation folks define it as a host of distribution automation advances; IT types tend to focus on systems integration and decision software; and the list goes on to include distributed generation, demand response, and more. Maybe Britton would like to give you his take on the terminology from a technical perspective…

Sanderford: Yes, let me first point out that the communications piece is probably where all of these constituencies agree. Two-way communications – that is, to and from the endpoint, which could be a meter, smart thermostat, or even a capacitor bank controller – is an absolutely essential part of both AMI and SGI. But, somewhat ironically, that is really the beginning of where the commonality among them ends.

Two-way communications does, however, remain the principal technological foundation upon which most of the SGI master plans depend because it is tightly linked with the ability of SGI to deliver on anticipated performance objectives. SGI is the focal point of the applications and processes that use and depend on this communications infrastructure.

EET&D: Can you perhaps give us a couple of examples of how this might play out in the marketplace?

Sanderford: These days nearly everyone has heard or read about time-of-use metering, pricing signals to encourage demand response and so forth. However, some very novel and potentially pervasive SGI applications may emerge from the ubiquitous AMI communications networks, which are now being rolled out. For example, I recently attended a meeting where loss prevention was a key topic. The application required communicating with meters and pole-mounted endpoints as well as the supporting back-end software. But then, during the course of the conversation, the developer realized that AMI could provide millisecond timing accuracy, and several new applications suddenly emerged around the ability to detect power phase.

Another thing that utilities are concerned about is what will happen when plug-in hybrid electric vehicles – PHEVs – come onto the grid. With PHEVs displacing about four dollars worth of gasoline with 60 cents of electricity, utilities will soon be seeing an entirely new load on the grid. Naturally, they will want to encourage this green application – perhaps with price incentives – but new controls will be needed to prevent system overloads when commuters start plugging their cars into rechargers at about 4-5PM daily. Notably, utilities will see this new load as one that can be readily shed as a means for reacting to storms or other grid stress events. To that end, we will probably see a specialized plug on cars designed to mate only with a load-managed box that is under utility control, perhaps including a Bluetooth link that securely limits charging times.

EET&D: So, if I'm trying to prepare my utility for SGI, it sounds like communications needs to be a critical element in my plan. What are some of the other things I need to consider?

Sanderford: A key utility driver today is a growing sense of urgency; the fact that there is a need to act now. But in order to be prepared for the demand and the regulatory requirements of the rapidly changing future technology, selections made today must provide the flexibility to adapt to the changes that will inevitably drive the AMI and smart grid tools of the future. So the utility must plan for contingencies and for connectivity throughout the grid, both now and for applications that are yet to be conceived.

EET&D: What is it that we expect SGI to do for us that the current grid cannot already do?

Yeates: We are now entering a period during which we must get more functionality and more useful life out of the grid resources and assets that are already in place. To do that quickly and most cost-effectively, we will have to add significantly more automation. The reality is we are tasked with finding the right way to make that transition as smooth and as painless as possible without disrupting the reliability that we have all come to expect from our power delivery network.

In the future, the grid will have to do a lot of things that were never imagined, even as recently as a decade ago, so there's a big challenge in front of us. And the answer may be that just as the definition of SGI is different for each segment of suppliers, what utilities expect from the grid also varies according to the type(s) of utility customers. Moreover, it makes sense that a large, multi-state investor-owned utility would not necessarily have the same future SGI needs as a rural electric cooperative.

Sanderford: Power consumers will have a much more proactive role in how and when power is used, the conduit through which it is received, the quality of the power and what they ultimately pay for it. We are currently participating with a number of utilities studying consumer response to various pricing schemes and methods. The

insights derived from this initiative will help determine the technology and methods of delivery of demand response in a repurposed grid. This consumer view also represents yet another dimension of the flexible demand response technology that will continue to evolve as user requirements become more clearly defined.

EET&D: These changes contrast sharply with the old methods where we simply take the power we receive and pay as we go based on a one-size-fits-all rate scheme. What guidance can you offer regarding how we get from where we are now to where we need to be?

Yeates: That's a tall order, Mike, but let me put some central themes on the table. Then, perhaps Britton would like to flesh them out on a more technical level. We've already discussed the critical role of 2-way communications, but there are some other things that also figure heavily into the future SGI picture that will allow it to deliver tangible value.

The first of these is the smart meter. At Sensus our development of a smart meter was done in cooperation with an advisory board of electric utility customers. We asked what utilities wanted in an electric meter and then built the iCon meter line specifically for electric utilities based on that user feedback. And they said demand response and remote disconnect were important. This process – learning what our utility customers want and need in the future – continues to be at the core of the development process at Sensus.

The next requirement is what we call future-proofing. Utilities want and deserve a system that will grow, change and adapt to this rapidly developing grid of the future. In our view, meters, communications modules and collectors/concentrators all need to become what I call "software-defined radios," which affords them enormous flexibility to evolve as we go forward and identify new requirements. We can no longer rely on all-in-one chipsets that quickly become obsolete – or at least functionally constrained – when requirements change, as we all know they do.

And again, looking to the future, the communications link must also have open architecture allowing connection with, and integration into, the home area network technology, distribution automation, billing and system integration software.

EET&D: We hear the terms "standard" and "open" tossed around a lot these days. Where do these concepts fit into the picture from your perspective?

Sanderford: The trend for some time now has been to move to "open systems" with the hope that standardization will bring system compatibility, increased quality and more predictable and sustainable deployments. These are good goals, and when it comes to a company's IT infrastructure, open systems offer many benefits. Voice and data networks, applications and extranets that support common business processes found across industries, companies, customers and vendors are some areas that benefit from open standards.

However, although virtually all AMI suppliers use the term "open," the reality is that all AMI providers use a proprietary middle layer where the ends of these communications "pipes" are varying degrees of open. Whether or not this is an advertised feature, this is probably the best way to maintain a reasonable level of security.

Interoperability is another word often abused in our industry. I can send an email from my laptop to yours, but they are not interoperable if they use different protocols (e.g., an air card versus 802.11), and unless meters use identical communications modules they are not interoperable either. However, they can be made to talk to each other. One way to accommodate that is the use of the recently ratified EUDT[2] in ANSI C12.22[3]. Another way to insure meter integration is for meter suppliers to adopt a simple common bus from the metrology to the communication board, making second sourcing of AMI meters far easier.

EET&D: Clearly the Smart Grid transformation that lies ahead poses huge challenges – business, technological and financial – for substantially all of the roughly 3,000 electric utilities in North America. As a major player in this market, what advice would you offer to utilities as they embark on the Smart Grid path?

Yeates: The challenges of AMI and SGI will continue to require very substantial, and probably escalating investments in infrastructure – not just in metering, but all across the grid topology. Everyone knows that our entire industry is facing enormous challenges involving an aging workforce and declining infrastructure that promise to get much worse before they get better. Moreover, the sheer scale of the tasks involved suggests that these investments will necessarily be based on new and complex business cases.

Because investment in grid infrastructure has been lagging for a long time this will represent new ground for a lot of utilities, so my first piece of advice is to do your homework. The business case for AMI is not just based on the initial infrastructure or the meter change out but must also assess the useful life of the system including future proofing and life cycle cost analyses.

Sanderford: Let me also add that while AMI and the grid of the future will provide needed tools, the stark reality is that until new sources of clean, renewable, sustainable energy are found and fully developed we are very likely to see energy rationing – and most of us don't know how to do that. In order to implement rationing in an orderly fashion there will be price incentives as well as access control. Limiting access infers automated controls, and if those controls are going to provide a material benefit, they must have just as much impact on the power flow through the distribution grid as does generation.

When we extend AMI systems to demand response; that is, to include disconnect/reconnect functions and to smart grid applications, the need for security rises

[2] Extended User Defined Data Table

[3] ANSI C12.22 standard for transport of meter-based data over a network

exponentially. Imagine for a moment losing control of a million meters with disconnect switches. Despite all the talk about open standards and interconnectivity, the security needs for AMI may drive a level of isolation from outside systems that is more akin to the defenses used for securing power plants on the grid. We all say "open" today, but after the first hacker attack from a kid with a developer kit, I think this term will vanish – at least in the metering context.

EET&D: So how does this all relate back to Smart Grid transformation?

Yeates: SGI necessarily involves deep analysis of stability in power control networks. For example, local independent control is a possibility in SGI, but the logic and the time delays of those controls can make it virtually impossible to guarantee unconditional stability. The alternative is networks with causal single point of control, as opposed to independent distributed ad-hoc local networks.

Rationing and scarcity will also force higher levels of efficiency in generation and distribution. Substantially greater use of automation will be essential to increasing efficiency, but as any machine – the grid in this case – is driven closer to 100% capacity utilization, any latent faults or deficiencies will become readily apparent and cause disproportionately higher downstream consequences than we have seen so far.

EET&D: Is there anything we can we do to stave off these emerging threats to reliability and sustainability?

Sanderford: Well, unless we take some fairly aggressive steps now, reliability is going to suffer. Let's face it we've already seen blackouts even before the grid infrastructure utilization was being pushed as hard as it is today, or especially as it will be in the future. Utilities have had a reputation for being slow moving, largely introspective organizations that do not embrace change easily – especially not radical change. However, we are seeing signs that this posture is changing. In fact, most of the larger utilities we interact with are already working with consultants and/or internal teams to evaluate costs, benefits and accompanying risks before taking any material steps toward SGI transformation.

EET&D: So to sum this up, what can we expect in the way of a timeline for all of this to be put into place?

Yeates: Realistically, I think we can safely say that there's still a very long road ahead; most likely decades rather than years. It will be simultaneously challenging and exciting to see how it all unfolds, but I also believe that we have the talent and technology required to meet those challenge head on – something we do around here every single day. And I'm personally excited – as I'm sure Britton is as well – to be a vital part of the solutions that will help make the Smart Grid a reality. ■

Intelligent CIS: The Missing Link for MDM Success

By Kelly James, Director of Market Strategy
First Data Utilities | Powered by Peace CIS
Miami, Florida USA

Utilities and energy companies will spend, without exaggeration, billions of dollars installing Smart Metering and meter data management (MDM) systems over the coming decade, taking the first steps toward enabling the Smart Grid. The most commonly cited objectives of these endeavors are energy efficiency, asset performance, operational effectiveness, and customer service. Although improved customer value is promoted as a primary driver of these initiatives, it is easy for a utility to be caught up in the asset and technology requirements, forcing customer service to take a back seat in Smart Metering projects.

In order to improve customer satisfaction through Smart Metering, it is necessary to plan for the realization of customer value and customer service objectives well before the first meter is installed and to take a business process driven approach to systems change. Unfortunately, many current Smart Metering projects are only considering MDM with a 'no change to CIS' policy.

A utility or energy company must deploy an intelligent customer information system (CIS) capable of providing insight into the complex information available in the Smart Metered world. The combination of the MDM and the intelligent CIS, integrated in a way that supports change and growth over time, will be the platform for delivering customer value from Smart Metering. Many utilities are now familiar with Smart Metering, defined here as:

The adoption of solid state "smart meters" that allow two-way communication between the utility distribution and retail providers and their energy consumers. Indeed, the adoption of smart meters –along with integrating metering software applications into utility IT systems infrastructure -- is considered by many to be the critical first step towards enabling the Smart Grid.

The full Smart Grid implementation, however, is a holistic approach, which combines the traditional delivery grid with sophisticated sensing and monitoring technology, IT, and communications, allowing interaction across the entire energy generation, transmission, distribution, and retail landscape. To meet the changing demands of this information-laden lifecycle it will be essential that utilities grasp the various relationships and interdependencies between the CIS, MDM and wider enterprise IT on both a technical and operational level.

To date, these subtleties have not yet been determined. Perhaps indicative of this uncertainty is the wide range of cumulative U.S. Smart Grid investment forecasts: from 2007-2020 expected between $70–120 billion. To date, 13 U.S. states have concluded that the Smart Grid is a fundamental requirement to support their energy future, with another 4 indicating qualified support, and 11 actively reviewing smart grids. Additionally, more than half of U.S. states are considering unbundling the volumetric portion of their rates to encourage energy efficiency[1]. This mixed commitment makes prioritizing utility spending on assets and information technology a difficult exercise.

Smart Grid and Smart Metering activity is by no means restricted to the United States. Victoria and New South Wales in Australia have already undertaken significant Smart Metering installation projects, and an agreement was reached in mid June for the introduction of Smart Meters nationwide in Australia. Yet not unlike many North American utilities, certain parts of the Australian utility infrastructure remain cautious about the metering rollout, believing the net benefits will only be achieved at the lower end of the investment range. Likewise, many European states are also engaged in Smart Grid-like programs and corresponding debates.

Besides heavy investment requirements, there is also the issue of Smart Grid project scope. Perhaps due to the high profile coverage of Advanced Metering Initiatives and Meter Data Management, there is a tendency by all concerned to focus solely on Smart Metering hardware and the management of increased data volumes. This is a reasonable first step - after all, the "smart meter" itself, data capture mechanisms, and software must all be in place to collect the data that will enable the future Smart Grid. Accordingly, Meter Data Management systems are predicted to make up a significant portion of utility hardware and software IT spending over the next 3 to 5 years.

[1] *U.S. State Regulators Divided on Smart Grids*; Metering.com (June 5, 2008)

Annual expenditures in the U.S. alone are projected to increase from a current level of about $25 million in 2007 to more than $200 million by 2009[2] But, before investing heavily in Smart Metering and MDM technologies, it is important to remember that, "installing a meter is but one small step in achieving the larger value of the entire system"[3]. Utilities must ensure these investments fit long-term, value achieving strategies across the full generation-delivery-consumption-billing-service lifecycle.

This means ensuring that appropriate attention and investment in not only the generation-delivery-consumption end of the lifecycle but also on the billing-service end. Meter-to-cash systems will play a big part in the success of the Smart Grid, as it evolves.

Smart Metering Objectives

Whether the project is for a vertically integrated utility, a distribution/network company responsible for the installation of smart meters, or an energy company or service provider who will use the data from the physical meters, setting the right goals at the outset of a Smart Metering project will have long term impacts on the success of the investment.

Utilities evaluating or implementing Smart Metering often have slightly different articulations of their project objectives, but they largely fall into five categories:

1. Regulatory/Legislative
2. Infrastructure/Asset Planning and Efficiency
3. Environmental and Social
4. Utility ROI and Benefits
5. Customer Benefits

Although all emphasize benefits to consumers, the reality is that they are all approaching Smart Metering and Smart Grid in different ways. To further complicate matters, the industry is recognizing that even customers within similar market segments have differing needs. These varying styles of customer communication and engagement make delivering on the customer value of Smart Grid projects a complex issue. When scanning utility Smart Metering and MDM pilots and current initiatives, the project realities do not always appear to support these customer value objectives, particularly not in the early phases.

One theory for this lack of customer focus is that many Smart Metering and MDM implementations fail to plan sufficiently for the desired customer experience and the resulting impacts on CIS integration and system requirements. Many begin a first phase of MDM implementation with a stated objective to "change no rates or products and minimize the impact on the CIS." According to research firm UtiliPoint International's Ethan Cohen…

[2] *MDM and Integration Market Forecast*; Cohen, E. (April 2007); UtiliPoint International Inc.

[3] *Solving the Smart Metering Puzzle*; Blackmore, K. (January 2007); IDC-Energy Insights.

"The idea that real time communication about rates will make the grid 'dynamic' and 'responsive' to customer needs is only a small part of the bigger picture. Such ill-founded investment will find the unwary utility in a hotbed of future trouble in rate-cases, and with customers, because many utilities will have simply invested in a technology without tangible operations or cost of service improvement."

Considering the importance of need for well managed customer relations, regular and varied communications, and accurate and informative billing through these times of change, it will be imperative that utilities make these Smart Metering investments only after planning a customer-centric approach to system change, integration and deployment.

The Intelligent CIS

The objective of the Intelligent CIS is to enable utilities to fully realize customer service and customer value potential from Smart Meter and Smart Grid initiatives. The Intelligent CIS addresses impacts to the end consumer, the front office and the back office and integrates with systems that will manage impacts to the field assets and the grid. With these objectives in mind, an Intelligent CIS allows the utility to:

- Support customer choice;
- Provide valuable customer information services through modern communication channels;
- Enable the intelligent use of data; and,
- Allow for flexible integration and creative deployment options across MDM and other utility systems.

Support Customer Choice

In supporting customer choice, the Intelligent CIS will enable new, creative customer products and programs that some competitive utilities have explored, but that have not typically been ventured by traditional utilities outside of their largest use customers. These include real time pricing, interval pricing, index pricing, dynamic pricing, time-of-use, advanced net metering (grid buy-back), demand response support and/or integration, conservation and curtailment programs, and incentive based energy efficiency programs. The Intelligent CIS will also enable multiple product and service bundles, and tailored pricing plans with options based on energy requirements and responsiveness to load and price signals.

Figure 2: Anatomy of an Intelligent CIS

Those utilities offering these services today often do so through a standalone complex billing engine or targeted C&I billing package, rather than an integrated CIS billing engine. The Intelligent CIS takes these proven system capabilities and refines them for business process scalability, supporting advanced billing business processes for the mass-market customer base.

As Smart Metering and Smart Grid begin to reach maturity and technologies accelerate, the Intelligent CIS will begin to incorporate programs for "modern pre-payment" and management of a customer usage account, potentially independent of a particular site or meter. Utilities will also need to consider how to support Plug-in Hybrid Electric Vehicle (PHEV) Programs, which will require users to have portable usage accounts when recharging their car at various locations, and usage management that facilitates recharging at low usage times.

The explosion of customer choices may drive customers to either accept a utility's recommendation through automation and customization of preferences, or encourage more customers to actively engage in the management of their energy footprint. The Intelligent CIS will support different customer profiles and facilitate both passive and active engagement in the Smart Metered world.

Valuable Customer Information Services

Utilities and energy companies are being asked to provide new and valuable information services to customers through various channels. In this world, utilities will be able to provide new views of usage information and tools for understanding usage and billing data, intelligent presentation of usage over time, and reporting on energy and cost savings.

Taking advantage of the wider range of modern technologies, utilities will also be able to dramatically improve outbound communications services. The Intelligent CIS will facilitate communication with customers in new and varied ways such as custom web portals, in-home displays, text messages, cell phone alerts, interaction with appliances and more. Customer communications will be driven by preferences and settings, and could include notifications of usage and price peaks, curtailment signals, potential savings, and alternate product choices.

Once initial information services are provided, the Intelligent CIS will begin to offer new usage analysis and product offerings for consumer product selection based on customer profiles, similar to the technology already being used today in mobile telecommunications products and web-based product sales tools.

Intelligent Use of Data

The Intelligent CIS will turn masses of usage data into useful customer information for both the customer, and the utility. In the short term, the focus should be on customer intelligence: offering information to consumers to help them to make sense of usage and billing options, offering intelligent recommendations, providing monitoring tools coupled with customer's chosen settings to allow "hands off management", and combining customer account information and usage information with historical site usage information and other variables for more accurate recommendations.

Once a significant history of Smart Meter data is obtained, the focus will turn to utility intelligence from customer data. This may include customer segmentation by energy requirements and responsiveness, historical

analysis of usage and customer data for segmentation and focused marketing strategies, detailed product offering analysis, dashboards for accurate real-time analysis of customer and billing related information, and analysis of successful and unsuccessful products and services. These more complex analytics will require an intelligent framework capable of pulling from multiple source systems to supplement the information stored within the CIS.

With this wealth of new analytics, utilities will be better positioned to make informed decisions about load management, customer management, customer acquisition and their product, marketing and revenue mix.

Smart Integration and Deployment

Integration and deployment within the utility's systems architecture is at the foundation of the capabilities of the Intelligent CIS.

The Intelligent CIS offers flexible deployment options that allow the CIS to couple successfully with MDMs of all different "flavors". At its core, the Intelligent CIS is built on Service Oriented Architecture for efficient and flexible integration. This enables business-process based design, independence from expensive and proprietary integration hubs, an ability to decouple specific systems and sub-systems, and a focus on the customer through the core CIS processes.

The Intelligent CIS employs SOA to allow flexible, phase-able integration through the componentization of CIS and MDM functions, and helps to minimize redundant data with designated systems-of-record and future options for modularized, swappable CIS subsystems working with MDM.

Technical scalability and performance is also a fundamental requirement for the Intelligent CIS which will use high volume data for billing and customer service. The Intelligent CIS also becomes an advanced real-time system requiring proven support for robust operations such as real-time interval reads and advanced billing, what-if scenarios utilizing up-to-the-minute data, immediate bill projections using both actual usage and intelligent estimates, and real-time service orders such as disconnect and re-connect.

Finally, the Intelligent CIS will allow for robust integration with systems and sub-systems beyond CIS and MDM. With SOA and advanced-automation systems, truly visionary Smart Grids are theoretically possible. Data from metering, MDM, and other grid systems will be integrated fully with CIS, OMS, and asset-management, and intelligent processes will make full use of that data in restoring outages, optimizing the efficiency of assets and giving the company and customers all the information they need to make decisions about energy services.

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Electric Energy T&D MAGAZINE

Utilities of the Future

As utilities move into Smart Grid pilots and Smart Metering initiatives, it is vital to consider the next steps carefully, a perspective supported by industry analyst, Warren Causey…

"In order to prepare for this whole new 'Pandora's Box' of changed utility/customer relationships – particularly at the residential level – utilities must have new-generation Smart Grids and equally smart customer-facing systems," says Warren Causey, an analyst with Energy Central. "These new-generation systems, especially MDM and CIS, must be flexible, adaptable and capable of meeting rapidly evolving customer-interaction requirements," Causey continued.

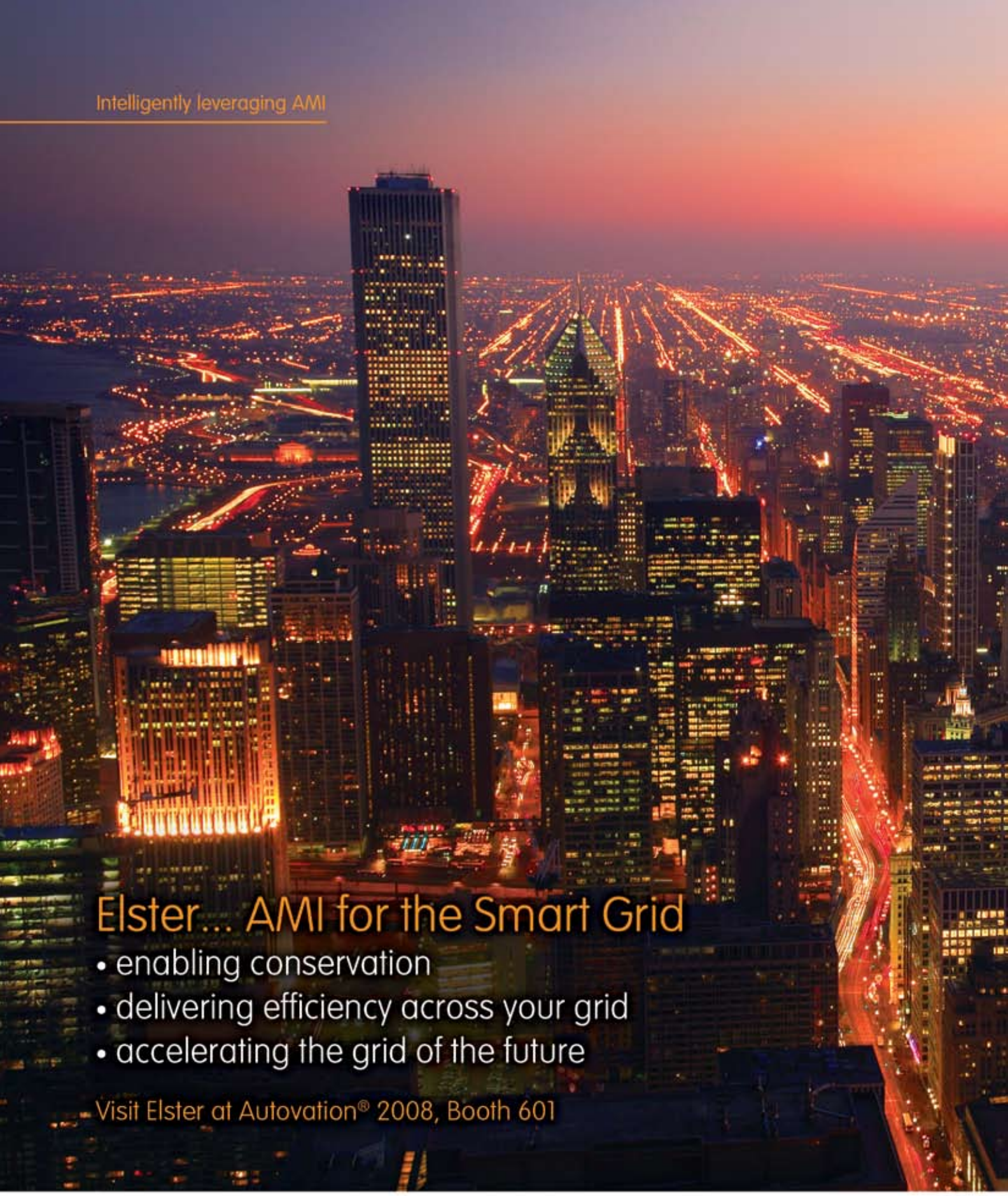
"Moreover, the requirements will be evolving very quickly over the next few months and years, so there is little time to waste in getting these systems in place. The Smart Grid definitely will require a Smart CIS and other much more intelligent systems as well. Last-generation CIS and other major systems will not enable utilities to cope with the new world they are entering. Perhaps the most pressing issue is that utilities are going to be providing less product for more money, and that is a customer-relationship issue that is going to require all the technological, and human, intelligence that can be brought to bear," Causey concluded.

The leading utilities and energy companies of the future will be those that go beyond support for high volume data to gather intelligence and insight from that data for both the business and the consumer. They will design business processes that begin and end with the customer and will integrate customer and billing measurement, analytics, and continuous improvement into the core of their Smart Metering IT solutions. They will think beyond the meter to the customer and will continue implementing smart processes and intelligent systems until the customer benefits of Smart Metering, and ultimately Smart Grid, are realized. ■

(Read the complete whitepaper entitled, "The Intelligent CIS in a Smart Metered World," co-authored by Kelly James and James Braatvedt, at *http://www.peace.com*)

About the Author

Kelly James *is a Director of Market Strategy for First Data Utilities and has worked in the utility software industry for eight years in North America, Australasia and Europe. Currently responsible for managing competitive and transitioning utility markets, Kelly drives numerous product strategy programs related to CIS, Web Self Service and Smart Grid initiatives. Prior to joining the product strategy team, Kelly was Director of North American Sales Consulting and has also held product analyst, sales engineering, and business solution architect roles within the organization. Kelly holds a Bachelor's degree from the University of Pennsylvania.*



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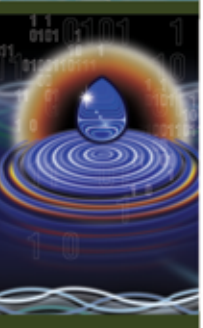

FlexNet, by Sensus Metering Systems, provides that unique solution. Grounded by an exclusive Primary-Use license frequency that fuels a host of unmatched features, FlexNet delivers solutions to an assortment of utilities: large and small, urban and rural, electricity, gas or water.

FlexNet is a simple, flexible and reliable RF fixed network data collection system, which is designed to increase meter reading efficiency, reduce overhead costs, and enhance customer service. FlexNet offers both two-way and one-way fixed based monitoring through a wireless, minimal infrastructure. This Primary-Use licensed system is the only one in the industry and it gives utilities access to a protected, guaranteed frequency allowing data transmission to occur at up to double the power of other systems. And, FlexNet is scalable to accommodate growth as a utility expands its service territory.

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For instance...

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Both electric and natural gas customers in Wisconsin, Iowa and Minnesota, part of the Alliant Energy service area, are getting more than one million iCon smart electricity meters and 400,000 FlexNet AMI gas SmartPoint enabled meters. FlexNet allows Alliant Energy to leverage its prior investment in an extensive array of communications towers already in place for voice communications.

In Canada, FlexNet is tapped for another 157,000 endpoints in the York Region of Ontario by its electrical distribution company, PowerStream, which first selected FlexNet for its Phase I project of 80,000 customers in 2006. Officials favored FlexNet because of its ability to provide the communication technology that enables the system's Smart grid to function, with features such as fault circuit indicators and other devices on the distribution network enabling the smart grid that will allow the utility to effectively manage its territory.

Meanwhile, a water and electric combination deployment in Spanish Fork City, Utah is taking shape thanks primarily to FlexNet's ability to read both water and electric services over the same network. Officials there report that FlexNet's tower-based RF solution yields low operations and maintenance costs, and supports their requirements for rapid growth with minimal infrastructure. And, FlexNet is compatible with Spanish Fork's existing networking and billing operations.

Why FlexNet Delivers

The FlexNet two-way communications network provides electric utilities with enhanced capabilities such as on-demand reads, remote demand register reset and remote shut-off, open system home area network options and smart grid applications like monitoring energy distribution.

FlexNet overlaps receiver coverage of meters, provides data/message redundancy and failover backup provisions. The tower-based system allows for a turn-key deployment not reliant on public vendors. Massively redundant parallel paths guarantee data delivery.

FlexNet's advanced RF system design translates into huge cost savings and reliability. Capital costs are reduced and recurring costs lowered due to breakthrough reductions in the number of data collection points. And FlexNet has demonstrated incredible range and reliability in the toughest combinations of urban and rural geographies. Maybe that's why utilities large and small trust their AMI deployments to Sensus at an ever-increasing pace.

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SENSUS

Challenges of Implementing AMI

By James Ketchledge, General Manager for Projects
Enspiria Solutions

Introduction

Successfully implementing Advanced Meter Infrastructure (AMI) capabilities and related Meter Data Management Systems (MDMS) is even more challenging than a typical utility project. While AMI systems are swiftly gaining traction in the industry through regulatory mandates, "green" power initiatives, and pure business case benefits, many of the vendors and technology providers have solutions that are still evolving and are in their infancy compared to more established utility information systems. An AMI project involves much more than selecting a vendor and waiting for the technology to be deployed. AMI projects require utilities to follow an excellent system implementation and integration process due to challenges related to AMI's inherent complex technology, the lack of depth in many vendors' project services, and the integration points across other enterprise IT systems. Therefore, a successful project requires success in three key arenas, Technology, Implementation, and Integration.

Technology Success

An in depth review of success factors related to AMI technology itself must lead to analysis of specific vendor solutions. Therefore, this discussion will be confined to examination of risks that are more general and common among multiple AMI technology providers.

The solutions provided by technology vendors continue to expand quickly, driven by regulatory mandates, "green" power initiatives, and pure business case benefits. AMI has been the fastest growth segment of utility spending over the past few years, and the trend is likely to continue or even accelerate as more states follow the lead of Texas, California, and the Ontario province. Such growth translates to heavy investment by vendors, so capabilities are hardly static, and weak points in solution offerings continue to be addressed.

Rapid growth environments attract companies interested in growth and create new ideas, new approaches, and high energy. Most rapid growth environments eventually reach a consolidation point, as winners in the market consolidate the smaller players and absorb niche elements of the solution. The AMI space is no exception, and merger and acquisition announcements have been common for the past year. This growth also places strain on technology companies and even companies with reliable delivery records may begin to show the struggle of multiple, simultaneous implementations and the difficulty in finding people in manufacturing, delivery and services with sufficient skills to support multiple clients.

Issues of scale are also of concern to larger investor owned utilities (IOU). AMI solutions that work well on a co-op or municipal scale can have issues scaling to million meter utilities. Communication networks have little issues with scaling, but the head-end is an area of concern if a technology provider does not have existing clients of IOU size.

Therefore, utilities are wise to clearly define their needs in the request for proposal process to a greater degree than normal, and carefully examine the past market success of responders. Time developing detailed requirements up front will eliminate problems down the road. It is also essential to understand the technology provider's development roadmap, and when various capabilities are anticipated to come on line, and then monitor that roadmap during project execution. While it is acceptable to have some capability in the "to be developed" category, having more than 10% is clearly a major project risk factor.

Implementation Success

Implementation success for AMI and MDMS projects is much more difficult to achieve than technology success, and should be the focus of a utility about to embark on the AMI journey. Common challenges for AMI projects include failure to meet schedule milestones, failure to meet utility expectations and requirements, poor coordination of necessary implementation tasks, and poor readiness to accept the organizational changes that AMI systems force upon a utility.

Technology providers are companies that supply the AMI system, which generally has three components. These are the smart meters, the communication network, and the software that manages the system and collects data, also know as the "head-end". Many of these companies have evolved from meter manufacturers who then over time offered automatic meter reading (AMR) capability

of collecting data from energy or water meters and transferring that data to a central database for billing and/or analyzing. AMI is generally distinguished by the characteristics of fixed communications network and adding two-way communication capability with the meter end point. Further AMI sophistication allows for demand side management through home area networks (HANs). In general, AMI capability and data provides the foundation for the future "smart grid".

Technology providers continue to grow their business by offering project implementation services or system integration capability around their solution. The robustness and maturity of these services can be more important to project success than the technology itself. The hazard for utilities is to under value this aspect of their AMI project. Consistently in our industry, project success is not a given. Studies show that as many as 80% of projects fail to meet their technical, cost, or schedule objectives. Some 30% of projects are cancelled and approximately 50% exceed their original cost estimates. AMI systems are not immune from these metrics.

Project implementation services that are essential for AMI implementation success include project management, system engineering, test engineering, and change management. While each of these services merit in depth discussion, a few major elements and lessons learned in each of these areas are provided below.

Good project management is a key to AMI implementation success. More than other utility projects, AMI project managers (PMs) for both the utility and the AMI vendor need to be seasoned and very experienced due to the system complexity, rapidly evolving technology, and complex integrations with other utility IT systems, including systems responsible for billing. PMs need organizational and operational knowledge, hard and soft project management skills, experience in managing the iron triangle of scope, cost, and schedule, and skills in mitigating risk and guiding the vendor.

Systems engineering is a key partner to project management in ensuring success, and a critical part of system engineering is requirements management which includes an upfront gap analysis, development of more detailed AMI or MDMS requirements, and tracking those requirements through the design process and ultimately the testing and verification process. The requirements analysis allows for a more detailed look at what the system can and can't do, and what are the real capabilities behind the marketing brochures and sales cycle. That analysis has led to significant surprises in AMI deployments, but it is far better to identify any gaps between the initial solution and utility expectations as fast as possible, so corrective action has the least cost and biggest window of time to be fixed.

Another very important part of AMI implementation services is test engineering. A mature test process involves continual verification of the system through gradual build up and deployment, and trying to test as much as possible as soon as possible. A "big bang" approach of verifying results too far down the road is a recipe for disaster. Most AMI projects have a field trial prior to full scale deployment, and the field trial's primary goal is to verify one or more vendors AMI systems ability to achieve the benefits identified by the AMI business case and to meet the functional and performance requirements agreed to in the statement of work (SOW). A secondary goal of field testing is to provide the utility hands-on experience with a vendor's AMI system. Successful execution of field testing is typically a contract gate for proceeding with mass deployment. Tools that analyze and display system performance data are quite valuable in testing the solution and continue to provide valuable data while deploying the solution, particularly in communication of results and keeping stakeholders in the loop. Figure 1 shows an example of such a test metrics tool, which measures various types of AMI data for availability and accuracy to support the field trial and ultimately deployment.

Figure 1: Field Test Metrics Tool

Finally, change management to ensure organization acceptance is critical. AMI and MDMS projects touch multiple constituencies in a utility, and effective change management facilitates the realization of identified benefits and manages this change. A comprehensive AMI Change Management Plan is needed to mitigate risks and ensure AMI is accepted and that the utility is positioned for long term success. The plan should focus on ensuring that employees can remain productive during the implementation. Successful change management programs start early, communicate frequently even when the answers are unknown, and self monitor to adjust activities as needed.

Reducing Implementation Risk

The lure of reduced acquisition costs can lure utilities in reducing attention to proper implementation services. Since so much of the cost is in hardware, proposals may offer project management, system engineering, or testing services for a small price or even at no apparent price. It is very important for utilities to perform the due diligence and ascertain the quality of the services that a technology provider has. If the utility does not have the expertise or a proven track record of managing the details of successful implementations, they may want to consider having a consultant who specializes in looking under the covers to assess the maturity and capability of the technology provider implementation and SI services.

Lastly, there are several ways for utilities to reduce their risk in implementing AMI and MDMS. These include verifying the service capabilities of the technology provider in depth at the proposal stage, teaming with the technology provider so that the utility can leverage in house SI capabilities, obtaining SI consultants to monitor or supplement the team, or turn to third party system integration service providers.

Integration Success

Another challenging aspect of AMI projects involves the interfaces and integrations with other utility IT systems. Most implementations initially ignore the valuable integrations between AMI and other utility IT systems. While the core AMI benefits of meter reading and the billing function are clearly critical, planning for other IT integrations early in the project life cycle facilitates ease of unlocking those benefits of an integrated utility IT suite. Utilities need to independently, or with assistance from third parties, examine integrations because most technology providers have limited or no experience in this area. Integrations with the other utility IT systems such as Customer information Systems (CIS), Geographical Information Systems (GIS), Outage Management Systems (OMS), Work Management (WMS), or Mobile Workforce Management (MWM) have valuable operational benefits.

Enterprise Vision and System Architecture

To ensure integration success, an enterprise vision is necessary and that vision needs to be translated into a concrete enterprise system architecture. That architecture will ensure that the barriers between such disparate systems as AMI, GIS, OMS, CIS, WMS, etc. are broken down thereby increasing operational efficiency. Good enterprise integration allows accurate exchange of information between different systems such that the integration appears seamless and that information residing in any one system can be leveraged by other systems, thereby optimizing business processes.

Utilities at the forefront of smart grid activities are also looking at integration frameworks, such as Enspiria's Enterprise Oriented Architecture^{SM} (EOA), that combine dashboards for display of information appropriate by job role, business intelligence, and a graphical capability to promote efficiencies and capabilities that could not be achieved before. This integration framework

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is extensible and scalable, and provides a common look and feel across the enterprise, as shown in Figure 2.

Integration Priorities

The primary interface for any large scale AMI system is the Meter Data Management Systems (MDMS), and the MDMS forms an integral part of many AMI implementations. MDMS helps the utility process and manage meter operations data as well as meter read data. MDMS provides a single repository for this data with a variety of analysis capabilities to facilitate the integration with other utility information systems. The interface with CIS for billing purposes is through the MDMS, and synchronization between CIS, MDMS, and the AMI head-end is necessary to ensure that premise information, customer information, and billing data is coordinated seamlessly.

The most valuable aspect of integrating AMI into the utility suite is the real-time or near real-time information that AMI provides through interval data. Having interval data provides insight and capabilities that were difficult to achieve before, and allows operational improvement that can directly impact utility performance indices. The AMI to OMS interface is a priority since AMI can help significantly to reduce a utility's System Average Interruption Duration Index (SAIDI). Other interfaces allow consumption information to influence system planning and thereby create more efficient distribution networks based on real usage at a resolution of 15 minutes to an hour, and not just monthly reads. Interfaces with GIS allow spatial display of AMI data over a service territory that make can make programs such as theft detection more effective.

Scalable and Extensible Architectures

Utilities should look beyond old point-to-point integrations where possible and embrace techniques that enhance this data sharing between applications. With the revolutionary addition of AMI's real-time information into the utility IT environment, the time is ripe for more scalable and extensible architectures such as an enterprise service bus (ESB) approach that connects individual applications through publishing messages to a bus and subscribing to receive certain messages from the bus. Studies have shown that ESB approaches reduce the cost of new interfaces by much as 50%, and the cost of maintaining that interface by up to 80%.

Summary

The youth of AMI technologies and the associated vendors' inexperience present a risk to implementation that utilities ignore at their peril, particularly given the central nature of AMI systems in the utility revenue stream. A successful AMI project emphasizes the classical system integration skills of project management, system engineering, test engineering, and change management and recognizes that AMI involves much more than selecting a vendor and waiting for the technology to be deployed.

Rather than wait to examine the benefits of AMI integration, an early look at the enterprise architecture and how AMI will fit into it will pay dividends in reduction of functionality gaps and ease of future scaling. The integration of AMI derived real-time data into the enterprise for operations and planning purposes is revolutionary, and utilities that take advantage of it can create real improvements in performance metrics.

Following these guidelines and lessons learned from past implementations, utilities can achieve the ultimate vision of a successful AMI project that meets core business requirements and positions the utility for the smart grid of the future. ■

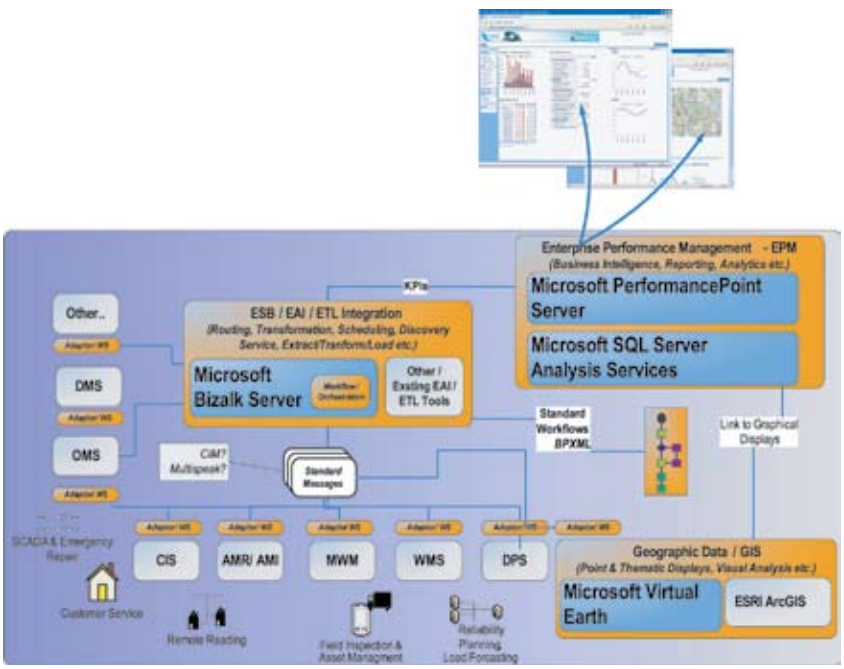

Figure 2: An Integration framework facilitates unlocking AMI benefits

About the Author

***James Ketchledge**, PMP, is the General Manager for Projects at Enspiria Solutions, where he manages the project management office and directly leads AMI implementation and integration projects. He has 22 years in systems/software engineering and 11 years of project management experience. He holds Masters and Bachelor degrees in electrical engineering.*

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Robert M. Samborski

Executive Directions

Professional Association Spotlight

By Michael A. Marullo, Automation/IT Editor

GITA

Robert M. Samborski, Executive Director of GITA

Publisher's Note: It is my pleasure to introduce another new feature to our lineup this year. Executive Directions was created to expand awareness of an industry component that all too often does not receive the level of recognition it so richly deserves for its immeasurable contributions to the guidance and betterment of who we are and what we do in a professional capacity. These are the industry associations – and without them, we would all have a much harder time capturing, documenting and turning the creative genius that our industry cranks out daily into readily usable knowledge, tools and solutions.

Professional Associations such as GITA (Geospatial Information & Technology Association), IEEE (Institute of Electrical and Electronics Engineers), ISA (Instrumentation, System & Automation Society) and Utilimetrics (formerly the Automatic Meter Reading Association) are just a few of the many professional industry organizations that we rely on to guide not only the structure and purpose of what we do, but especially to provide vital educational forums from which we all benefit, regardless of how much or how little we contribute personally to achieving their routinely stellar goals and objectives.

We begin this thrice-annual series with Robert M. Samborski, Executive Director of GITA headquartered in Aurora (Denver), Colorado. As always, we welcome your feedback…

– Steven Desrochers, Publisher

EET&D: You've certainly been at this for a very long time, Bob. I guess the first thing I'd like to know is what has kept you at the helm of GITA for over two decades, and how has the job changed over the years, if at all?

Samborski: Well, I guess I'd have to say that from the outset, I've never been bored a single day over the past 20 years… perhaps frantic, upset and overwhelmed at times, but never, ever bored! While some major activities are recurring – conferences, for example – it's almost like the job changes on a daily basis. And that's what I like about it. I still very much look forward to going to work on Monday mornings.

EET&D: Not surprisingly – and speaking as a 20-year member of GITA myself – I think it's safe to say that the Mission/Vision has changed over the years. But for the benefit of readers that may not be as familiar with GITA, what would you like them to know about the association and its future direction today?

Samborski: Our primary mission was, is and always will be to promote and advance the use of geospatial technology through education, information exchange, research and, increasingly, advocacy. We strive to be the leading unbiased resource for anyone who is interested in the use of geospatial information. Last year, we stated the obvious and refocused our attention on how the technology can help address our serious infrastructure-related problems. Our members have always been involved in owning, operating, maintaining and protecting our society's key infrastructure assets, so it was a very natural move. Considering the current state of our infrastructure, it was also very timely.

EET&D: Although GITA is an increasingly broad-based association with geospatial and information technologies being the common thread that spans several industry verticals, utilities and utility-centric suppliers and consultants comprise a significant portion of the membership. As such, there is a wide range of information, tools and groups within the organization that are available to utility practitioners. What are some of those resources, and how can they be accessed?

Samborski: We are constantly striving to achieve a proper balance between the

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industries represented by our members and the often "horizontal" cross-industry technologies that are simultaneously common to many yet unique to some. This is no small challenge since these things are constantly changing and evolving. Quite frankly, keeping up with that is a big part of what keeps me awake at night.

But more directly to your question, we try very hard to provide as broad a set of educational resources as we can to as wide a range of our membership as possible because we are first and foremost, an educational organization. Virtually everything we do has an educational component to it. That's not to say it's a formal academic component. It's mainly a "knowledge" dimension, practical information and real world experiences we can package and deliver to our members and constituents.

We do this in a number of ways, including our two main annual conferences as well as specialized seminars, meetings and symposia; special interest groups organized by industry and by technological discipline; studies, reports and tutorials; and many other specialized resources.

EET&D: With such a broad market purview, how is GITA able to address critical industry issues through its conferences and publications in such an eclectic context?

Samborski: We continue to identify critical issues and corresponding educational needs of our members through post-conference surveys, on line surveys, the Geospatial Technology Report, and the Industry Trends Analysis Groups, among various other sources. The resulting input – from six major vertical markets, including electric – is then incorporated into our strategic planning process. Results are distributed to the Geospatial Infrastructure Solutions Conference Committee, other conference committees such as the one dedicated to our GIS in Oil & Gas Conference, the Education Committee, Research Committee and other association entities. Key topics also serve to generate user articles for the association's newsletter, *Networks*.

EET&D: For someone who might be totally unfamiliar with GITA, could you please elaborate on some specific examples of how one might derive tangible value from the various types of association resources?

Samborski: There are many, of course, but I think key among these is ITAG, our Industry Trends Analysis Group; the annual Geospatial Technology Report; and our rapidly evolving ROI Workbook series, which includes both published reports and accompanying seminars.

EET&D: Let's start with ITAG, since I know that represents a pretty broad cross section of what GITA is all about. Again, I have some personal knowledge of what ITAG does and its value as a member myself. One of the things I like best about ITAG is that I can explore the business and technological boundaries of the specific markets where I have an interest, and I can also explore those in new areas where I want to learn more, knowing that I'm part of a group that is extensively composed of deep subject matter experts that have literally been there and done it.

That's a huge resource for anyone that wants to expand their horizons on a particular market, business or technology, but I'm sure you can articulate the bigger picture for our readers better than I can.

Samborski: That's a great summary, Mike! But let me also add that ITAG is an ad hoc organization that is purposely broad and open to our entire membership. If you have knowledge, we want to hear what you have to say, and we want to make it easy for you to share that knowledge with others. I think ITAG does a good job of that, and our members seem to agree – as you underlined yourself.

EET&D: How about the annual *Geospatial Technology Report*? What is it, how is it produced and what value does it deliver?

Samborski: The *Geospatial Technology Report* is one of many things we do that you don't have to be a GITA member to derive value from. That is, the report is available to everyone although we do offer a cost discount to our members, as you might expect.

Each year, we develop a detailed research questionnaire that reflects what our members feel are the most important dimensions of the markets and corresponding technologies associated with our profession and we use a web-based survey instrument to gather that information from user organizations. Once the survey work is completed, we compile the data, analyze it and publish the findings in this annual report. We've been doing this study since 1998 now and have refined it every year since we started.

The result is a widely subscribed resource that is a great way to find out quickly what the hot buttons are, what's new and what has changed in our industry in the past year. It can also be useful as an industry primer for those just getting into the geospatial side of things or for anyone who wants to brush up on the latest drivers, issues and trends, and find out who's doing what with the technology.

EET&D: What was the genesis of the ROI Workbook, and how would you characterize the phase that project is currently in?

Samborski: The ROI Workbook is something that I believe a lot of people would love to have for a whole range of other kinds of projects. As the name implies, it zeroes in on that one critical question that is always being asked by managers at enterprises of all types, sizes and locations; that is: "What's our return on investment (ROI) if we do this project?"

This is something that kept coming up year after year at our conferences, committee meetings and even board meetings. Utilities have invested heavily in GIS and spatial data system platforms over the past two decades, and now they want to see where the returns are before continuing to invest even more. After all, it's a very reasonable expectation, I think, to want to know where and how the money you're spending comes back to you in a beneficial way.

So, a couple of years ago we finally decided to do something about it. After giving it a lot of thought we started by doing some preliminary research to see what resources were available to help establish a game plan for what we knew would probably be a substantial undertaking. We finally teamed up with the American Water Works Research Foundation, the Federal Geographic Data Committee as well as its national counterpart in Canada, GeoConnections, which all provided initial funding for a project called, "Building a Business Case for Geospatial Information Technology: A Practitioner's Guide to Financial and Strategic Planning." The result of that partnership was the ROI Workbook, containing methodologies and processes for developing a solid business case to substantiate geospatial investments.

Since then, we have conducted several projects for federal agencies and several states, with dramatic results. In August, we launched a workshop series designed to get this information out in the field. I'm planning on holding a couple more workshops around North America before the end of this year.

EET&D: GITA hosts two major conferences annually: Your annual conference – which has been recently re-positioned as the *Geospatial Infrastructure Solutions Conference* – and the *GIS for Oil & Gas Conference*. Maybe you could explain how these two events are alike and how they differ?

Samborski: The philosophy behind both is exactly the same; that is, we provide unbiased, non-commercial and objective education and information organized in a highly professional forum that facilitates networking and knowledge-sharing. The primary difference is that the *GIS for Oil & Gas Conference* focuses on using geospatial technology in oil and gas transmission and distribution. We're adding more of an upstream focus each year, and we're going to hold our initial Oil & Gas conference for Canada in November. The *Geospatial Infrastructure Solutions Conference* addresses the educational needs of all other market segments – electric, gas, water/wastewater, telecommunications, transportation and the public sector - in terms of how geospatial information and technology can help practitioners in those fields do their jobs better.

EET&D: Looking forward, what changes do you see coming in the marketplace, and what might the impact of those changes be on GITA?

Samborski: When you do what we do, these major changes will be opportunities – to help our members adjust to whatever the future brings. I'm very excited about our infrastructure focus and the incredible potential for contributing solutions to a serious problem that is growing on a daily basis. GITA can be a leader in this area.

With an initial *Geospatial Dimensions of Emergency Response Symposium* now under our belts, we are well positioned to bridge the gap between geospatial infrastructure practitioners and the emergency response community, a trend that has gained significant momentum lately. Finally, you don't have to tell anyone about the rising cost of energy, and that is an area in which we expect to be able to leverage GITA's core capabilities by expanding our Oil & Gas conference series to Canada and Europe and broadening our reach into alternative energy.

EET&D: Bob, I have to tell you that when I joined the association in 1988 to get a crash course on what was then called "AM/FM" [Automated Mapping & Facilities Management], I had no idea what I was getting into. I know that you were still fairly new on the scene at that time too, and I doubt that anyone really knew how the geospatial industry would explode into such a major market in the two decades that followed. What do you think the market will look like in another twenty years from now?

Samborski: With all the changes taking place on so many different levels – technological, regulatory, organizational, and so forth – it will indeed be interesting to see where things go from here. As always, our role will be to help everyone keep up. That will continue to be a big challenge with lots of new opportunities for an organization like ours, so I'm certainly not expecting to be bored any time soon! ■

Supporting Utilities in the Quest to "Go Green"

By Chris Purpura, Vice President of Marketing and Customer Solutions
Aeris Communications

Smart Metering and the latest advances in automated metering infrastructure (AMI) are at the foundation of customer-oriented programs that contribute to Utilities' "Green Initiatives". As such, Smart Metering programs and the underlying support systems are driving a major transformation in the business model of how the Utility operates, requiring rapid and pervasive deployment of reliable, secure and two-way broadband communications across its infrastructure. In this article, Aeris® Communications will provide an overview of Smart Metering and AMI, and how smart meters and data communications technologies work together to provide an end-to-end solution to support the Utilities in their quest to deliver better services in a more ecologically friendly and cost-effective manner.

Industry Challenges

The Utility industry has changed slowly over the past century. Until recently, the biggest concern was managing changes as directed by the market in a timely and orderly manner for increased power generation or new distribution methods. Times have changed. In the upcoming decade, there will be many compelling reasons driving the Utility industry to change that simply were not factors in the past.

Major challenges faced by the Utility industry in the next ten years include:

- Energy demand is projected to increase over 60%.
- Over 50% of the Utility industry's skilled workforce will retire with job experience and knowledge that cannot be replaced one-for-one.
- Global demand and resource scarcities will drive energy costs to unprecedented heights.
- Government mandates, carbon caps, and regulations will limit new generation sources to "renewable" and "green" only.

The Industry must adapt to meet these challenges. A primary key to success for Utilities will focus on the real-time collection of data from all end points with 'smart devices' through reliable, secure, real-time, high bandwidth communications network(s), and then deliver the information and facilitate automation and remote control back out to the devices.

Smart Meters and Smart Metering Programs have emerged as major tools to address these challenges, both for now and for the foreseeable future. To fully grasp this, however, we will examine how the real-time use of the data collected by these 'smart devices' fits into the Utilities' overall business objectives to be more energy efficient, customer friendly, and investor responsible.

The Evolution of Smart Meters and Smart Metering Programs

First Generation Smart Meters - AMR

Deploying Smart Meters was one of the first initiatives the industry took towards becoming "Smart Utilities". The first generation of Smart Meters was built around the simple **Automation** of manual **Meter Reading** (AMR). This was a point solution that met the specific need of reducing meter readers, but could not be directly applied to more advanced or alternative uses. The ROI for this solution was specified against the simple business case of replacing meter readers.

However, AMR did not go far enough in terms of a full set of capabilities that would deliver much broader ROIs and much less impact energy use by the consumer. Many AMR programs were approved and contracted to deploy one-way or one and one half-way wireless communications technologies, all of which had very narrow bandwidth. The limitations of these communications choices are now becoming widely understood, particularly in the context of newer definitions around **Automated Metering Infrastructure** (AMI), the second generation of smart metering solutions.

Second Generation Smart Meters - AMI

AMI adheres to the principle of more functionality and automation with more frequency. AMI is evolving into an end-to-end solution with capabilities beyond AMR - but based on the lessons of AMR. Upon realizing the benefits of reducing or eliminating meter reads, many Utilities identified all of the functions carried out by field personnel that can now be done remotely over the air including service connect/disconnect, outage detection, and meter reads. In addition to automating field service functions with real-time communications, real-time pricing becomes possible, too.

Legacy Utility System		2nd Generation Smart Meter (AMI)
Service connect/disconnect	»	Remote connect/disconnect
Manual outage detection	»	Automated outage detection
Monthly meter 'reads'	»	15 minute interval 'reads' (improve demand forecasting)

Table 1 - Field Personnel Functions

Third Generation Smart Meters – AMI+DR

The third generation of smart metering solutions, which we'll call AMI with **Demand Response** (AMI/DR), essentially creates a real-time market for electrical power that links supply all the way out to demand, on a real-time or near-real-time basis. AMI/DR involves the full integration of energy usage data (demand), connected to and compared with real-time supply and pricing information to automatically determine how to optimize market conditions. Market conditions can determine changes in supply needs, load control shifts from one area to another, and even voluntary and/or forced reduction of demand usage at the retail level.

Some of the AMI base capabilities will move to more real-time intervals, such as pricing. Time of use (real-time) pricing allows customers to be aware of variable energy costs and make voluntary adjustments as to when they consume electricity. Critical peak pricing reaches out to the consumer and allows them to see the real-time price of electricity, and determine what adjustments to make now to how and when they consume energy. Conversely, it also allows the Utility to make profit based decisions around reducing demand versus buying short term capacity at high demand price points.

Demand Response (DR) enables full command and control over the consumption of electricity. Many consumers, both Commercial/Industrial as well as residential, have voluntarily enrolled in DR initiatives. These incentive based programs allow the Utility to reach out and "turn down" energy consumption in real-time as needed, in effect creating the concept of 'deferred generation' or 'avoided production'. A fully utilized DR system relies on an efficient two-way communications system between the energy source or provider and the consumer.

Utilities' Objectives for Installing Smart Meters

There are four reasons Utilities are implementing Smart Meter programs:

- Smart Metering transforms the way Utilities do business.
- Smart Metering improves customer service.
- Smart Meters are a key component of an infrastructure with integrated distributed resources.
- Smart Meters enable customers to better manage internal and external energy resources.

1. Smart Metering transforms the way Utilities do business.

Utilities initially looked at Smart Metering as a labor saving program. Next to the postal carrier, the utility meter reader had become an all too common fixture in the neighborhood. Manual meter reads were expensive and prone to inaccuracies. The data collected from Smart Meters has supplanted the manual process.

The customer connect, disconnect and reconnect process was another expensive proposition for Utilities when the only method was to dispatch service personnel to the residence. Smart Meters that could respond to customer connection requests virtually eliminated the need to do this in all but special circumstances.

The Utilities also benefited from knowing the status of electricity delivery in real-time across their customer base. Armed with the data that identified the exact location of the service disruption, utility trucks could now be dispatched directly to trouble spots better utilizing valuable time and resources.

2. Smart Metering improves customer service.

The same Smart Meter that relays electricity delivery status to the power company notifies the customer when their service is out at the Utility level, instead of a local blown fuse or house wiring failure. When installed, customer back-up or reserve electrical systems can be triggered to supplement power. The customer is best served with reduced or no outage time.

Satisfied consumers see the Utilities more favorably, and are more apt to support and participate in Utility programs that make better use of energy resources. All of this results in a healthier business climate for the Utilities.

Data Communications Needs for Objectives 1 and 2

Meter reads, service connects, service disruptions and delivery status have relatively low bandwidth data delivery needs. Several data communications technologies can reach out and carry this information effectively from end to end including power line, private wireless and cellular wireless. However, the ability for the data communications transport to be able to readily adapt and deliver the throughput necessary for the next two Utility business objectives should be a determining factor when selecting communications technologies.

3. Smart Meters are a key component of an infrastructure with integrated distributed resources.

The real-time knowledge of electrical power needs and conditions provided by Smart Meters with robust two-way communications promotes the use of "Distributed Generation" from customer-owned power sources.

Distributed generation refers to generating power from many small and ecologically friendly energy sources that are collectively efficient and located closer to the consumer, then putting this energy back into the grid as supply. Examples include tapping into residential solar panels, windmills, and excess stored electricity in plug-in electric hybrid vehicles (PHEV) batteries. The customer is, in effect, turned into a producer and reimbursed by the power company with energy credits, rebates or cash.

The opportunity for Utilities to tap into these new energy sources with little upfront investment is tremendous. The challenge for the industry is to manage the fragmentation of control for generation from the original small number of dependable and controlled power generation sources to an open market where consumers become generation sources. This reciprocating market of supply and demand must be managed both at the individual and aggregate level.

4. Smart Meters enable customers to better manage internal and external energy resources.

Third and fourth generation (AMI and AMI+DR) Smart Meters directly address this objective. In the home, the Smart Meter

can be connected to HVAC and other major power-consuming appliances to control or curtail usage when power costs exceed benefits. Customers actively participate on the grid and are paid, whether directly through programs mentioned above, or awarded rebates, credits or lower tariffs to reduce their energy consumption.

Smart Metering programs provide customers with real-time pricing - price signals based on time of day and energy conditions, allowing them to choose to consume now and pay, conserve, and/or contribute to the grid. Encouraged customers can change their load shape and, in turn, the Utilities' overall load demands.

Data Communications Needs for Objectives 3 and 4

Both distributed generation and active participation programs require a constant real-time flow of information both ways (interval data) with a footprint that can be installed easily, unobtrusively and quickly. Also, many of the information gathering and dissemination devices will be installed by third parties, or even by consumers themselves. These devices will also be coupled with various meters, thermostats and control panels, and integrated within home energy automation systems.

Communications Platform Selection

Utilities are putting significant amounts of time and energy into the selection of new physical equipment (smart meters and other devices), but are not putting the same emphasis into choosing the right communications architecture that will support the Smart Grid of the future. It is essential that Utilities examine their "Green" initiatives and look deeply at the communications network(s) that will support all generations of deployment, up and down the grid, and over multi-year periods of time. There are many technology candidates that can be utilized to provide this information pipeline. It is very unlikely that only one communications technology will be used by a Utility for all devices in all cases.

Aeris believes that a compelling case can be made for specialized cellular networks as a major piece of the communications backbone to support the Smart Utility. A ruggedized data-specific cellular network has been in place for over ten years delivering reliable and robust communications to several different industries, including Utilities. What has changed dramatically over the past few years is the improvement of broadband communications and its much lower price points. By matching specialized network services developed by Aeris with the public carriers' investment in pervasive broadband wireless networks, Utilities can speed up deployment time, meet reliability needs, and reduce costs today. ■

About the Author

***Mr. Purpura**, who joined Aeris in 2007, is responsible for all marketing, product management and customer solution activities.*

Mr. Purpura has more than 15 years experience in Internet, infrastructure software, and VoIP communications companies both private and public. Most recently Mr. Purpura led New Ventures and Strategic Alliances at Platform Computing, the leading middleware company in enterprise grid middleware. Mr. Purpura has also held various senior executive level positions across Marketing, Product Management, Strategy, and Alliances functions at GoldenGate Software, a leading data transaction middleware vendor; Network Inference, a leading Policy Engine vendor (acquired by WebMethods); and Aspect Communications, a leading Contact Center vendor. Mr. Purpura also served as Director of Product Management at Oracle where he led the initial market strategy and launch of Oracle's Application Server product division.

Mr. Purpura holds a Bachelor of Arts in Political Science degree from the University of California, San Diego.

Bill Payment in the 21st Century: It's all about choices!

By Randy Vyskocil, Western Union Payment Services

There's a dramatic shift taking place in the utilities market: a renewed focus on the environmental impacts of the industry and refurbishing an aging power grid. The pressing national and global challenges of the energy industry are increasingly prevalent in the media and in a variety of ways. How can we reduce our carbon emissions? What are our alternative energy options? How will we pay for renewable energy? What power plants need to be refurbished? How can we build new carbon-free power plants? How can we provide energy efficiency services to our customers? All of these questions and more are on the minds of utility companies everywhere with most remaining largely unanswered thus far.

A venture into addressing such questions underscores a company's environmental responsibility to the public. Likewise, building new carbon-free plants or refurbishing old ones, demonstrates a company's responsiveness to an environmental need – a need the public demands. While the consuming public calls for corporate and environmental responsibility, this same group of stakeholders is enduring the mortgage meltdown as well as a widening financial crunch.

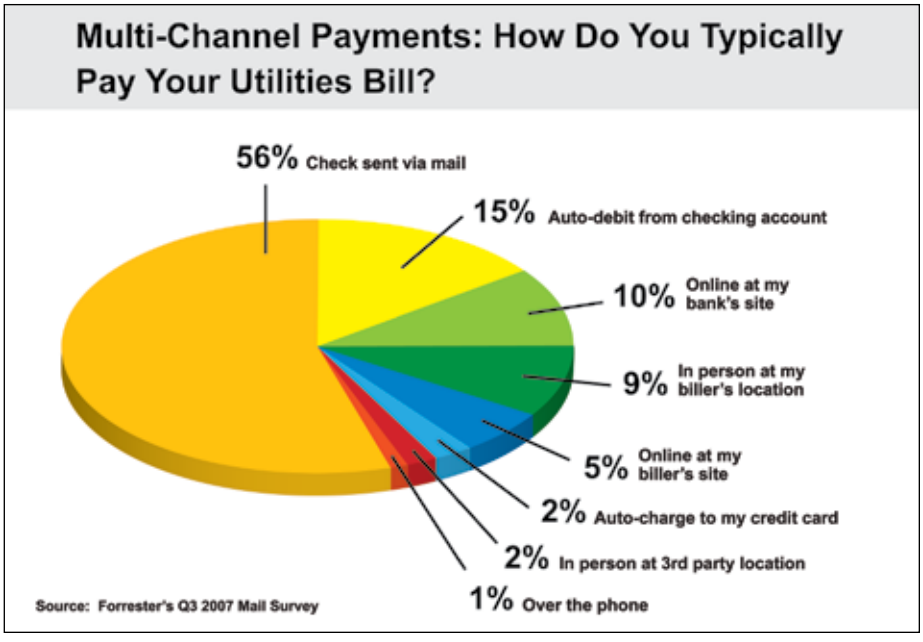
During a time when companies are focused on environmental improvements, it's now important to focus on steady revenue streams from customers to ensure that those goals can be met from a financial perspective.

Best-in-class utility companies recognize and value the importance of balancing industry and customer needs as much as they do business strategies and market trends. As economic challenges continue to pervade, the utility industry will increasingly see effects from late and uncollectable payments. Indeed, if customers stop paying their bills on a timely basis, utilities will experience the economic stress being felt by their ratepayers very quickly and directly.

The State of the Economy and Its Affect on Your Business

At a time when costs are soaring and foreclosures dominate headlines, Americans feel stuck. The uptick in consumer prices is taking a larger bite out of family budgets, resulting in a significant rise in delinquent payments and utility shut-offs. An April 2008 PEW Research report indicates that slightly more than half of middle class respondents say they expect to make more cutbacks in the year ahead while one quarter say they expect to have trouble paying their bills. In the past, customers who were struggling often took out an extra line of credit or home equity loan to meet their financial obligations, including bill payments. But based on the poor condition of today's housing market, this option is becoming harder to access and is forcing people to look for other ways to cover everyday expenses.

On June 16, 2008, *USA Today* reported that utilities across the country are raising power prices –some by as much as 29 percent – mostly to pay for soaring fuel costs and new plant construction. In addition, the Consumer Federation of America reports that utility bills are up nearly 30 percent from just five years ago – the sharpest jump since the 1973 energy crisis.



Given these strained financial circumstances, utility customers are managing their budgets more closely than ever and prioritizing their expenses and bills accordingly.

Nationwide, an estimated 15.6 million households owed almost $5 billion in utilities payments in March, according to the National Energy Assistance Directors' Association 2008 energy survey. That is an increase of almost $640 million – or 9.5 percent – over 2007. Of the households that owe, about 14.8 percent – up from 13.5 percent last year – are at least 30 days behind in their utility bill payments.

In these difficult times when many customers are facing steadily increasing costs and ever-greater financial challenges, customers will select and prioritize when and how to pay their bills, directly subjecting billers to the financial status of the customer. Moreover, customers prioritize paying their bills based on urgency. Besides the strain of living paycheck to paycheck, many customers are further stressed over the bill payment process itself.

The result: studies suggest that utility bills are among the last to be prioritized and paid when crunch time hits. The solution: understand your customers and the challenges they face paying bills. The opportunity: implement customer-care solutions that empower customers to accelerate their payment through any channel they trust. It's about speed, convenience and reliability.

Best-in-Class in a Down Economy

According to Moody's index, "The apparent dichotomy between the trends in early- and late-stage delinquencies may be indicative of an ever more challenging collection environment. That is, once cardholders fall behind in their credit card payments, it is increasingly difficult for them to become current on their payments again."

As customers struggle to make ends meet and get payments in on time, one way that utilities can help reduce some of the stress customers feel is offering a variety of payment options. When customers look for payment solutions, you don't want to be skipped over because you don't offer the option that best fits their needs and lifestyles. For instance, if a consumer's only option is to pay bills via debit card, and you don't offer that choice, they will most likely decide to pay other bills that accept debit and hope to make up missed utility payments in the future. When that happens, you lose a customer's payment, and they fall even further behind.

Eighty-four percent of businesses expect to be paying more for collection efforts in 2008. Only eight percent of these companies have Web-based collection support, although a majority of people prefer to pay late bills on the Web. Therefore, it's more important than ever to provide these customers with fast, safe and convenient ways to make their payments while keeping them out of further debt. Service, trust, reliability and ease will be the deciding factors in how these customers choose to pay and which bills they put at the top of their list to keep current. Offering multiple payment options can that build customer relationships while saving you money is a win-win situation.

Delivering Flexibility & Convenience to Your Customers

According to a proprietary study conducted by Forrester Research and Western Union Payment Services in 2007, 56 percent of responding households mail a check to pay their bills, reducing consumer control and precision regarding when their payment is actually received and processed. Clearly, there is – and will probably continue to be for some time – a high percentage of customers that utilize traditional bill paying methods and mailing checks. However, the findings show that there is an opportunity for utilities to provide additional bill payment options to their customers, and in turn, increase customer loyalty and engagement while also saving money.

Utilities also have the opportunity to integrate consumer bill payments into the customer care program. Doing so helps to give customers a sense of ownership by paying their bill during a time when so many other things are spiraling out of their control.

Moreover, multiple payment options create stronger and more profitable customer relationships by improving the customer experience across all channels and streamlining functionality to make it easier to process payments. Following are some specific payment categories that can be implemented to build trusting relationships with your customers.

Electronic Bill Payment

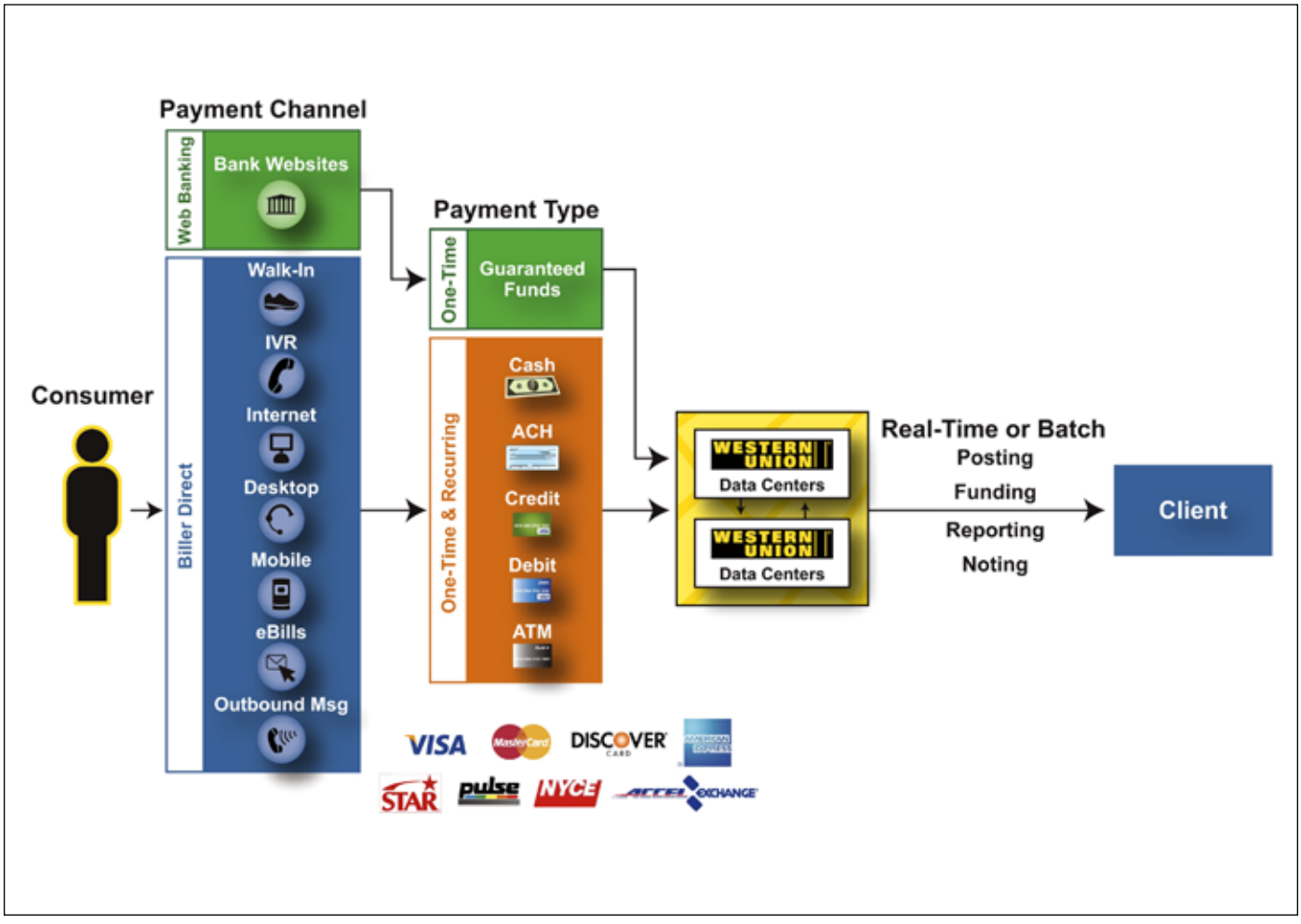
By the year 2011, over 59 million households are expected to pay bills online, which is a 63 percent increase from 2007, according to a recent Forrester Research study on customer technology adoption. Electronic bill payment is often the preferred choice of customers for paying monthly bills of varying amounts. Providing an electronic payment option will allow your customers to set up a recurring payment schedule that will also help ensure receipt of a timely payment every month. The various electronic payment platforms help to personalize each consumer's payment method, while the simplicity of the service provides convenience.

Implementing electronic bill payment options provides various benefits to the utility as well. First, it is a cost efficient method for collecting payments. Second, payments can be received instantly instead of waiting for the check to be mailed and then processed by one or more banks in the payment path. Third, there is a quicker response rate as an increasing number of customers are likely to pay their bill immediately when using an electronic payment option. Fourth, an electronic payment option will improve your customer relationships via increased customer access and engagement opportunities.

And lastly, by providing electronic bill payment options to your customers you are affording them the opportunity to achieve paperless billing and also doing your part to be environmentally responsible. According to a new study commissioned by the PayItGreen Alliance, if one in five households switched to electronic bills, statements and payments, the collective impact would save 151 million pounds of paper, avoid filling 8.6 million household garbage bags with waste and avoid producing two million tons of greenhouse gas emissions.

Walk-In Payments

Walk-in payments are convenient for those customers who prefer to make payments by cash, including the 50 million Americans who don't own credit cards. This payment option allows customers to pay their bills in convenient locations where they are conducting



their everyday errands, such as trips to supermarkets and malls. Customers who choose to pay bills using the walk-in payment method are looking for convenience, speed and reliability – primarily within their own neighborhoods.

For billers, there's the option of maintaining your own walk-in bill payment facilities (i.e., on-premise) or outsourcing the walk-in bill payment option by using third-party off-premise processors. This option accelerates payments to the utility provider while helping to improve cash-flow and significantly reducing past due accounts.

Credit Card Payments

Credit card acceptance is nothing new to the utility industry. Customers can pay their energy bills with a credit or debit card at about 80 percent of all utility companies. But most large utilities have not traditionally offered recurring payment programs. Instead, they usually outsource one-time credit card payments by phone to third parties that charge customers a fee to cover the cost of the call as well as the applicable credit card fees. The average of these fees is more than $4 per transaction. As a result, several large electric and gas utilities are leading the charge to reduce payment processing costs by offering recurring card payments via the Web.

Online Banking

Online banking is the payment method of the future, but it is already well under way. By 2010, it is estimated that 46 percent of online bill payments will be made through "consolidator" Web sites. Also, it is estimated that the number of customers paying via "consolidated" online banking will increase by as much as 59 percent by 2010.

The world of online banking is changing the way people pay bills. Customers are able to schedule payments that will post the same day and take advantage of real-time customer validation, which significantly reduces the number of misapplied payments. This option substantially improves the overall customer experience. Moreover, the biller pays no fees to utilize the online banking option, and billers will receive guaranteed funds in 1-2 days.

Overall, online banking is arguably the most convenient and flexible payment option for the customers as it helps them manage their money more effectively by scheduling transactions in advance and controlling when the payments are actually made with a high degree of precision and certainty.

Embracing Change

As utilities continue to cope with an uncertain economy and the impact it is having on their customers, understanding and delivering useful tools that promote the financial well being of customers will guarantee lasting relationships. By providing your customers with multiple payment options you will create stronger and more sustainable customers relationships and a vastly improved customer experience that pays dividends to utilities and customers alike. ■

About the Author

Randy Vyskocil *has been in the information technology and payments business for more than 12 years. He is responsible for all business development for Western Union Payment Services' Utility Vertical Market focused on providing biller direct and online banking, billing and payment solutions to utility providers.*

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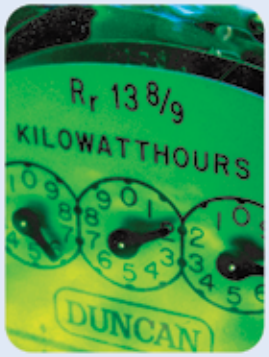

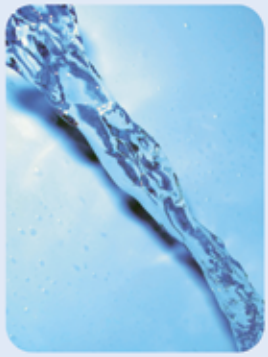


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Under tender	Recently announced	Under expansion to provide:	Under expansion to provide:	Under expansion to provide:
Total water production capacity: 100MIGD	Total water production capacity: 100MIGD	Total water production capacity: 84MIGD	Total water production capacity: 160MIGD	Total water production capacity: 100MIGD
Total power generation capacity: 1,600MW	Total power generation capacity: 1,500MW	Total power generation capacity: 1,592MW	Total power generation capacity: 2,000MW	Total power generation capacity: 760MW

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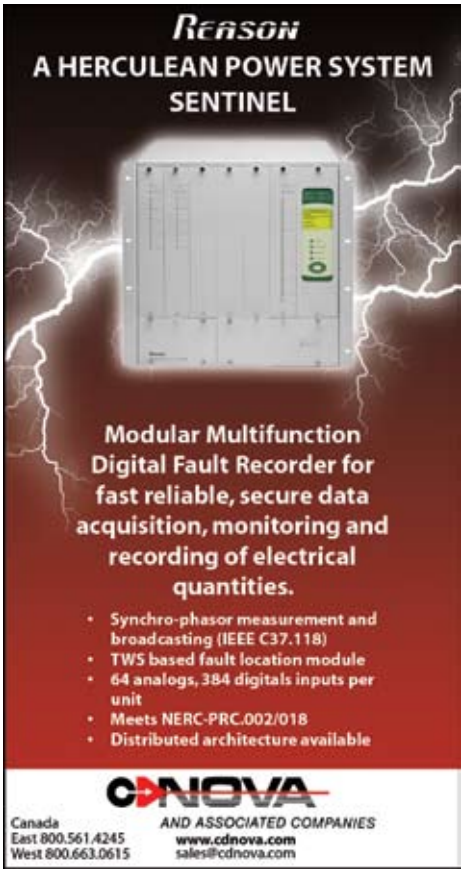

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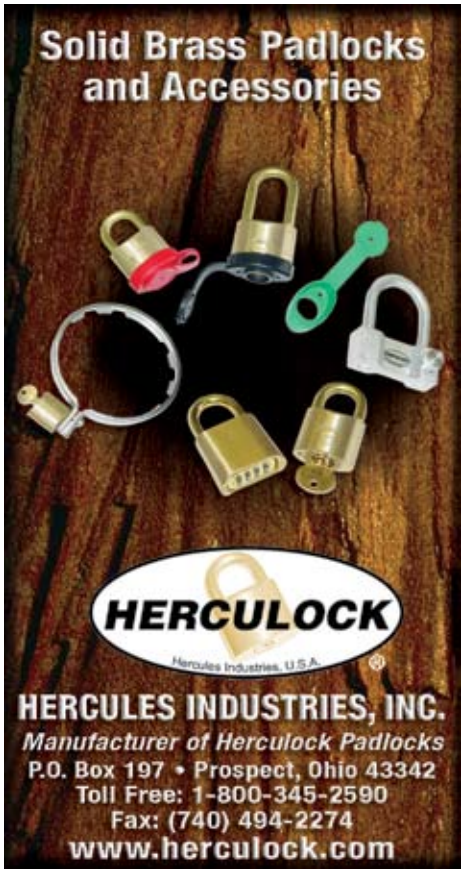

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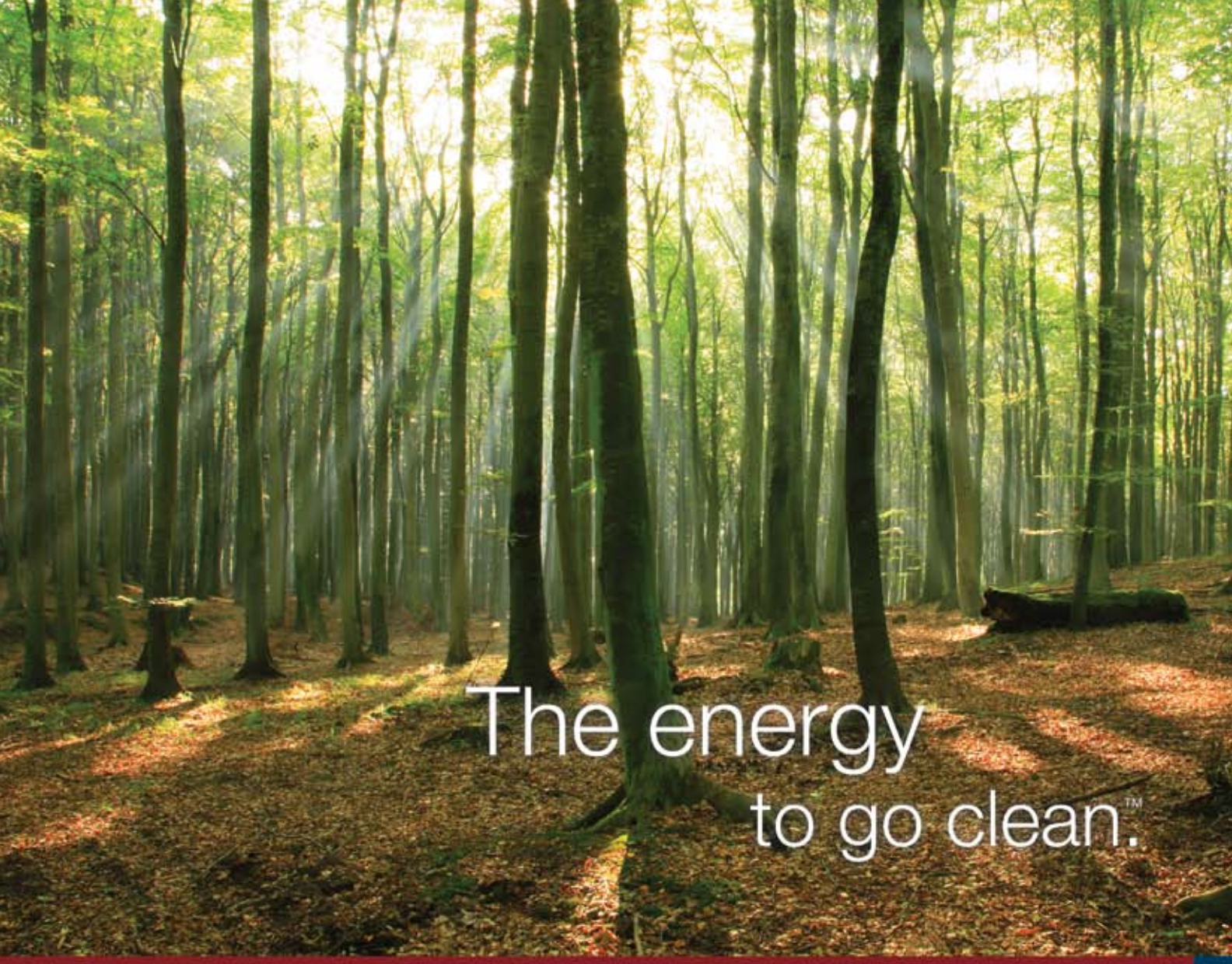

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