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January 2008 Volume 13.01



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16 New Year's Resolutions for T&D

With this first issue of the new year, we offer you a look at how utilities from Alaska to New York are planning for their T&D projects in 2008. Additionally, grid expert Frank Hoss from GE Energy gives us a look beyond 2008 with his view of the perfect grid of the future.

30 DistribuTECH/TransTECH 2008: **Building the Smart Grid**

When DistribuTECH and its new companion show, TransTECH, come to Tampa, Fla., Jan. 22-24, Smart Grid 101 will officially be in session. An estimated 4,500-plus attendees and 270-plus exhibitors will be learning how to make their respective utility systems more intelligent.

48 Utilities at a Crossroads—Invest **Now or Pay Later**

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56 Using the Common Information **Model for Enterprise Integration**

Do the benefits of using the Common Information Model for enterprise intergration outweigh the costs? The answer is a definitive: "It depends."

68 No Single Bullet Wounded the World Transformer Market

The power industry buzzes with talk of transformer prices. Is there a single reason for the rise in transformer costs, and what does the future hold?

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t about 4 o'clock the morning of Dec. 10, I woke up to what my sleep-addled mind could only guess was an alien invasion on the order of what Spielberg portrayed in his War of the World's remake.

It was the sound that woke me up: A combination low-pitched but loud humming, buzzing, crackling and metallic banging. That's the best I can do; it would take a wordsmith

The Ice Storm Cometh

Steven Brown, editor in chief



on the order of H.P. Lovecraft to accurately describe the otherworldly clamor echoing through my backyard. Have you seen the trailer to that new movie "Cloverfield"? The one where some unseen but apparently huge beast sends the Statue of Liberty's head rolling down a New York City street? It sounded like that.

It was the sound that woke me up, but what truly put me in the apocalyptic mind-set was the eerie green light flooding my bedroom. What could it be other than advance scouts preparing the way for Martian colonization or Cthulhu risen from the deep?

Somewhere between the second and third series of buzz-hiss-boom and flash of green light, I had my senses about me enough to realize the icy rain that had started falling before I went to bed must have accumulated to the point of pulling down some power lines and popping some transformers. Subsequent sounds of tree limbs cracking and falling, and a quick, fearful peek out my back window, confirmed that this was the case.

The rest of the early morning hours were spent in fitful half-sleep, as I listened to transformer after transformer popping in the distance and wondered how much ice it would

take to bring down the tree that hangs over my garage.

As unpleasant an awakening as it was, the following days have been worse. As I write this article, I remain one of 600,000-some Oklahomans without power. They're calling it the worst outage in state history, and I'm not going to argue with them. (Happy Centennial, fellow Oklahomans!) Our office is on emergency generator power, and maybe half the computers are up and running. (Mine is one of the lucky few.) Back at my house, we're on about hour 56 without power. We've run through all the Dura Flame logs the stores have to offer, and I'm now gathering up wet fallen limbs from the yard to fuel the fireplace and warm at least one small part of one room in our house.

AEP's Tulsa subsidiary, Public Service of Oklahoma, reports it will take a week to 10 days to fully restore power. I'm not about to judge them harshly; the town looks like it's been bombed in places. I applaud the efforts of local PSO workers and the thousands that have come in from neighboring utilities to lend a hand. Godspeed, you noble linemen!

It's an experience that really makes you appreciate electric power and the discomfort that follows when you're without it. In this issue, we polled a number of utilities about their plans for grid improvement in 2008 and beyond. Since it's our January issue, we'll call this collection of reports "New Year's Resolutions for T&D."

I'm a consumer of electric power rather than a provider, so I don't have a T&D resolution. What I do have is a T&D holiday wish: Restored power and continued reliability throughout 2008. As it turns out, I'm an electric power addict, and the withdrawal pains are miserable. **\(\)**

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Europe advisory committee met in late November to plan the upcoming June conference. Attendees can expect expert presentations from RTE, Areva, ABB, ESRI, and CESI—just to name a handful of those accepted. The two tracks will cover the smart grid and system performance, respectively, with individual sessions in network applications, operations, power markets, communications, equipment performance, measurement, asset optimization and a special panel on looking at "people as assets" within your organization. POWERGRID Europe is scheduled for Milan's Fiera Milano June 3-5, 2008.

Echelon Smart Meter Approved in Canada

The Networked Energy Services (NES) smart meter from Echelon has received certification from

Measurement Canada. Echelon's NES

meter, which includes a built-in, remotely controllable 200 amp service disconnect switch and built-in power line networking communications, has been approved for measurement of active (kWh) and reactive (kvarh) energy as well as for use as a bi-directional meter with registers for delivered and received energy, making it the first meter with this combination of features approved for revenue use in the Canadian market.

More information regarding Echelon's North American NES meter can be found at www.echelon.com/metering/datasheets/EM-502xx-ANSI.pdf.



World's Largest SVC In-service at Allegheny Power

The world's largest Static Var Compensator (SVC) was placed in service in early December at Allegheny Power's Black Oak Substation near Rawlings, Md. The installation is expected to enhance the reliability on Allegheny Power's 500-kV Black Oak-Beddington transmission line—one of the PJM area's most congested lines—by quickly changing reactive power levels to control the line's voltage. In addition, the SVC will enable increased transmission capacity on multiple 500-kV lines in the PJM region.

The project came about as part of PJM's Regional Transmission Expansion Plan, which identifies upgrades and additions to ensure transmission system reliability throughout the multi-state region.

"The Black Oak SVC will benefit millions of customers by providing a new level of reliability to a critical transmission line serving the Mid-

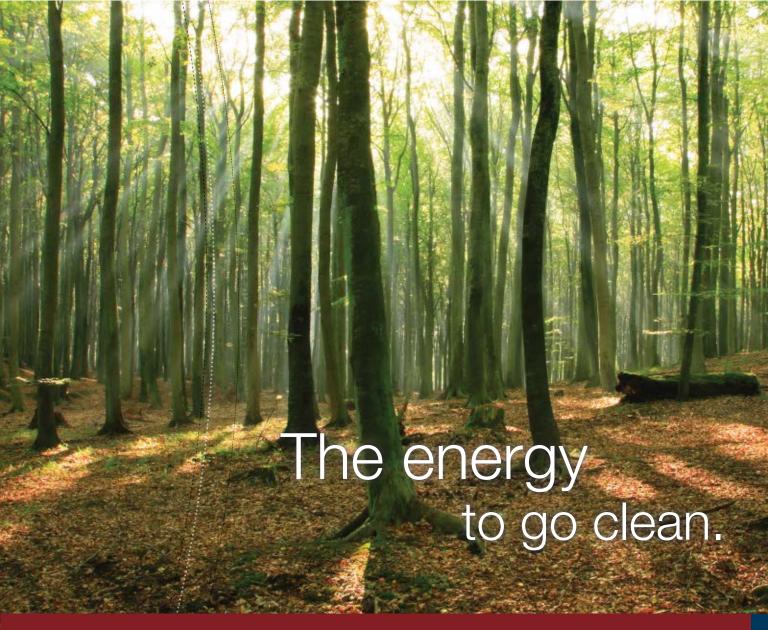
Atlantic region," said David E. Flitman, Allegheny Power's president. "Further, allowing more power to flow on existing lines is an important step in keeping pace with the region's increased demand for electricity."

An SVC is a type of flexible ac transmission system (FACTS) device that can provide fast-acting reactive power compensation on high-voltage transmission networks.

ABB completed the Black Oak SVC turnkey project in 14 months, record time given its size, complexity and scope. The Black Oak SVC is equipped with ABB's advanced MACH 2 control system that will be capable of controlling the SVC's operation, as well as the switching of 500-kV capacitor banks connected to the same substation.

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What's the Solution to the Transformer Price Problem? By Gerry Yurkevicz, Global Insight

Editor's Note: Yurkevicz participated in our story on transformer prices (see page 68), but he gave us a wealth of information that we couldn't manage to squeeze into the short article. Therefore, we've included a few tidbits here in the news.

There are a number of initiatives that utilities are taking to better manage in such a sourcing environment.

Equipment, material and labor markets important to utilities have become complex quickly. One utility senior management team pointedly remarked to us on how much time they have spent over the years on coal and natural gas markets, and now carbon and climate change issues, but almost no time on steel, equipment, or construction contractor markets and issues. Many utilities are trying to build market intelligence capabilities in a number of ways: through internal staff development, increased supplier interaction, or use of third-party information. Utilities must know much more about their suppliers. For example, utilities must use information on global cost reduction initiatives that transformer manufacturers are implementing in their own manufacturing, sourcing and administrative areas to improve utility sourcing results.

• Improve cost estimating processes: You can't just inflate everything by 3 percent per year anymore. A range of companies—from utilities, project developers and EPC firms—have gotten estimating wrong and suffered at the bottom line. Many utilities are developing category-specific forecasts to improve cost and project

estimating processes to better plan, budget and develop rate filings.

• Improve strategic sourcing and supplier relationship management competencies:

Utilities face significant negotiating and supplier management issues in markets such as transformers, where they are confronted with a limited supplier base in North America. To have a chance, utilities must extract all the value they can from the planning, supplier selection, negotiating and contract implementation processes. As a result, many utilities find that strengthening two core procurement functions—strategic sourcing and supplier relationship management—are the keys to improving performance.

- Build supplier relationships as well as attack the demand side: Working closer with suppliers to buy better as well as focusing on standardization and consuming better often improves sourcing results in equipment markets such as transformers.
- Search out new suppliers: The world is growing, and most of that growth is outside of North America. We expect strong regional equipment suppliers to emerge over the next five years in these new growth markets. Now is the time to begin a focus on supplier selection to take advantage of these future opportunities.

Yurkevicz is a managing director in Global Insight's worldwide Energy Group. He directs Global Insight's new Utility Sourcing Advisory Service.





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Allegheny Power to Upgrade West Virginia Line

Allegheny Power, a division of Allegheny Energy Inc., will install 3M's high-capacity Aluminum Conductor Composite Reinforced (ACCR) to upgrade a key line linking the Bedington and Nipetown substations along Interstate-81 in West Virginia, according to Tim Koenig, head of 3M's high-capacity conductor program.

Allegheny Power serves 1.7 million customers in four states, including Pennsylvania, Maryland, West Virginia and Virginia. It owns approximately 9,760 megawatts of generating capacity.

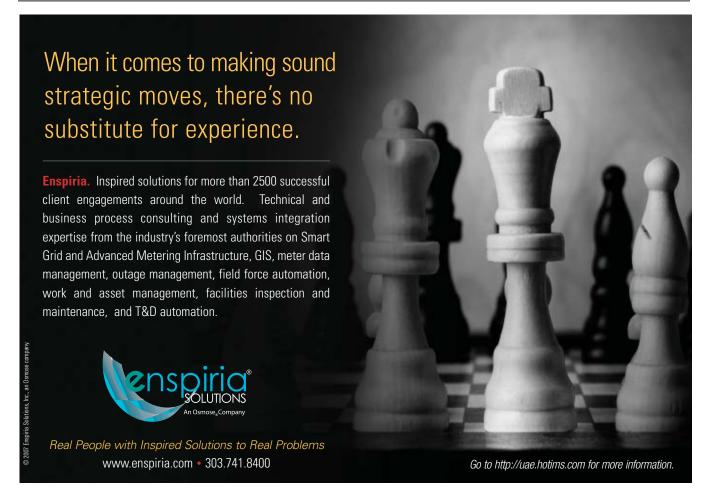
The 1.7-mile 3M ACCR upgrade will boost transmission capacity on a line serving growing communities in West Virginia near the border with western Maryland, some 50 miles northwest of Washington, D.C. The 138-kV line, which will share structures with three other lines for most of its length, including two underbuilt 12-kV lines, has a flow of 2,200 amps and is expected to peak at a temperature of 200 degrees Celsius. The line is built on self-supporting steel poles with drilled pier concrete foundations.

Richard Hoch, an engineer for Allegheny Power, said "The 3M ACCR we chose for this project gave us the ability to leave the under-built 12-kV circuits in service during construction and to avoid structure replacement. We also needed a conductor that



sagged neatly with an adjacent 954 ACSR conductor on the same structure. By using the 3M ACCR, the money and time saved was invaluable on this fast-paced project."

3M ACCR was developed with the support of the U.S. Department of Energy, which tested the conductor at its Oak Ridge National Laboratory (ORNL) in Tennessee, and with early contributions by the Defense Advanced Research Projects Agency.



12 UA January 2008

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Reduced Copper Wire Thefts at PSE Substations

To combat an increase in copper theft resulting from a worldwide spike in the price of copper, Puget Sound Energy has initiated several measures to deter thieves, protect lives, and keep its electric system operating.

By combining new deterrent technologies with increased law enforcement, PSE has decreased copper thefts from its substations

Reduced copper wire thefts at PSE substations

County	1/1/2006 – 10/31/06 incidents	1/1/2007 – 10/31/2007 incidents	% Change in Incidents and Apprehensions
Island	0	0	0%
Jefferson	0	0	0%
King	23	31	35%
Kittitas	2	0	-100%
Lewis	0	0	0%
Pierce	23	8	-65%
Skagit	5	7	40%
Thurston	10	3	-70%
Whatcom	5	0	-100%
Total	68	49	-28%
# of Arrests	4	10	150%

by 28 percent and more than doubled the number of arrests by law enforcement since January in the nine counties where the utility provides electric service.

The new technologies include replacing chain-link fencing around substations with extruded steel fencing, which can't be cut, and applying spray-on microscopic labels to copper wire for

identification by recycling centers and law enforcement agencies. PSE is also replacing copper with new materials such as copper-weld—a steel line coated in copper—which has virtually no recycle value.

PSE is also employing remote monitoring devices, roving patrols and partnerships with local law enforcement to help curb copper theft at its substations.

"With the extra eyes watching our infrastructure we can call local law enforcement to the scene during the crime—not after it has happened," said Sue McLain, PSE's senior vice president of operations.

Since 2005, copper thefts have cost PSE nearly \$500,000, primarily from damage to substations and equipment. A theft of \$50 to \$100 in copper can cost hundreds of thousands of dollars in electrical system damage.

"The costs are much more than the price of the stolen copper," McLain said. "It is the damage to the electric system that is significant. And, the life-threatening safety risk to the people stealing the copper is immeasurable."

In addition to PSE's efforts, a law requiring recycling companies to maintain detailed transaction records and seller information, as well as making it a misdemeanor for companies to knowingly purchase metals from a person convicted of theft or crimes involving methamphetamine, has been a significant factor in the declining thefts.

The law, which took effect in July, already has helped reduce copper wire thefts at PSE's substations. The most dramatic drops in thefts have occurred in Pierce County,

with a 65 percent reduction and Thurston County, with a 70 percent reduction.

The price of copper has risen from 80 cents per pound in 2003 to about \$3.50 this year. Nationwide losses to businesses hover around \$1 billion, according to the U.S. Department of Energy.

Dow Announces Wire, Cable Price Increases

Transformers aren't the only pieces of infrastructure costing utilities more these days (see Getting Equipped, page 68).

Dow Wire & Cable in late November announced a \$.12 per pound increase on all its wire and cable resins, compounds and materials sold in North America. The price increase became effective Jan. 1, 2008.

Jim Burton, North American sales director for Dow Wire & Cable, cites historically high feedstock prices as the chief reason for the increase. "When you couple the high demand for wire and cable materials with the continuing high cost of oil and derivatives, prices for compounds that use polyolefins as their input must be adjusted to reflect those market conditions," he said.





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An Editor's Note on T&D Resolutions To celebrate 2008, Utility Automation & Engineering T&D invited experts from all over the country to predict the future. We wanted to know what different parts of the country are doing and planning: how they are spending New Year's RESOLUTIONS for Resolutions their T&D cash, how the public will interact in the process, how little—or how much—is in the works for the upcoming year. And we got an avalanche of responses from Alaska to New York City. Each little tidbit is unique to the utility and written personally by one of their own, in their own voices. You can find those resolution snippets beginning on page 22. We also asked Frank Hoss of GE Energy to sit down and picture the perfect grid of the future how he would make it all work together if he were elected T&D czar. You can read his article starting on page 18. He leads off our section of 2008 T&D resolutions. Enjoy. - Kathleen Davis, associate editor 2008 Resolutions 2. Write Great American Novel. American Novel. 3. Put in a new, modern substation near 12th street junction. 1. Lose weight. www.utility-automation.com



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Editor's note: We challenged grid expert Frank Hoss to paint us a picture of "The Perfect Grid." He mulled it over and wrote up the following in answer to our challenge.

Perfect Grid, or the Perfect Storm?

By Frank Hoss, GE Energy



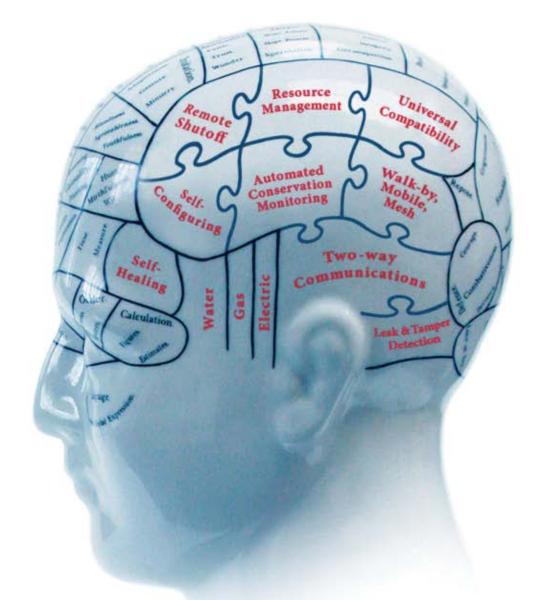
Perfect: the state of being flawless, ideal, complete or just the right thing. Just like the old adage "beauty is in the eye of the beholder," the use of the term "perfect" requires some understanding regarding the intent of its use. Looking at the electric utility industry's present state, and what the future likely holds, can help shape the definition of "perfect."

Some key facts to consider:

- U.S. electricity usage is projected to grow more than twice as fast as committed resources over the next 10 years (50,000 MW by 2014 and 258,000 MW by 2030).
- Peak demand for electricity in the U.S. is forecasted to increase by about 18 percent (135,000 MW) in the next 10 years.
- Committed resources to meet demand, including demand response programs, are projected to increase by only about 8.5 percent (77,000 MW).
- Counting uncommitted resources, total resources would increase only by about 12.7 percent (123,000 MW).
- Many states/regions could fall below their target capacity margins within two to three years if additional supply/demand-side resources are not brought into service.
- 28 U.S. states currently have, or will shortly have, renewable portfolio standards (RPS) in place, anywhere from 3 percent to 33 percent of total generation.
- While several transmission projects were completed in 2007, and a

- number have been accelerated, projected transmission additions still lag demand growth and new generation additions in most areas. Financial pricing, cost allocation, siting and permitting transmission lines remains difficult.
- While the number of proposed nuclear plants sounds promising, because of their large size, the grid will also require expansion and strengthening to provide for reliable integration.
- Power companies have announced more than 140 new conventional coal-fired plants between now and 2025; however, more than 20 of these have been denied permits/cancelled in the last few months. At least six Federal CO₂ legislative initiatives are pending. Regulation at the Federal level is almost certain within the next five to six years. CO₂/greenhouse gas (GHG) emissions are becoming a driving factor in power sector decisionmaking.
- A number of U.S. regions continue to be highly dependent on natural gas as a fuel for electricity generation. Canadian imports have started to decline, and while overseas markets can provide a new supply, it requires construction of liquefied natural gas (LNG) terminals. This increases the grid's exposure to global economic and political risk.
- Electric grid physical and cybersecurity is a primary concern. The electric grid is vital to the U.S. and world economy. This infrastructure must be protected from any acts of terrorism and vandalism/theft.
- Energy customers expect to be provided with choices in their consumption of electricity. Electric prices and consumers' appetite for electricity continue to grow, and the combination no longer makes it an "out of mind" decision.

Summarized, it's not realistic to think



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we can build enough coal-fired plants or install enough renewable generation to keep up with surging U.S. electrical demand and the rising opposition to global warming. EPRI's Intelligrid Project gives an overall, good concise summary of future power delivery system characteristics needed to meet these challenges. This provides a good basis for defining the "Perfect Grid." I believe that three of the seven identified future power delivery characteristics are core to this definition. These are:

- Interactive with consumers and markets.
- Accommodates a variety of generation options, and
- Self-awareness of grid/network operations.

Interactive with Consumers and Markets

Consumers and markets will interact with the electric grid primarily through demand response (DR) programs and dynamic pricing models (real-time pricing, TOU, etc.). These programs have a direct positive impact on GHG emissions reduction resulting from the delayed/cancelled construction of new fossil-fueled generation, can be commissioned within a few years, and offer consumers more choices. Florida Power and Light (FP&L) estimates that customer participation in its conservation and energy management programs has helped prevent the need to build 11 power plants over the past quarter-century.

DR is the proactive management of electric utility loads to more efficiently and reliably market, produce, transmit and deliver energy. Demand response applications can be as simple as the utility interrupting load in response to severe grid transients or supply shortages (direct load control or active demand-side management), or as complex as millions of customers voluntarily reducing their consumption/load in response to price signals (passive demand-side

management). Large commercial and industrial customer DR programs are not new. They have been in place for 20-plus years. This is primarily because the individual loads are larger, requiring fewer controls and automation, in achieving the desired load reduction/ shedding. However, as demand has continued to grow, there has been a noticeable shift in the overall makeup and magnitude of the energy demand peak. Residential consumers now make up about 60 percent of the peak, with unprecedented growth occurring, such as 17 percent growth in the last three years in the U.S. Mid-Atlantic states. Additional DR will have to come from residential consumers. There currently are successful residential DR programs—FP&L has about 750,000 residential customers enrolled with the capability to shed approximately 1,000 MW of load and the ability to obtain almost 2,000 MW, if needed. With the exception of having to address emergencies, DR is generally used to flatten demand peaks.

How much DR is needed to meet growing demand, and, thus, accelerated interaction with consumers, will primarily depend on accepted/legislated GHG emissions targets and the availability of specific new technologies. The Electric Power Research Institute (EPRI) recently completed a study "The Power to Reduce CO, Emissions," showing that the aggressive development and deployment of several advanced technologies could reduce U.S. electricity sector CO₂ emissions by roughly 45 percent by 2030, relative to estimates in the EIA 2007 Annual Energy Outlook base case. Most importantly, the analysis indicates that the rising trend in CO, emissions from the U.S. electricity sector can be slowed, stopped and ultimately turned around. Efficiency (DR programs) is shown to have a significant impact on CO, emissions reduction, with the technology being available today. The amount of DR needed will be highly

dependent on the availability and amount of new technology deployed. In addition to technology choices, the issues of program design, rate structure and customer impact will also have a tremendous influence on DR's success or failure.

For demand response programs and dynamic pricing to work, the utility must have a communications gateway to either directly control the consumer's loads or provide a pricing signal to allow consumers to manage their consumption directly by making the decision when to use appliances/ equipment or as input to a home/ premise energy management panel which automates these decisions based on initial consumer input/ settings. Successful DR to achieve the needed demand reductions will require a combination of active load control by the utilities and voluntary energy management by the consumer. Advanced metering infrastructure (AMI) projects, currently being deployed, are providing the two-way communications infrastructure needed to support these programs.

Accommodates a Variety of Generation Options

Utilities presently generate about 40 percent of the CO, in the U.S. With recent legislative, regulatory, and societal focus on environmental consciousness (e.g., carbon constraints, GHG emissions, global warming), new coal-fired plants are being turned down/denied approval at an unprecedented rate. This leaves the utility with few choices to meet this substantial demand growth and the environmental constraints. Nuclear generation likely won't be available until 2020. Natural gas generation, which can be built within a few years, will be used to meet some of this growing energy demand; however, fuel price volatility and supply susceptibility to global economic and political risk makes it a less favorable fuel choice.

Also, there are currently 11 states with GHG emission targets, 27 with climate action plans, and 28 with renewable portfolio standards. Large investments are being made in wind and solar generation, at both transmission and distribution levels; however, until sufficient energy storage devices are available, utilities will have to address the problems of intermittency. For example, a recent California energy market study of the deployment of 33 percent RPS will require an additional 1,700 MW of quick-start generation, 40 additional transformers/substations, 1,860 megavolt amperes reactive (reactive power) in voltage support and day-ahead forecast errors upwards of 100 percent greater. Cal-ISO will also need 6,000 MWh of additional flexibility (up from the present 4,300

MWh). It's worth noting that many wind farm sites will require transmission infrastructure investments to get the power from wind-rich, remote locations to the load centers. A number of the new coal-fired power plants that have recently been turned down had transmission infrastructure investments included, resulting in this no longer being available for co-located wind projects. Residential consumers will have to support a portion of this through DR, which is the only capacity resource with a positive environmental impact and yet acts like a gas peaking plant to the utility.

Self-Awareness of Grid/Network Operations

The electric utility transmission grid, distribution network, and load serving

entities (LSE)/retail customers have operated largely independently, both externally across, and internally within, their respective organizations. Looking ahead, as the operating environment becomes more dynamic, reliably generating, transmitting, delivering and consuming electricity will require these entities to work much closer together, i.e., have a "self-awareness" internally as well as externally to conditions that are critical to grid/network operations, protection and control. This self-awareness will provide for the automated operation, protection and control of the grid/network, and data/ information to utility personnel to make decisions. Embedded communications/ sensors will provide the capability for these utility environments to efficiently work alone and together, as required,



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www.utilitv-automation.com January 2008 UA for normal operations and in response to abnormal or emergency conditions. This will facilitate substation and distribution automation, provide for predictive rather than reactive response to emergencies or abnormal conditions, and in some cases even be self-healing. Under normal operations, this will facilitate the best use of resources and equipment (e.g., more granular availability of voltages and loads across the network could be used to control cap banks, load tap changers, VARs, etc.).

"The Perfect Grid," as defined here, looked at the environment that electric utilities are likely facing. Predicted demands are far out-pacing committed supplies, environmental concerns are driving business decisions, and consumers must become much more involved.

However, maybe "perfection" should be viewed as a journey, not an end state. Perfection will not be achieved overnight, in the next year, or perhaps the next decade. It is an absolute, however, that the future

electric environment will be much more dynamic and interdependent, and utilities must develop a roadmap based on the plausible scenarios likely to be encountered. Their success depends upon it, or the "Perfect Grid" may become, the "Perfect Storm."

Hoss is GE Energy's regional T&D marketing development manager for the Americas, focused primarily on the development of advanced metering and distribution "intelligent grid" solutions. In this capacity, he evaluates potential regulatory, legislative, environmental and societal influences on utility operations, and assists utilities in developing a comprehensive roadmap to successfully meet these challenges.

Utility New Year's Resolutions

AEP's Eye on 2008

By Carl English, President, AEP Utilities

Like many electric utilities, American Electric Power is taking a comprehensive look at how we deliver energy and manage our distribution assets in the face of environmental concerns, higher prices and a growing consumer awareness of climate change issues in 2008.

AEP, with 5.1 million customers in 11 states, is one of the largest electric utilities in the nation. Because of our size, we have a large footprint in almost every aspect of the business, but none more so than environmental. We take great pride in our leadership on issues such as clean-coal development, carbon capture and greenhouse gas emissions, but realized that one element was missing from many of these efforts—and that's distribution.

So Mike Morris, our chairman, president and chief executive officer, gave us a challenge: Develop new ways to conserve energy, improve our environmental performance and provide customers with greater reliability and control over their own energy future. Hence the creation of "gridSMART."

gridSMART is a comprehensive effort by AEP to transform customer service, energy efficiency and distribution operations by employing distribution automation and smart meters. But gridSMART is more than new automation—it's also about making us think about our own energy usage. This ranges from the amount of fuel we use to run our vehicle fleet to internal transmission and distribution line losses to how we can upgrade our buildings



AEP Utilities President Carl English (left) talks with Gary Cannon, distribution system supervisor for AEP affiliate Public Service Company of Oklahoma, in Tulsa, Okla.

with the same systems we encourage our customers to use. It's also about understanding how automation will allow us to work more efficiently, thus reducing our own energy consumption.

Because of our size and the number of jurisdictions we serve, deploying gridSMART will be a multi-year project. We have an industry-first partnership with GE Energy to develop advanced meters and technology platforms to

facilitate gridSMART features. We plan to install advanced meters in two midsized cities of approximately 100,000 customers each to test the technology and gauge customer response in 2008. Those pilots also will allow us to see how the new technology will affect internal processes such as outage response, call center interaction with customers, crew management, order processing and related tasks.

The gridSMART project also anticipates the use of distributed resources, such as sodium sulfur batteries, which we have begun to deploy. We expect to add 6 MW of NAS battery capacity in 2008 to enhance system reliability. We have a goal of 25 MW in place by 2010.

We expect to have all of our customers on smart meters by 2015, pending regulatory approval.

On the transmission front, our hands are already full. We expect to begin extending our 2,100-mile-plus 765-kV system to create an interstate transmission grid for the United States. With our partner, Allegheny Energy, we will begin siting the Potomac Appalachian Transmission Highline LLC (PATH), a 250-mile 765-kV transmission line in West Virginia.

In September AEP and ITC Holdings

Corp. completed a study for 700 miles of 765-kV transmission in Ohio and Michigan that would connect to the existing 765 system in Ohio. The proposals require PJM and MISO approval.

We are also considering substantial transmission development with our partner, MidAmerican Energy Holdings Co., for Electric Transmission Texas, LLC, in the Electric Reliability Council of Texas (ERCOT), and with Electric Transmission America, LLC, elsewhere in the United States. Development of a robust interstate transmission grid will benefit U.S. consumers by improving market efficiency, removing barriers to access for renewable power and newer technology generation, and improving network reliability to a level the U.S. economy deserves.

B.C. Hydro Gives a Quick Glimpse at the Year

By Craig Befus, Distribution Standards

BC Hydro has started work on a few major initiatives in distribution and substations. In substations, we have an active project to replace electromechanical relays with new smart relays that include metering. On the distribution side, we have begun efforts toward building our smart grid and smart metering infrastructure (SMI).

One objective is to find a common wide-area communications infrastructure that can support both smart grid and SMI—even though the communication requirements differ significantly. As part of the smart grid push, we are looking at extending SCADA to line reclosers, switches, regulators and capacitor banks as well as looking to automate operation of

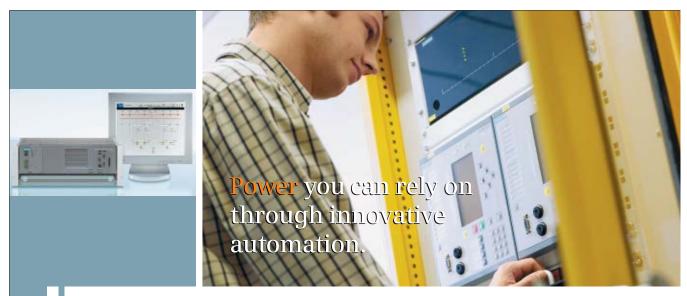
these devices in certain areas.

We have a Volt VAR optimization project underway that will improve system efficiency and lower consumption at peak load periods. We are also looking at communications to remote faulted circuit indicators. The SMI project scope presently includes extensive feeder telemetry, customer metering, and time-of-use rates to account for all energy and provide incentive to our customers to conserve energy.

AP&T's "Strategic Vis-olusion Initiatives" for 2008

By Mark McCready, Director of Marketing

I must admit, the invitation to submit a bit of discourse regarding Alaska Power & Telephone's plans for 2008 in terms of "resolutions" struck an odd chord. Most of us utility types tend to mold our tall



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Mark in the field at Kasidaya Creek Falls near Skagway, Alaska.

tales around phrases such as "strategic planning, initiatives or ... corporate vision." Hence the headline incorporating corporate-speak and the magazine's New Year's request to share with our peers who we are and what we're up to in 2008.

AP&T is an employee-owned energy, communications and data services provider serving Alaskans since 1957. One hundred forty-four employees serve more than 30 communities stretching from the Arctic Circle to the southernmost tip of southeast Alaska. The demographic alone presents its own unique challenges. Distances are vast, costs to provide services to very remote communities are high and weather provides the third piece of a trifecta that is a wild-card unto itself.

End of commercial, on to the facts: The energy side of the house has taken a leadership role in the development of renewable resource opportunities in Alaska, AP&T will continue that focus in 2008 with the completion of our fourth small hydro facility just south of Skagway, known as Kasidaya Creek Hydro. The company has shifted its energy production carbon footprint in the last 12 years from 99 percent fossil fuel, to over 70 percent renewable-base energy production. A Denali Commission grant funded Hydro-Kinetic river-turbine project is in the works for the Yukon River at Eagle even as test towers gather wind data near Delta for a potential wind farm venture at that location.

Not to be outdone, the

communications and data segment will focus resources toward the build-out of mountain-top network facilities enabling enhanced delivery of high-speed broadband data services to several southeast Alaskan communities. Progress on this network in 2008 will be a keystone in AP&T's broader plans for the southeast.

And, just like many of our personal resolutions, what T&D resolution would be complete without the resolve to get some of those pesky line maintenance items behind us in the New Year. With that thought, I'll end by sending safe and health-filled wishes to our peers in 2008.

Con Edison Builds for New York's Future

By Mary Ellen Conlin, General Manager, Environmental Engineering

When you're running the largest underground electrical system in the United States that serves Times Square and the media, financial and fashion capital of the world, plus world headquarters for Pepsi Cola and IBM, reliability is paramount—and Con Edison's reliability is No. 1 in the nation.

To maintain that reliability and plan for the future, Consolidated Edison Company of New York Inc. (Con Edison) filed a three-year rate proposal with the New York State Public Service Commission (PSC) seeking support for continued significant investments in its electric-delivery infrastructure, as well as demand-reduction and energy-efficiency initiatives. The filing began a nearly yearlong public review process with the PSC and interested parties that will wrap up in the spring of 2008.

Con Edison has been a part of the economic engine of the New York metropolitan area since the late 1880s when Thomas Edison threw a switch on Pearl Street in the shadow of Wall Street. One of the oldest electric utility systems in the United States, Con Ed operates 94,000 miles of underground transmission and distribution lines and more than 36,000 miles of overhead

transmission and distribution lines. The company distributes electricity to more than 3.2 million customers in New York City and Westchester County, serving more than 9 million people and meeting the energy needs of 44 million visitors a year. Con Edison's service territory, while relatively small geographically, represents approximately 40 percent of New York State's peak electricity demand.





These pictures illustrate the work Con Edison is doing to upgrade and reinforce the system for the 9 million New Yorkers the company serves.

Electric demand in Con Edison's service territory is growing at approximately 1.5 percent per year. Construction is booming in every neighborhood throughout the region. In New York City and Westchester County, significant economic development projects are under way or being planned from the new rail link at Howland Hook on Staten Island to the Freedom Tower rising in Lower Manhattan to the new Yankees and Mets stadiums in Bronx and Queens, to the development of the Atlantic Yards in Brooklyn, to the new homes going up and businesses opening in Westchester County.

As New York begins to face the challenges of the 21st Century, the company's rate proposal seeks the necessary revenue critical not only for addressing short-term conditions, but also for providing long-term solutions to support the energy strategies proposed by the governor and the mayor.

Significant infrastructure investments will include replacing or installing more than 10,000 miles of cable; 4,500 transformers; 3,000 composite covers, along with equipment modernization such as upgraded remote-monitoring systems on over 12,000 underground transformers. Over the term of the three-year rate proposal, the company's investments would include:

- \$918 million to construct new substations and to upgrade and replace existing substations;
- \$683 million to strengthen the electric distribution infrastructure;
- \$340 million to install advanced metering infrastructure and automated meters; and
- \$154 million to improve storm response and coastal storm mitigation efforts.

Our filing expands the energy-efficiency incentive programs available to both residents and business owners. Con Edison will continue working with customers to install energy-efficient lighting, refrigeration, motors, programmable thermostats for air conditioners, and clean distributed generation. The company is also continuing demand-response programs that pay businesses to reduce electric use during peak summer days.

Among the other initiatives that Con Edison has requested in the new rate proposal are:

- The continued development and demonstration of new fault-current limiters to facilitate the connection of renewable and distributed generation;
- Installation of advanced sensors and communications technologies to better monitor and control the secondary system; and

Further development of the "3
 G System of the Future," a new
 design for the city's underground
 infrastructure that would reduce
 congestion under the streets and
 maintain reliability through asset sharing technologies.

Renewable Energy, Network Planning Top Hawaiian Electric's List of Resolutions

By Ken Morikami, Engineering Manager

In 2008, Hawaiian Electric Company (HECO) will continue to demonstrate leadership in the areas of renewable energy and network planning and maintenance. Recently, we sought approval from our regulators for a proposed program to expand our transmission and distribution system to areas of known renewable energy resources. This will help to facilitate

the development of renewable energy projects as HECO is supporting the State of Hawaii's goal of reducing fossil fuel dependency. By providing these needed transmission and distribution interconnections and other operations-related equipment, more renewable projects can become commercially viable and can be integrated into our grid in a way that maintains system reliability.

But HECO's plans for T&D expansion don't stop there. Unlike other utilities across the country, HECO's electrical system is isolated and not connected to other grids. Therefore, the company must be completely self-reliant in all areas, including generation, transmission and distribution. This means keeping our existing assets in peak condition and planning for future expansion.

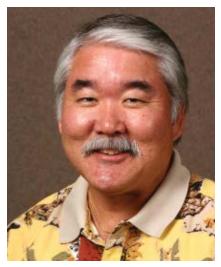
Keeping these guiding principles in mind, the company's T&D projects focus

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on three areas: accommodating new growth on the island of Oahu; managing existing aging assets; and responding to requests from customers.

The western part of Oahu has seen rapid development in recent years, and that trend will continue for the foreseeable future. The University of Hawaii plans to break ground in 2008 on a new West Oahu campus. The area is also expected to see new major shopping centers with big-box retailers such as Target, Costco and Wal-Mart setting up shop within a few years. This area will also be the future home to the first Disney hotel and resort complex not associated with a theme park.



Ken Morikami, Engineering Manager of Hawaiian Electric Company, gave UAE the details of the utility's plans for this year.

The development in West Oahu is not limited to commercial projects. In 2008, another 1,000 residential units will be added to the area. By 2012, this will jump to 8,000 units. Much of this land was historically used for agriculture or was not developed and therefore does not have much utility infrastructure in place. So, beginning in 2008, HECO plans to design and construct new substations, along with associated 46-kV subtransmission lines and 12-kV distribution lines, to serve the projected increase in load in the area.

Like many utilities across the country, Hawaiian Electric is committed to the challenge of managing its existing aging T&D assets to extend their useful life. In 2008, the company has prioritized continued replacement of 10-MVA transformers at distribution substations. This program will continue on into the foreseeable future, as worldwide there is currently a lengthy lead time to procure new transformers.

Hawaiian Electric also works closely with various government entities and other customers who request T&D facilities be relocated to accommodate construction and development plans. The company has always strived to maintain a close relationship with its customers, a practice which will carry on in 2008 and beyond. HECO is also looking at new technologies to better serve our customers. We are currently in the midst of an expanded advanced metering infrastructure pilot program that runs through early 2008. These "smart" meters could potentially offer customers a variety of pricing options and could enhance energy conservation efforts.

Wisconsin Public Service Reveals 2008 Plans

By Otto Marquardt, Manager-Electric Distribution Engineering, and Greg LeGrave, Director-Electric Distribution Planning

Wisconsin Public Service Corp., a subsidiary of Integrys Energy Group, serves about 420,000 electric customers and is based in Green Bay, Wis. The company, generally known as one that is intent on providing the latest proven technologies in providing reliable service for customers, expects a wide range of transmission and distribution projects to be in varying stages of completion in 2008.

Perhaps most significantly, the company will see the complete energizing of the 220-mile 345-kV Arrowhead (near Duluth, Minn.) to Weston (Central Wisconsin) transmission line. Work on the line began in 2002 following a three-year approval process. Siting for the line proved contentious, as many individuals and a few governmental organizations

opposed the project. The line will ease serious constraints of the electric grid in Wisconsin.

The company will also begin operating the 500-MW coal-fired Weston 4 Power Plant and associated substations.

WPS is nearing completion of a major system-wide voltage conversion to 25 kV. The company began the conversion in the 1960s—well ahead of most other utilities.

With the rapid rise of renewable energy requirements, Wisconsin will see several wind farms being completed in the state. In preparation, WPS is making modifications to its Wesmark substation near Denmark, Wis., to accept a connection from a nearby 20-MW wind facility.

Also on the renewable front, the Ringle Landfill near Wausau, Wis., will begin producing about 2.5 MWs of electricity. WPS is preparing to connect the capacity to its system east of Wausau.

In addition, the company is planning to implement additional distribution automation switches that will automatically open and close to help customers with service restoration following unexpected electric outages.

In its Green Bay division, WPS plans to undergo a pilot project to control capacitors from a central location using remote communications.

The Next "Big Build" is on the Horizon for Idaho Power

By Lynette Berriochoa, Corporate Communications Specialist

On some days, particularly hot summer afternoons, Idaho Power's transmission lines are full. Like a busy California freeway during rush hour, we can't get one more car—or one more electron—on the lines.

This requires action. Planners knew this time was coming. Company leaders anticipated a big investment. Project leaders are gearing up for some extraordinary 500-kV transmission projects that connect Oregon, Idaho and Wyoming.

"We are seeing continued growth and

increasing demand. We can't maintain the pace we're at right now without making some big changes. We can't eke any more magic out of the system," said Lisa Grow, vice president of Delivery Engineering and Operations.

That magic is something customers don't see but expect to happen each time they flip a light switch. And Idaho Power's employees often work magic on those hot summer afternoons, trying to keep the electrical supply and demand in balance.

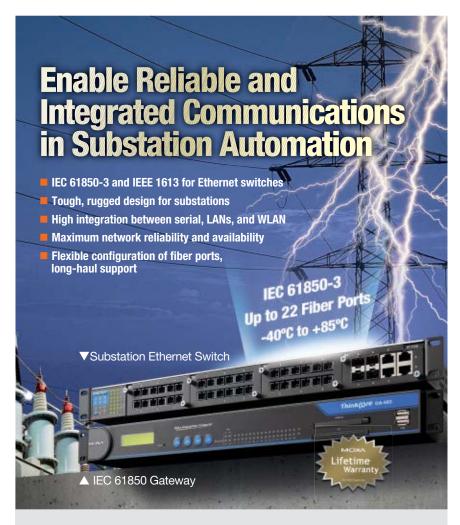


Lynette Berriochoa goes behind the scenes at Idaho Power.

"Based upon the current trends, we know new generation resources must be built; we just don't know yet where or when," Grow said. "Knowing where the transmission will be helps to remove uncertainty for the generators. Because it takes longer to build transmission than it does to build a generator, it makes sense to have transmission built first.

"And building new infrastructure is something we're good at," she added. "That's one of our core competencies and this will be an exciting and challenging opportunity for many employees. We have a rich tradition of vision and of doing things well. We say 'fair-priced, reliable energy today and tomorrow'; this is the 'tomorrow' part of that statement."

Idaho is a key place in the interconnection, and Idaho Power is acting quickly through partnerships, like the one with PacifiCorp on the joint



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Gateway West Transmission Project. Grow said it's an economy of scale. Working together, utilities can build fewer projects to meet their needs, rather than each building individual projects. It's more responsible and more cost-effective, she said.

In 2008, Idaho Power and PacifiCorp will continue to define and refine the project specifics for Gateway West, a transmission project spanning southern Idaho and central Wyoming. The proposed line is about 650 miles long.

The preliminary work—rating, permitting and right-of-way acquisition—will dominate the next couple of years. Idaho Power will be pursuing similar steps for the Hemingway-to-the-Northwest project, a proposed 260-mile, 500-kV line into Oregon. The company is working through the regional planning entities and the states to ensure an open, public process.

As Idaho Power begins the steps for the Gateway West project, others in the region are working within the same philosophy and developing other projects.

"The regional projects that are currently under discussion have great synergy with the Gateway West Project," Grow said. "These new lines will allow flexibility and will create some dynamic trading points in the Western Interconnection that today is highly constrained. In the end it helps ensure the lowest-cost resource for our customers."

KCP&L Looks Ahead

By William Menge, Manager, Distribution Reliability, Asset Management and Automation

In 2008, KCP&L will be in the third year of implementing our award-winning Comprehensive Energy Plan (CEP). The CEP is an innovative five-year strategic plan that was created in collaboration with a wide array of stakeholders. KCP&L engaged regulators, government officials, customers, employees, labor representatives, suppliers and environmentalists in a truly collaborative effort to shape the way we generate, deliver and use energy in our region.

The CEP addresses 5 categories key to KCP&L's business and our region:

- Environmental Improvements,
- New Wind Generation,
- New Coal-Fired Generation,
- Infrastructure Improvements, and
- Affordability, Efficiency and Demand Response Programs.

The balanced portfolio and collaborative approach employed in gaining acceptance for the CEP were the main reasons KCP&L won EEI's coveted Edison Award in 2007.

Environmental Improvements

Environmental upgrades will continue at two coal-fired plants to continue reducing emissions to meet or exceed existing and anticipated federal air quality standards.

New Wind Generation

Plans will progress for the installation of the next 100 MW of wind generation in addition to the 100 MW commissioned in 2006.

New Coal-Fired Generation

Construction will continue on a new 850-MW low-emission, coal-fired generation plant in Missouri.

T&D Infrastructure Improvements

To maintain KCP&L's high reliability and customer satisfaction levels, the CEP provides for accelerated investments in T&D infrastructure in three arenas: distribution asset management, transmission asset management, and distribution automation with the following components:

- Distribution Asset Management:
 Distribution system inventory and condition assessment, proactive URD cable replacement, URD cable injection, and programs to address poor performing pocket areas.
- Transmission Asset Management:
 T&D circuit breaker replacement,
 RTU replacement, wood pole and structural replacements, transmission disconnect switch replacement, and

- shield wire replacement.
- *Distribution Automation:* Faulted circuit indicators, underground network automation, relay automation, dynamic voltage control, 34-kV automated switching, and rural power quality. (See "KCP&L Plan Energizes Distribution Automation" in the September 2007 issue.)

Affordability, Efficiency and Demand Response

This component provides for affordability programs for low-income families, weatherization programs, high-efficiency lighting and appliances, online energy analysis tools, and energy training for customers. Putting more control over energy management in the hands of customers has potential to reduce overall demand.

Additional Initiatives for High Reliability and Customer Satisfaction

In October, KCP&L was named winner of the 2007 ReliabilityOne National Reliability Excellence Award by PA Consulting. KCP&L also achieved top tier performance in J.D. Power and Associates' Customer Satisfaction survey in 2007. In order to continue performing at these high levels, KCP&L will continue with a variety of additional T&D programs that fall outside the CEP. A sampling of these additional initiatives includes: assertive URD cable maintenance and replacement; worst-performing circuit improvements; capacity additions matched with regional growth; installation of a new energy management system; growth of our mobile computing platform; and smart grid research to name just a few.

Merger with Aquila in Missouri

Lastly, KCP&L plans to complete a merger in 2008 with Aquila in the state of Missouri. Significant effort and resources will be focused on completing a successful integration of Aquila's Missouri Electric assets and customers into KCP&L in 2008. <<



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s marketing buzz terms go, "smart grid" and "intelligent grid" are pretty good ones. After all, who would want our power grid to operate at anything less than a genius level? When DistribuTECH and its new companion show, TransTECH, come to Tampa, Fla., Jan. 22-24, class will officially be in session. Call it Smart Grid 101. The goal of all attendees should be to gather enough knowledge in Tampa so they can go back to their home offices and "tutor" their T&D systems up a letter grade or two.

DistribuTECH/TransTECH 2008: Building the Smart Grid

The learning session starts even before the main conference kicks off. Pre-conference Utility University full- and half-day courses take place on Monday, Jan. 21. Refer back to the November issue of Utility Automation & Engineering T&D, or to the show website at www. distributech.com, for details on UU courses. **UA January 2008** www.utility-automation.com



It wasn't that long ago that ideas like AMR and remote disconnect seemed pretty futuristic.

Today, companies like Cannon Technologies, Inc., Carina Technologies, DCSI, Hunt Technologies, and Itron are building innovative systems that do just that – with interbases and connectors from Brooks Ekstrom.

And it's no wonder we've led the way in facilitating the integration of these new

technologies at the meter socket. Our solid modeling – 3D design, and rapid prototyping capabilities expedite delivery to market. After all, we've been the leader in meter-related adapters, connectors, extenders and modifiers for half a century.

And now, we're developing the components for whole new generations of meter-based applications, from dish satellite and generator

interfaces, to remote powering solutions for fiber-to-the-home applications. And ringless socket applications are now made easier with our new slide and snap coupler adapters.

So go ahead and dream up a new application.

Chances are, we already have the answer.

See us at DistribuTECH Booth #1239



UTILITY PRODUCTS GROUP

BROOKS SECURITY PRODUCTS

BROOKS EKSTROM

BROOKS METER DEVICES



Go to http://uae.hotims.com for more information.

Show in Print

Bright and early Tuesday morning, Jan. 22, class shifts into high gear with an 8:30 a.m. Keynote Session focused on "Building the Smart Grid of Tomorrow Today." The opening session for DistribuTECH and TransTECH 2008 will feature three speakers with a firm grasp on what it will take to get today's grid closer to the genius level: Don Cortez, division vice president, regulated operations technology, at CenterPoint Energy will kick things off. CenterPoint is in the midst of an "intelligent grid" project that's been getting a lot of press attention, both in the trade and general media. Cortez will fill us in on CenterPoint's efforts and provide motivation for other utilities to champion their own smart grid efforts. (Editor's note: Don Cortez replaces the originally scheduled speaker from CenterPoint, Georgianna Nichols.) Jeff Sterba, chairman, president and CEO of PNM Resources, will also speak in the keynote session. Sterba is a proponent of smart electrical devices, open architecture communication systems to interconnect those devices, and innovative

regulation and rates to foster the grid's development. Headlining the keynote will be former U.S. secretary of energy Spencer Abraham.

Smart Sessions

In a manner of speaking, most all the conference sessions at DistribuTECH deal with the "smart grid," and they always have. Technologies like advanced metering, demand response, distribution automation and outage management have always been at the core of DistribuTECH's conference content. That remains true for this 18th meeting of the annual conference and exhibition.

But a few of the conference sessions this year focus very specifically on the more modern concept of a "smart," self-healing grid. The sessions include representatives from the utilities that are leading the way in smart grid implementation. If you're looking for the true scoop on smart grid technology, listed here are a few can't-miss conference sessions you'll want to check out.

Pulling Together Multiple Technologies to Become the "Utility of the Future"

Tuesday, Jan. 22, 1:00 p.m.

Kansas City Power & Light received the 2007 Edison Electric Institute Award for a "Comprehensive Energy Plan" that includes six distribution automation initiatives: 1) Underground Network Automation; 2) Integrated Circuit of the Future; 3) Substation Reclosing Relay Automation; 4) Dynamic Voltage Control; 5) 34-kV automated reclosers; and 6) Rural Power Quality. The panelists from KCP&L in this session in the "Distribution Automation" track will give a first-hand account of how all these projects work together to enable KCP&L's "Utility of the Future." The panel will be made up of engineers in distribution automation, power quality and reliability, and substation automation.

Evolving to the Intelligent Grid

Tuesday, Jan. 22, 3:00 p.m.
In this session from the "Advanced

Win a Ford Mustang at DistribuTECH

The new generation Mustang is a blend of the best of both worlds, the ever-popular '60s model Mustang with the contemporary performance coupe that is necessary today. The new model is faster, more agile, roomier, quieter and more sporty than any generation of Mustang before. Don't miss your chance to stand in the winner's circle at DistribuTECH with your very own Mustang!



The Odyssey™ Team A Winning Combination



From the Control Center out to your remote-located modems, the RSM* & RMD** together with the Host OCP***, create the only real cyber security perimeter for your Control System.

A few of our Features and Benefits, Product Specifications and Configurable Parameters:

Features and Benefits:

"Remote Service Module

"Remote Modem Defender

"*** Odyssey" Communications Processor
Secure RC4 encryption algorithm 2048-bit encryption strength 5120-bit initialization vector SHA-256 secure hash algorithm ISSAC pseudo-random number generator

Ultra low latency Encrypts legacy serial control networks Support for bit and byte protocols Encryption over TCP/IP
Centralized User Management
Role Based User Access Controls

Remote Hardware Authentication Force Immediate User Logoff Capability Maintenance Modem Protection Centralized User Authentication Centralized Access Logs Real-Time Access Reporting

Real-Time Credential Verification Modem Disable Capability Modem Call Schedule Capability Encrypts Dial-Up Link Connection IED Protection

Centralized User Authentication Integration w/3rd Party Vendor Tools Scalable for Large Networks Centralized Device & User Mgmt Disaster Recovery & Failover Support SCADA Protocol Agnostic

Single Display w/ Overall Status Monitors existing SCADA Line LZW Compression

Serial Bit Protocol Support TCP/IP Link Support High Speed Bit/Byte Translation Centralized Event Log Aggregation Synchronized Time Stamping Intrusion Detection Capabilities Comm. Data Capture Capability Centralized Data Capture, No Cabling Millisecond Level Resolution Capture
Capture Integrated With Link Security Protocol Analyzer Capability

Server Platform Independent No O/S in Field Devices Centralized Firmware Upgrades FIPS-140-2 Compliant

Operating Temperature -40°C to 85°C Power Input Range 12 – 150 VDC Data rate: up to 115,200 bps Flow Control: RTS/CTS or none
Interface: EIA-232 and Conitel compatible Rack Mounted Enclosure Available Pole-Top Enclosure Available ISO 9001 certified IPC Class 3 certified Other Certifications: CE Mark ANSI/UL 60950 CAN/CSA C22.2 No. 60950 EN60950 EN55022 EN55024 ICES-003 FCC Part 15 Class A

Command Timeout Pass-through mode, no packetization Pass-through mode, packetization Device Discovery Timeout

Key Exchange Timeout Key Expiration Interval Max File Trans Retries Max Ping Loop Count New Device Interval Packet Retry Count Ping Loop Timeout Host Serial Port Baudrate Host Serial Port Data Bits Host Serial Port Parity Bit Host Serial Port Stop Bits

Host Serial Port Flow Control Host TCP Port Number Host TCP Reconnect Timeout

Host Link Type (byte or bit) Host Clear Port Type (serial or Ethernet) Host Secure Port Type (serial or Ethernet) Host Link Keep Alive Timeout Host Link Send Timeout Host Link Receive Timeout

Host Link Receive Timeout Host Max Payload Size Host Link Dictionary Update Time Host Link Master Dictionary Reset Time Host Link Dictionary Update Ratio Host Conservative Mode

Host Maximum Control Packet Delay Host Switched Carrier Host CS RTS Preamble

Host CS RTS Postamble Host SC RTS Preamble Host SC RTS Postamble Host Remap CD to DTR Host Store and Forward

RSM Type RSM Byte Port Baudrate RSM Byte Port Data Bits RSM Byte Port Parity Bit RSM Byte Port Stop Bits RSM Byte Port Flow Control RSM Bit Port Baudrate RSM Bit Port Data Bits

RSM Bit Port Stop Bits

RSM Bit Secure Port Handshaking RSM Bit Clear Port Handshaking RSM Secure Port Receive Mark RSM Secure Port Send Mark RSM Secure Port Send End Mark RSM Clear Port Receive Mark RSM Clear Port Send Mark RSM Clear Port Send End Mark

RSM Link Keep Alive Timeout RSM Link Send Timeout RSM Link Receive Timeout RSM Max Payload Size RMD Line Number Choices RMD Initialization String RMD Login Retries RMD Login Delay RMD Login Timeout RMD Idle Timeout

RMD Line Answer State RMD Line Port Baudrate RMD Line Port Data Bits RMD Line Port Parity Bit

RMD Line Port Stop Bits RMD Line Port Flow Control

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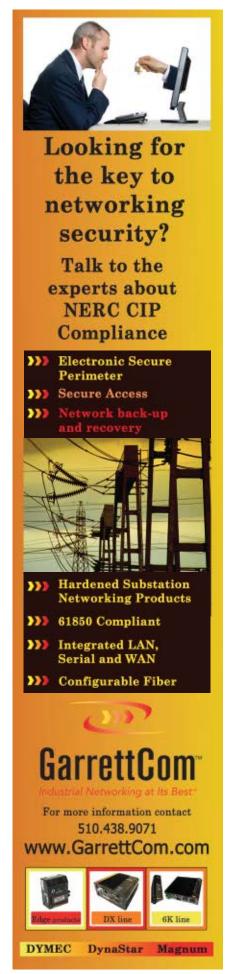
Stop by and see us at DistribuTECH 2008 in Tampa, January 22 - 24, 2008 - Booth #2010

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Show in Print

Metering and AMR" track, industry experts and the utilities themselves will describe the key benefits of the smart grid build-out. Representatives from CenterPoint Energy and Exelon will discuss how they're leveraging such technologies as AMI, broadband over powerline and distribution automation to add intelligence to their respective grid operations.

Intelligent People Building the Smart Grid in Power Distribution

Wednesday, January 23, 9:30 a.m.

Demand response, smart grid, AMI, distributed energy resources and microgrids are not just buzz words. Major advancements are now happening in the utility industry. This session in the "Distribution Automation" track begins by discussing new development work that utilizes feeder modeling, integration of distribution automation and AMI to bring about more comprehensive solutions in demand response. The second topic presented is a follow-up to the huge smart grid deployment in the Dallas-Fort Worth metroplex by CURRENT Technologies and Oncor Electric Delivery (formerly TXU Electric Delivery), which encompasses applications like smart metering, URD fault location, outage and restoration detection, capacitor control and distribution automation. The third topic presented discusses efforts at San Diego Gas & Electric to develop the self-healing grid that includes microgrid designs with distributed energy resources. Come early to get a seat as we expect another standing room only session.

Smart Grids: Fact or Fiction?

Wednesday, January 23, 2:30 p.m.

Who would want a "dumb" grid? No one. Everyone strives to have a smart grid, but what does that really mean? This panel session in the "Integration, Performance and Asset Management" track will present several utility experiences in planning and implementing smart grid technologies, and, in the process, dispel the myth that the smart grid is all hype.

The panelists from BC Hydro, Sempra, CenterPoint Energy and Duke Energy will describe how they are planning for and implementing smart grid applications. It is an achievable vision, not a pipe dream.

Those are just a few of the smart grid-focused sessions running Jan. 22-24 at DistribuTECH 2008. For a full listing of conference sessions, see the conference grid on pages 44-45 of this issue, or check out www.distributech.com for even more details on all the 2008 sessions.

Smart Grid—and Smart Prizes, Too

Everyone who attends DistribuTECH/TransTECH 2008 should go home with a lot more knowledge about the smart grid than they had prior to attendance. But two lucky attendees will go home with even more than that.

Wednesday evening (Jan. 23) attendees at DistribuTECH's Gasparilla Pirate Parrrty networking reception will want to be sure to pick up a "booty" bag of coins as they enter the party and get a pirate's chest key to participate in the treasure hunt. One lucky attendee will have the key that opens a treasure chest that contains a Caribbean cruise. Be sure to register for the Gasparilla Pirate Parrrty when you register for the conference.

If you're not lucky enough to win the Caribbean cruise at DistribuTECH's networking party, you may still go home a winner. Conference organizers are giving away a new Ford Mustang, and you'll never have better odds of winning a prize of this value. All an attendee has to do to enter the prize drawing is visit the booths of sponsoring companies in the DistribuTECH exhibit hall and get a stamp on the official entry form. Once the entry form is filled with stamps, return it to the PennWell booth to have it entered in the drawing. The Mustang drawing will take place on DistribuTECH's final day, Jan. 24, and entrants must be present to

To learn more about DistribuTECH and TransTECH 2008, or to register for the event, please visit www.distributech. com. **«**

Exhibitors Featured in this Issue

Editor's note: The following company descriptions are provided as a courtesy to those DistribuTECH/TransTECH 2008 exhibitors who showed their support of Utility Automation & Engineering T&D magazine by advertising in this issue. Check pages 40-42 of this issue for a complete list of DistribuTECH/TransTECH exhibitors.

AEGIS TECHNOLOGIES INC.

Booth #2010

Aegis Technologies develops solutions that improve lifespan, performance, diagnostics, and security of legacy and new control systems including SCADA, DCS, and more. Visit our booth for a live demonstration and to see how we can make you NERC CIP compliant. See ad, page 33

AUTODESK INC.

Booth #2337

Autodesk Utility solutions improve business processes and data quality by leveraging design information across the build, operate and maintain asset lifecycle. Autodesk solutions get the right information to the right people at the right time.

See ads, pages 65 and 70

BADGER METER INC.

Booth #601

Badger Meter Inc. is a leading supplier of meters and meter reading solutions. Badger's Recordall meters configured with RTR or ADE encoders support numerous RF solutions including ORION, Itron, Galaxy, in addition to connectivity to major network providers. See ad, page 29

BROOKS UTILITY PRODUCTS GROUP

Booth #1239

Brooks UPG is the premier supplier of metering-related products including: meter adapters for converting bottom-connected and K-base to socket type, meter interbase collars, test switches, pre-wired meter sockets, IT enclosures, sectionalizers, primary metering enclosures, security seals, and locking rings, meter safety and line test equipment. Brooks UPG has an extensive portfolio of products for enabling effective deployment of AMR/smart metering projects. We have answers.

CELLNET+HUNT

Booth #1900

Cellnet+Hunt is the leading provider of advanced metering and grid communication systems. The company supports more than 500 utility customers worldwide with 18 million endpoints deployed and the most fixed-network deployments in the industry. Visit www.cellnethunt.com. See ad, back cover

COMVERGE INC.

Booth #2110

Comverge is a leading provider of clean energy solutions that improve grid reliability and supply electric capacity on a more cost-effective basis than conventional alternatives by reducing base load and peak load energy consumption.

See ad, page 7

COOPER POWER SYSTEMS

Booth #1300

Cooper Power Systems products and solutions improve reliability,

productivity and safety. Our industry experts consistently offer new innovations to the power industry, enabling the smart grid today. In addition to traditional apparatus we now provide intelligent products integrated with the Cannon Yukon **Advanced Energy** Services Platform and **Cybectec Enterprise** Gateway. See ad, page 3

CS WEEK

Booth #1346

Top professional speakers, user groups, best practice meter-to-cash workshops and 115-plus exhibitors make CS Week Conference, May 20-23, 2008, the outstanding conference for all levels of CIS, IT and field service personnel in the utility industry. www. csweek.org. See ads, pages 38 and 52

DATA COMM FOR BUSINESS INC.

Booth #942

Data Comm for Business Inc. (DCB) manufactures a broad line of communications equipment for SCADA, AMR, load management and remote access applications. Equipment includes modems, DSUs, FRADs, protocol converters, gateways, routers, SCADA and much more. See ad, page 64

DATAMATIC LTD.

Booth #2118

Datamatic's MOSAIC is the first universally compatible AMR/AMI system with migration through walk-by, mobile and a true, mesh network with full two-way communications down to the endpoint. Come see Datamatic's RSV (remote shutoff valve) for water services. Available integrated with the MOSAIC network or as a standalone system. MOSAIC now also supports acoustic leak detection over the network via FCS Permalog devices. See ad, page 19



Continuous Grid Intelligence

Utilities today face unprecedented challenges from regulators and customers to increase efficiency and reliability. Tollgrade answers this challenge with LightHouse™ advanced sensor technology for Continuous Grid Intelligence.

A wireless solution for actively monitoring your distribution assets, LightHouse improves reliability, isolates faults, monitors network events, and reduces repair times.

To learn more about LightHouse, visit us at Distributech 2008 Booth 323 or go to www.tollgrade.com.



See ad, page 31

DCSI

Booth #1220

Experience "The Intelligence of Reliable Utility Performance" with fixed-network AMI/AMR and advanced MDMS systems from Hexagram, TWACS by DCSI and Nexus Energy Software. Our new, integrated company offers proven solutions for your distinct utility challenges.

See ad, inside front cover

ELSTER

Booth #1200

Elster delivers proven, reliable, leadingedge AMI and AMR systems and solutions for gas, electricity and water utilities. Elster's solutions portfolio allows any utility to take full advantage of maximum operational efficiencies and cost reductions, revenue protection and enhancement, unparalleled customer service and implementation of true, system-wide conservation efforts, all while managing their consumption. See ad, pages 8-9

ENSPIRIA SOLUTIONS INC.

Booth #1818

Enspiria Solutions helps utilities significantly improve the bottom line through operational effectiveness, energy efficiency, asset performance enhancement, and improved customer service. Our consulting and systems integration expertise includes AMI, GIS, OMS, WMS/MWM and substation automation.

See ad, page 12

ESRI

Booth #939

Running on over one million desktops and thousands of servers, ESRI's products provide a critical technology infrastructure to help increase operational efficiencies, improve customer service and speed decision making.

See ad, page 57

FLIR SYSTEMS

Booth #2338

Utilities and industrial facilities worldwide use FLIR's ThermaCAM infrared cameras for predictive/ preventive maintenance programs to identify problems before they turn into costly failures, downed equipment, or dangerous electrical fires. See ad, page 51

GARRETTCOM INC.

Booth #1018

GarrettCom manufactures hardened Ethernet, serial and routing products for the power utility industry. Magnum, Dymec and DynaStar products are designed for the harshest environments. DC and AC power. IEC61850 and IEEE1613 compliant. Ethernet switches and converters offer fiber flexibility and Gigabit.

See ad, page 34

GE ENERGY

Booth #1700

GE Energy is one of the world's leading suppliers of power generation and energy delivery technologies including T&D, with 2006 revenue of \$19 billion. See ad, page 5

GE MDS

Booth #1338

GE MDS provides organizations handling mission-critical communications with the best combination of range and speed for both fixed and mobile services—all on one infrastructure. Our secure, wireless networking solutions for point-to-point and point-to-multipoint architectures support both serial and IP/ Ethernet interfaces.

See ad, page 63

GENERAL DYNAMICS ITRONIX CORPORATION

Booth #1833

General Dynamics Itronix Corporation (GD-Itronix), is a world-class developer of wireless, rugged computing solutions for mobile workers, which distinguishes itself through technology innovation, superior implementation capabilities and customer support services. See ad, page 53

HD ELECTRIC COMPANY

Booth #422

Serving the electrical power industry for 75 years, HD Electric Company is displaying products from the Controls & System Measurement product group with a special focus on the NoMax and VarCom electronic capacitor controls. See ad, page 54

HIRSCHMANN AUTOMATION AND CONTROL INC.

Booth #1738

Hirschmann Automation and Control (a Belden company) develops and manufactures networking equipment intended for harsh, mission-critical environments that require high network availability. The products consist of Layer 2 and Layer 3 switches available in a variety of form factors. See ad, page 67

INTERGRAPH CORPORATION

Booth #1110

Intergraph supplies end-to-end solutions for operations, engineering, and resource and asset management to the utilities industries. Our integrated applications support and streamline critical workflow processes for intelligent grid operation, facilities design and analysis, operations and outage management, and infrastructure and cyber security. Intergraph also provides mobile work force management and field applications enabling complete real-time integration with the back-office applications. See ad, page 73

ITRON

Booth #1500

Itron Inc. is a leading technology provider to the global energy and water industries, and the world's leading provider of metering, data collection and utility software solutions. Our products include electricity, gas and water meters, data collection and communication systems, including automated meter reading (AMR) and advanced metering infrastructure (AMI); meter data management and related software applications; as well as project management, installation, and consulting services. See ad, page 15

JOSLYN-HI VOLTAGE

Booth #924

T&D equipment for electric utilities: reclosers, sectionalizers, capacitor switches, disconnect switches, load break interrupter attachments, load break underground switches, and VacStat vacuum interrupter monitor, and Fisher Pierce capacitor controls, FCIs, current sensors, Smartlink communications.

See ad, page 25

KEMA

Booth #1724

KEMA provides business and technical consulting, operational support, measurement, inspection, testing and certification services to 500-plus energy and utility clients worldwide. Founded in 1927, KEMA delivers a comprehensive

range of integrated services that address each link in the energy chain from generation to the consumer. See ad, page 59

METERSMART

Booth #1725

MeterSmart's hosted on-demand platform, Encentra, enables utilities to unlock the full potential of their AMI, MDM and CIS systems. MeterSmart integrates third-party hardware devices, energy information and program administration capabilities to create a customer-facing control interface for utilities to manage their demand-side programs. Customized for each client, MeterSmart's end-to-end turnkey solutions are reliable, secure and meet or exceed the most stringent standards in the industry.

See ad, page 10

MOXA NETWORKING CO. LTD.

Booth #640

MOXA designs and manufactures complete solutions of device networking products for industrial automation, which include IEC61850-3 Ethernet switches, industrial embedded computers, serial device servers, industrial wireless, multi-port serial cards, video servers, and remote I/O servers.

See ad, page 27

NRECA (NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION)

Booth #633

We are the national association for America's electric cooperatives. Join us February 20-25, 2008, in Anaheim, Calif., for the TechAdvantage Conference & Expo. The premier show for the electric co-op industry. See ad, page 75

OMICRON ELECTRONICS

Booth #1333

OMICRON develops innovative power system testing solutions: CMC test set for relays, transducers, meters, SCADA and PQ devices (including IEC 61850); CPC100 for automated substation testing of CT's, VT's, power transformers & resistances, CP-TD1 power factor testing, CP-CU1 line impedance measurement; CTAnalyzer; FRAnalyzer (sweep frequency response), DIRANA (dielectric response analyzer) and MPD600 (partial discharge analyzer). See ad, page 13

OPEN SYSTEMS INTERNATIONAL INC.

Booth #900

OSI is the leading supplier of open automation solutions for utilities worldwide, consistently delivering unmatched product openness, price performance, functionality and customer satisfaction. OSI's industry-leading solutions include SCADA, EMS, DMS, GMS, RTUs and substation automation. See ad, page 41

OSMOSE UTILITIES SERVICES INC.

Booth #1635

Provides leadingedge inspection, maintenance and repair services for T&D assets and T&D network data. Capabilities range from pole inspection to complex connectivity & inventory surveys. Advanced mobile computing and data management technologies deliver accurate data to GIS & OMS. See ad, page 58

RTK INSTRUMENTS

Booth #2311

RTK Instruments, a member of the MTL Instruments Group, is a leading supplier of alarm annunciators, alarm systems, event recorders and related instrumentation for all process and utility industries and all environments including hazardous areas. See ad, page 37

SCHWEITZER ENGINEERING LABORATORIES INC.

Booth #1010

SEL provides power protection, communications, instrumentation, encryption, and automation systems, products, training, and services. Products include protective relays, meters, rugged computers, fault indicators, wireless fault indication, encrypting transceivers, satellitesynchronized clocks, SCADA, RTUs, programmable automation controllers,

Alarm Annunciators & Event Recorders









Products ideal for all process and power alarm applications

High Integrity Design (high availability)

Serial and Ethernet Communications

Low-cost 1ms Time Stamping/Annunciation

Surpasses EMC and surge tests

LED, ultra-bright, illumination

No single source of failue for the best reliability

5-year Warranty

Full range of Alarm Products for Safe and Hazardous Areas

You'll be in good company... suppliers of Alarm Systems and Event Recorders to: ABB, Areva, BNFL, ConEd, Duke Power, Florida Light and Power, PG&E, PowerGen, Schneider, Siemens and many more.



Please call 908 688 6709 for full details or visit us at www.rtkinstruments.com

A member of the MTL Instruments Group plc



Go to http://uae.hotims.com for more information.

recloser and voltage regulator controls, tough Ethernet switches, and complete system panels and turnkey buildings. *See ads, page 1 and 39*

SENSUS METERING SYSTEMS

Booth #1519

Sensus Metering Systems is a global leader of metering and AMR/AMI system solutions for utilities. The company provides superior electric, gas and water metering solutions for residential and commercial/industrial installations and industry leading AMR/AMI systems featuring FlexNet, TouchRead and RadioRead systems.

See ad, page 49

SIEMENS POWER T&D

Booth #1001

Trillions of kilowatts of electricity are transmitted and distributed annually to end users around the world using Siemens' innovative technologies. Here in the USA, we provide solutions to operate the power grid reliably and securely while increasing reliability, stability,

www.utility-automation.com January 2008 UA



ELECTRIC LIGHT&POWER

excellence awards

CS Week and Electric Light & Power announce the 2008 Expanding Excellence Awards, designed to recognize excellence in customer service. The Expanding Excellence Awards program honors outstanding contributions and innovations in utility customer service. Within this program are three distinguished awards:

Best CIS Implementation

Awards are given to organizations that successfully completed a CIS project implementation during 2007.

Innovation in Extending a Legacy System

Awards are given to organizations that introduce new techniques or technologies to extend the usage and value of legacy systems. This award may apply to any business process enhancements that support customer service.

Innovation in Customer Service

Awards are given to organizations that have developed an innovative approach to improving Customer Service in the Revenue Lifecycle (meter to cash including field service). Innovative approaches may apply to any aspect of the Customer Relationship within the Revenue Lifecycle.

May 19-23 2008 San Antonio, TX



CS Week and Electric Light and Power invite you to participate in this year's annual Expanding Excellence Awards competition. For additional information please visit our website:

www.csweek.org/expandingexcellenceawards

flexibility and capacity of power delivery systems. What can we do for you? See ads, pages 11, 21 and 23

SMARTSYNCH INC.

Booth #710

SmartSynch's innovations in delivering energy usage data over public wireless networks simplify deployment for utilities and increase returns on resources. Our Smart Grid Intelligence solutions, featuring standards-based IP connectivity, are future-proof investments in AMI technology. See ad, inside back cover

SUBNET SOLUTIONS INC.

Booth #1414

SUBNET provides substation and enterprise solutions that supply your utility business systems with live substation information. Finally achieve secure, unified and intelligent access to all substation information (SCADA, non-SCADA, fault records, NERC CIP, HMI, etc). See ad, page 69

TELVENT

Booth #1711

Telvent (Nasdaq: TLVT), the IT company for a sustainable and secure world, specializes in high value-added products, services and integrated solutions for energy, transportation, environment and public administration industry segments, as well as global services.

See ad, page 55

THOMAS & BETTS CORPORATION

Booth #824

System protection & control solutions from the Elastimold product line featuring solid dielectric switchgear and fault interrupters, source transfer packages and distribution automation. See ad, page 43

TOLLGRADE COMMUNICATIONS INC.

Booth #323

Tollgrade Communications Inc. is a global leader in network testing, measurement and monitoring

solutions to efficiently manage and troubleshoot the infrastructures of electric distribution, cable and telecom companies.

See ad, page 35

TWENTY FIRST CENTURY COMMUNICATIONS

Booth #2131

TFCC services complete the outage reporting cycle. With HVCA for reporting, we now have services to assist the field crews in managing their work. Field Connect uses technology to answer calls instead of valuable resources. See ad, page 17

UTILITIES TELECOM COUNCIL

Booth #726

For 60 years, UTC has assisted members who own, manage or provide critical telecommunications and IT systems in support of their core business. Our purpose is to create an environment in which members will succeed. See ad, page 79

Stay Out of the Vault and Still Find the Fault



Reduce fault-finding time and costs

- Restore power faster with
- mobile fault indication
- Keep crew safe in their truck until the fault is found



Let Ranger point you to the fault

Learn More at www.eosmfg.com/tdw1

Go to http://uae.hotims.com for more information.

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Conference-at-a-glance

8:30 AM - 10:30 AM	Keynote Session							
Conference Tracks	DISTRIBUTION AUTOMATION	SUBSTATION AUTOMATION	TransTECH TRACK 1	TransTECH TRACK 2	CUSTOMER Service & CIS	MOBILE & Geospatial Technologies		
Industry Application	Electric	Electric	Electric	Electric	Electric, Gas & Water	Electric, Gas & Water		
Room	18	25	22	23	15	13		
1:00 PM - 2:30 PM	Pulling Together Multiple Technologies to Become the "Utility of the Future"	Would You Do It Again? Utilities Experiences in Substation Automation	Real World Case Studies of Transmission Wind Power Challenges		Outage Communications: How KCP&L Keeps Everyone Up to Speed When the Lights Go Out	Business Case for GIS		
3:00 PM - 4:30 PM	Innovative Integration of Protection and Automation for Feeder Restoration	IEC 61850 - Plug and Work Revisited (IEC 61850 Application and Experiences)	Renewables, Transmission & Distribution Do Mix: Innovative Solutions to Integration	WAMS & PMUS: What Does It Mean To The Reliable Operation of the Grid?		Business Case for Mobile		
Wednesday, Ja	anuary 23, 200	8						
7:30 AM - 9:00 AM	Breakfast Roundtable							
9:30 AM - 11:00 AM	Intelligent People Building the Smart Grid in Power Distribution	Making Systems Interoperable - The Standards Evolution Continues	FACTS and Power Electronics - Innovative Solutions to Complex Challenges	Transmission Siting Tools and Methodologies	Utilities Benefit if Customers Manage Energy Use	Workforce Mobilization Panel		
2:30 PM - 4:00 PM	Keeping Up With Communications - The Path to EZ Automation!	Engineering for Success - Designing and Deploying Successful Substation Automation	Real-Time Transmission Line Monitoring and Optimization		Using Mobile Field Service to Meet Customer Needs	GIS and Mobile Dat Quality		
Thursday, January 24, 2008								
9:30 AM - 11:00 AM	Dipping Information out of the Automation Data Well	Ethernet at the Core: A Look at Standards-Based Substation Network Implementations Designed for Extensibility, Resiliency and Security	It's Not Always Easy - Lessons Learned from the Implementation of Large Transmission Projects			Bridging the Gap - Mobile/GIS Data Integration Issues		

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Electric	Electric	Electric	Electric	Electric	Electric & Gas	Water
16	3	24	14	21	20	17
Best Practices for T&D Asset & Technology Performance	Advanced T&D System Planning Technologies and Best Practices	NERC CIP Security Issues	SCADA Operations Improvements and Next Generation Communications	Managing Peak Demand	California Dreaming is Becoming a Reality	Information Management and Integration
Sweating the Assets: Do You Know What Your Assets Are Up To?		Storm & Disaster Management	NERC CIP for SCADA Systems	Demand Response: From Research to Programs to Markets	Evolving to the Intelligent Grid	Advances in Automated Metering Systems
Mater Date				Economics,	Stratomy Fuglition	
Meter Data Management and Enterprise Integration	Effective Integration to Drive Performance	Leveraging Software Integration With OMS	Issues in SCADA Communications Networks	Implementation, Communications: All Necessary Parts of Successful Demand Response	Strategy, Evolution and Learning: Utilities Share Their Projects	Water Utility Efficiency and Asset Management
Smart Grids: Facts or Fiction		T&D Engineering & Equipment	Making Things Better - Applying DMS Applications to Optimize Distribution	Real World Demand Response - New Concepts	AMI Benefits Beyond the Business Case	SCADA Security
Vendor Merger & Acquisition - What's In It For You?		Grounding and Protection for Communication Sites			Optimizing Results in AMI/AMR Planning, Deployment and Operations	Water Leakage Stemming the Flood

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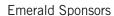
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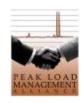




















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Recent challenges to energy supply, highlighted by events such as the 2003 Northeast blackout, the California energy crisis, Hurricane Katrina and other natural disasters, have exposed the vulnerabilities of the nation's aging utility infrastructure. The Department of Energy estimates that losses to the economy due to power outages and power quality disturbances add up to \$188 billion annually.

Utilities at a Crossroads: Invest Now or Pay Later

By Don Cortez, CenterPoint Energy

In addition to an aging infrastructure, other trends are helping to drive utility upgrades. Some key trends include increased energy costs, regulatory policies emphasizing energy efficiency, heightened environmental awareness and homeland security concerns. CenterPoint Energy is hoping to meet these challenges for its 2 million electric customers by proposing the deployment of an "intelligent grid" initiative.



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The idea of upgrading the electric grid to make it more efficient would seem easy enough until you consider that utility companies, in the past, have not been on the cutting edge of technology. The 100-year-old technology has been stuck in a rut and, in many cases, operated manually. As one utility executive recently said, "If Thomas Edison arrived in today's world, he would recognize our electricity system immediately, since it is that old."

But a "perfect storm" is gathering to create a change that will ultimately transform the utility industry. With this change, utilities will be able to respond more quickly to the evolving needs of customers, whose tolerance has grown thin for power outages, voltage fluctuations and lag time in receiving information about their energy usage and cost.



The advanced metering infrastructure rollout at CenterPoint Energy will ultimately empower customers to participate in demand response and energy conservation programs.

CenterPoint Energy (CNP), the nation's third-largest combined electricity and gas delivery company, is ready to propose one of the first deployments of the intelligent grid, which connects electricity and gas with communications and computer controls to create a highly automated, responsive and resilient energy delivery system. In a strategic relationship with Itron and IBM, CenterPoint Energy is working on three core smart grid stages. The first is an advanced

As one utility executive recently said, "If Thomas Edison arrived in today's world, he would recognize our electricity system immediately, since it is that old."

metering system, which includes remote meter reading, remote connections and disconnections, premise outage detection and voltage threshold monitoring. The second is an automated distribution grid management system, which includes load management, grid self-healing, field crew management, fault location and fault diagnostics. The third is predictive fault analysis. CNP hopes to leverage these new technologies to enhance the efficiency and reliability of its operations.

The move toward creating an intelligent grid was facilitated by the Texas legislative and regulatory environment. In Texas, customers are allowed to choose their own electricity provider. Retail electric providers purchase power from generators and, in turn, sell it to business and residential consumers. CenterPoint Energy is the energy delivery company in the greater Houston area that owns the wires, poles and substations—the electricity infrastructure.

An intelligent grid would allow CNP to:

- Automate key operations and reduce the need for manual intervention;
- Improve system reliability by decreasing the frequency and duration of outages;
- Facilitate Texas' electric market restructuring by enabling the power delivery system to respond to market demands;
- Provide customers with near realtime information on their electric usage so they can make smart energy decisions; and
- Prolong the life of electric infrastructure with automated monitoring and proactive maintenance.

Changing metering technology is something utilities can do relatively easily, but moving to a true smart grid involves an investment in new technologies and a different, more automated way of conducting operations. It will also involve a culture change, having people step aside to allow devices to talk with other devices without getting in the way. To fully leverage this intelligent grid, utility employees have to think differently and allow the system to work on its own, to self-heal, if necessary, and to automate.

Advanced Metering System

Advanced metering is a key component of CNP's intelligent grid plan, with drivers that include a competitive retail market in Texas, changing and growing consumer needs, and a strong emphasis on conservation and energy efficiency. A number of other utility companies in Texas and elsewhere are also beginning to take a proactive approach with advanced metering to ensure they are properly positioned for the future.

In 2007, CenterPoint Energy successfully completed field testing of Itron's OpenWay advanced metering technology, deploying approximately 10,000 new OpenWay CENTRON solidstate meters. The advanced metering infrastructure (AMI), with two-way communication technology, enables the collection of vast amounts of useful data while empowering customers to participate in demand response and energy conservation programs offered by the state's retail electric providers. CenterPoint Energy successfully tested the system's performance and reliability against a variety of benchmarks and

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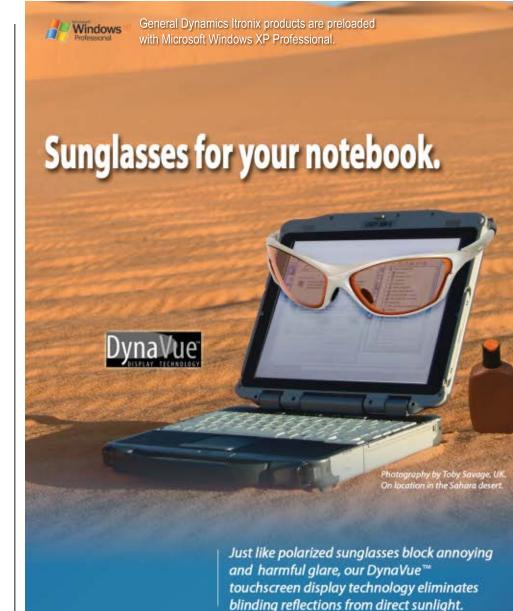
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functionality requirements in an operational environment.

The OpenWay system was selected because it is a highly adaptable, openarchitecture solution that features full-two way communication to every meter and is designed to meet a broad set of advanced metering, communication and control technology requirements. CenterPoint Energy's evaluation of these AMI meters focused on several capabilities and requirements, including:

- The ability to deliver 15-minute interval data and on-demand reads from every meter;
- The ability to maintain very high overall system read reliability;
- Remote disconnect and reconnect functionality for each meter;
- The ability to remotely download new firmware to each meter;
- ZigBee home area network communication with other meters, smart thermostats and load control devices to support energy efficiency and demand response applications; and
- Smart-grid functionality such as remote outage detection and remote, automated service restoration.

The initial deployment of OpenWay showed scalability; so in the coming months, CenterPoint Energy plans to ask the Texas Public Utility Commission to approve its full deployment plan, and the necessary cost recovery, for 2 million advanced electric meters in its Houston area territory during the next five years. CNP is also the natural gas utility serving the Houston-area and has 1.1 million gas customers that will be linked to the electric system's communications infrastructure. If this plan is approved, it will be an aggressive transformation. Under the Houston area's normal growth conditions, CNP typically installs 45,000 new electric meters annually in its service territory. However, when the company begins its advanced metering deployment, it will be installing approximately 35,000 new AMI meters per month.



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How it Works and the Subsequent Benefits

As noted earlier, the advanced metering system provides energy usage information and interval data that is uploaded every day to nearby cell relays connected to the meter via broadband over powerline technology. The OpenWay system, using the wireless ZigBee standard, will be able to communicate with home area networks, including in-home appliances and thermostats.

It is vital for the utility industry to make this easy for consumers. Without consumer buy-in and regulatory support, deployment of the next-generation utility grid could be delayed significantly.

What should consumers expect from the advanced metering system? They will have smart thermostats in their homes, such as those made by several companies in the ZigBee Alliance (www.zigbee. org). These thermostats receive a signal from the advanced meter which triggers a programmed message to lower the heat, increase the air conditioning temperature or shut off the pool pump during peak load periods.

CenterPoint Energy is working with IBM to develop the grid management system. At the heart of the intelligent grid is the analytic engine which will continuously monitor grid sensors and respond with information or control of grid field devices. The analytics are based on engineering algorithms, derived from sophisticated outage analysis research as well as institutional knowledge and experience. Initially, the work will involve reactive diagnostics of field conditions, but the work will quickly transition to focus on predictive analysis of field equipment.

If approved by the Texas PUC and implemented by CenterPoint Energy, the utility, retail electric providers and consumers will all reap benefits from the implementation of advanced metering and an intelligent grid. Consumers should ultimately save money by having near real-time energy consumption information that will give them the ability

to monitor and alter their energy use. The company and customers will also enjoy the benefits of remote detection of power outages and remote, automated restoration of a high percentage of outages, resulting in fewer and shorter interruptions of electric service.

CenterPoint Energy will have powerful grid diagnostics and more control, automated meter reading, improved asset management and increased customer satisfaction. Electricity retailers will receive smart home support, demand response support, and will have the ability to adopt virtual pre-payment programs and dynamic pricing to reduce peak power demand. Ultimately, the environment also wins as customers make smart energy choices to reduce consumption.



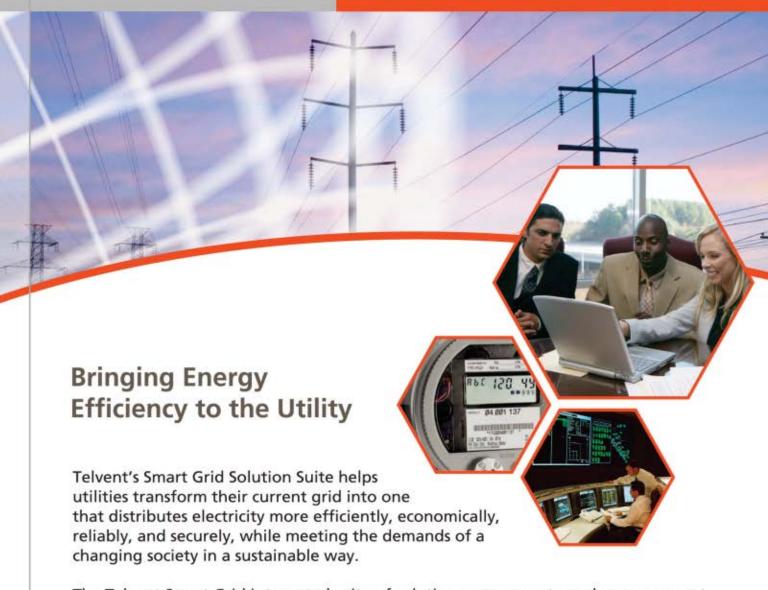
Installation of an OpenWay CENTRON solid-state meter at CenterPoint Energy.

These are exciting and challenging times for the energy industry. Changes in technology and the way we deliver and use energy may not be easy or quick, but the potential benefits of this technological transformation make this one time when the "perfect storm" is a storm we welcome. ******

Don Cortez is the division vice president of regulated operations technology at CenterPoint Energy in Houston, Texas. He is also one of three Keynote Speakers scheduled to kick off DistribuTECH and TransTECH 2008 on Jan. 22, 2008. See pages 30-47 for more details.

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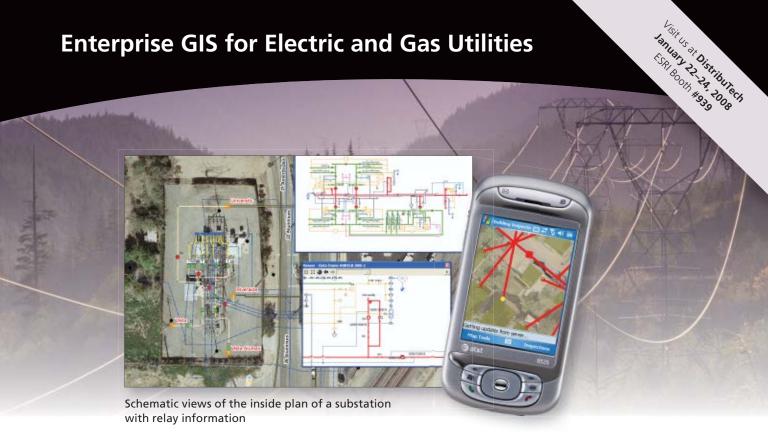
ost large electric utilities have had at least one project "try out" the industry-standard Common Information Model (CIM). A number have even based their large-scale enterprise application integration efforts on it. While these efforts are generally successful, the additional costs (real and perceived) often make people question whether the benefits are worth the trouble. The answer is a definitive: "It depends."

Using the Common Information Model for Enterprise Integration

By Greg Robinson, Xtensible Solutions

Before a utility can make an informed decision regarding when and how to use the CIM, it needs to (1) have a clear understanding of the goals the utility intends to accomplish with CIM; and (2) plan accordingly with its eyes open to the actual state of and plans around CIM standardization. To the casual observer, CIM standard development efforts seem never-ending; they continue to progress and evolve. Therefore, numerous issues must be managed by end users and their service providers.





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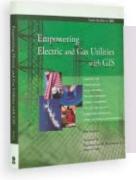
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When people refer to the CIM, they usually mean the information model itself as well as all of the associated IEC 61968 and IEC 61970 standards that support its use (at www.iec.ch, refer to working groups 14 and 13, respectively, of Technical Committee 57). The CIM itself is defined in Unified Modeling Language (UML) notation and consists of classes and attributes for these classes, as well as the relationships among them. A key purpose of the CIM is to provide a common language to describe exactly what data is being exchanged among a utility's business systems. For example, as opposed to using custom tags in XML messages, field names are based on class/attribute and association relationships defined in the CIM.

Interest in CIM use has recently

surged as evidenced by the formation of and participation level in the CIM User Group (www.ucainternational. org). This growing interest is somewhat attributable to the evolution of systems integration technologies from Enterprise Application Integration (EAI) to Service Oriented Architecture (SOA) and Web Services, as well as the increasing needs from utility businesses to have better information management. As utilities continue to look for total business integration solutions, regardless of underlying technologies and standards, the CIM and related standards will likely play a critical role in transforming today's point-to-point integration landscape to serviceenabled enterprises. But how does one go about this?

Two Approaches for Using the CIM

There are at least two vastly different views on why and how a utility should use the CIM, resulting in a tug of war that can hinder productivity.

- 1. Minimalist: Information management minimalists have a tactical, project-oriented focus and prefer to use the CIM on a project-by-project basis for specific system interfaces—only when it lowers project costs and/or risks. Many view themselves as protecting projects from overly burdensome corporate standards and constraints that would impede progress on "real work."
- 2. Strategic: Enterprise Information Management (EIM) champions have an overarching, long-term focus and see the CIM as a key



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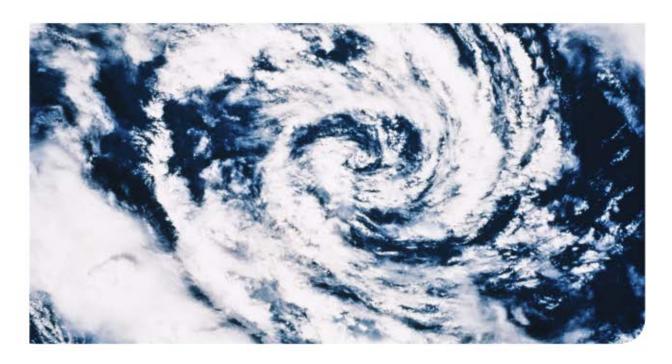
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component for IT to enable business transformation and performance optimization. They view information as a corporate asset and want to protect the enterprise from "cowboy" projects that create artifacts that are expensive to maintain and hard for other projects to use.

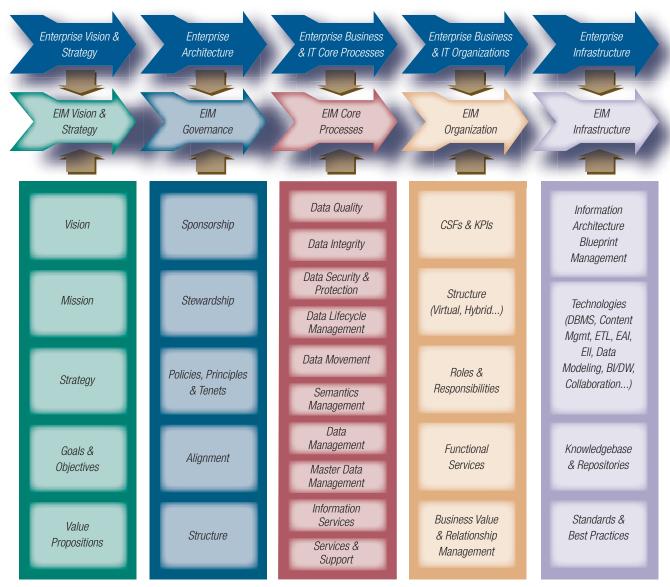
The advantage to the minimalist view is that utilities can achieve it with minimal IT master planning and

Figure 1

Overall EIM Framework

little upfront investment. IT projects may continue operating in much the same manner as they always have, and everyone knows their roles. Projects and vendors have more autonomy and more control over their work. It is the natural default position, and since it is more comfortable for many parties, it is a common approach even though a utility's management has not made a conscious decision on this matter.

On the other hand, some utilities opt for the second view because they are being compelled to create a more flexible business and are tired of their plans being hindered by complex, brittle IT systems. For example, some of these utilities are now planning their investments in such a way as to get more intelligence and value from the data that will be collected from "smart grid" devices, especially automated metering infrastructure (AMI). Using data intelligently wherever it is needed throughout the enterprise requires a new architecture and strategy. This leads these utilities to an integration strategy that is based not only on standards such as the CIM, but also EIM to give the standards a proper context.



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Gartner has defined EIM as a commitment to:

- structure, secure and improve the accuracy and integrity of information assets;
- solve semantic inconsistencies across all boundaries;
- and support the technical, operational and business objectives within the organization's enterprise architecture strategy.

EIM would ensure that a utility's service providers each accomplish their individual functions in a manner that positively contributes to enterprise objectives. As depicted in Figure 1 (page 60), EIM is defined through a framework that encompasses five major components: vision and strategy, governance, core processes, organization, and infrastructure.

This second view (CIM in an EIM context) requires planning that is driven by business strategy and implemented in both a top-down and bottom-up fashion. As it represents significant change, many restraining forces can hinder its adoption. A utility must be prepared to proactively deal with both the driving forces and restraining forces when it embarks on the strategic view.

Driving Forces, Restraining Forces

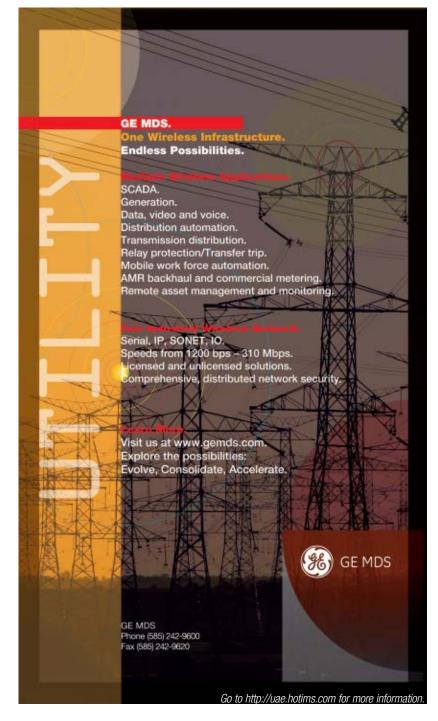
Driving forces are those which help achieve a goal, in this case organizational adoption of the CIM in an EIM context:

- 1. Consistent enterprise-wide data. Data is consistent and congruent irrespective of data sources. For example, there may be legacy and/or new work management systems for substations, others for distribution, others for plants, and so on. Additionally, different systems may be used among the service territories. If two utilities have merged, even more of the same types of systems will exist. The same type of information ought to be represented the same way for all work orders regardless of the system generating it.
- 2. One version of the truth. Information about assets will exist simultaneously in many systems (work management, facilities management, design, financial, SCADA, network management, protection, etc.). This data should be consistent among these many systems and data warehouses so that operations are efficient, hazards are avoided, and so the data can be properly used for business intelligence and decision support.
- 3. Access to data regardless of source. Data is made easy to discover and access through a consistent set of services irrespective of the data's source.
- 4. Business transformation agility. Implementing an EIM-based integration architecture improves IT flexibility, which serves to facilitate business change (rather than hinder it with a complex and brittle

- integration of systems).
- 5. Reduced project implementation costs. While it takes time to learn pre-built industry information models, canonical message models, use cases, etc., doing so results in a net productivity gain. Projects can shift more time to the application at hand and less on determining how to integrate applications.
- 6. Reduced maintenance costs. In terms of both time and money, it is expensive to support a different set of interfaces emanating from each application system. With an EIM in place, vendor-proprietary technologies and methods are hidden behind well-defined interfaces. This enables applications to be upgraded or replaced with significantly less effort and without the side-effects that commonly occur when traditional integration techniques are used.
- 7. Reduced IT risks. The risk of missing integration requirements is significantly reduced as the CIM is used in multiple utilities in multiple domains with multiple application systems, with numerous parties feeding corrections and lessons learned back to the IEC for incorporation in future releases.
- 8. Availability of external services.
 While standard interfaces have proved desirable within the enterprise, it is imperative for business to business integration.
 Using the same semantics across both minimizes development costs as well as the risk of errors in transformations spanning different business worlds.
- 9. Scalable business process automation. Consistent data enables business process automation to be implemented independent of the number of applications and data stores

involved. To do otherwise results in brittle and expensive solutions that will not scale to any significant size. An EIMbased semantic layer is required for scalable business process

- automation, monitoring and management.
- 10. Scalable business activity monitoring. (same rationale as for 'scalable business process automation').



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ENTERPRISE INTEGRATION

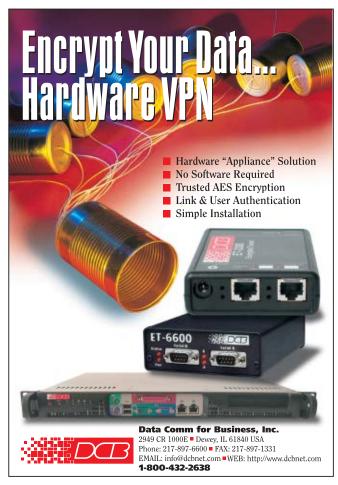
- 11. Accurate reporting—regulatory, KPIs. (same rationale as for 'scalable business process automation').
- 12. Mergers and acquisitions. An EIM-based integration framework provides a neutral vehicle for integrating disparate applications from different companies. Decisions to replace individual applications can be deferred until there is a business need, rather than doing so merely for merger purposes.

Some common restraining forces that will tend to hinder adoption of CIM in an EIM context include

1. Lack of stable integration standards. As previously mentioned, the CIM and other relevant standards

- continue to evolve, thereby requiring significant effort on version management.
- 2. Vendor's way = lower project costs. Vendors will want to use their methods, tools and data models for interfacing with other systems. In the absence of utility required methods, tools and governance, vendors will make the case to the utility's project team that their way offers the lowest cost and risk.
- 3. Vendors pushing for customer lockin. Many vendors employ strategies to achieve "customer lock-in" through use of proprietary data models, methods and tools. While they may agree to implement standard interfaces, these vendors will often find ways to influence the customer to use proprietary

- interfaces.
- 4. Consultants pushing to be "thought leaders." If a consultant is not an EIM or CIM expert, he or she knows his/her value will be diminished on projects. Faced with this threat, some will take a position that, "while these are good concepts, they are not practical to implement. You're much better off using our fieldproven approach."
- 5. "Hours-sold" revenue driving system integrators. More efficient methods and the ability to swap in other companies' resources would seem to be at odds with a well-entrenched system integrator that receives revenue based on hours sold to the utility. Some system integrators are embracing





Autodesk: Leveraging Design to Improve Asset Information



Utility Industry Challenges

Utilities face relentless pressure to do more with less and maintain high reliability and customer service, all the while coping with aging assets, capital constraints, a rising demand for energy and addressing sustainability.

Infrastructure: The North American Electric Reliability Corporation predicts that demand for electricity will increase 19 percent nationwide over the next 10 years while transmission capacity will grow by only 6 percent. In addition, surveys indicate that about half of all utility infrastructures in North America are more than 50 years old. This is an issue that is reoccuring across the world, and is estimated to cost \$40 trillion over the next 25 years to refurbish infrastructure globally.

Efficiency: There is rising consumer interest and participation in energy efficiency measures and distributed energy resources, which adds to the complexity of grid design and optimization.

Knowledge Transfer: Utilities will have to cope with the retirement of experienced staff over the next decade—workers with valuable knowledge that will be difficult to replace.

However, even under such tough circumstances, utilities still can increase productivity and cost efficiencies by improving asset information. If asset information is accurate, timely,

and available to all who need it when they need it, a utility can operate more effectively.

Asset Information Challenges

Unfortunately, for most utilities, it is not easy to access or share asset information across the design, build, operate and maintain infrastructure lifecycle. Often, the information

resides in proprietary formats or in data silos

throughout the organization. When design information is shared, it is often exchanged via paper format and is manually entered into an as-built system. Making design data available to those managing as-builts, responding to maintenance issues, or answering customer service requests usually requires either manually reconciling the data or converting it to the proprietary formats. Autodesk utility solutions improve business process and data quality by leveraging engineering design information across processes to build, operate and maintain asset lifecycle.

So, what if utilities could get accurate and consistent information quickly enough so they can maximize operational efficiencies, improve responsiveness, and increase quality of service?

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By leveraging the Autodesk design tools utilities likely already have, they can build on that strong foundation. Autodesk solutions for utilities make it easy for all departments to integrate, access and share design and as-built information—in their business processes. This helps to eliminate waiting for reports or pieces of information from different departments and wondering how accurate and up-to-date the information is.

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infrastructure asset information, so they can more easily handle customer requests; Build intelligence into your design process and carry

more quickly respond to outages; and more effectively provide

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- Gerard Nanninga, Head of Electrotechnical Department, Hanze Technical University, Netherlands (winner of the European Utility Award 2007) on energy efficient meters
- Joseph Hughes, Senior Technical Manager, Electrical Power Research Institute, USA, on integrated infrastructures for utility and energy service operations
- Michael Markides, Senior Analyst, IMS Research, USA, on the results of an industry-wide semiconductor research project
- Bob Heile, Chairman, ZigBee Alliance, CA, USA, on wireless communications for meters
- Dr Peter Honebein, Managing Member, Honebein **Association**, USA on emotional and social aspects of meter system design

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- the CIM because it provides an opportunity to build a competitive advantage into their service offering, making them more attractive for future opportunities. Others will view it as a threat to their revenue stream and will want to effectively kill substantial use of it.
- 6. Internal experts want to remain experts. Some experts of legacy systems or technologies that are subject to being replaced by the new systems/approaches can be most innovative at coming up with reasons why the new approach will fail. This is yet another form of "lock-in." Without staff capable of separating legitimate concerns from emotional reactions, projects can make poor decisions resulting in substantial additional costs and schedule slippages.
- 7. Project managers striving for control. Of course, it is desirable for a project manager to mitigate risks by ensuring he or she has good controls on the project. So, unless a manager can rely on an effective corporate integration framework with the necessary standards and governance, the manager will naturally push much responsibility onto vendors. Unfortunately, this drives them right where the vendors want them to be: "vendor's way = lower project costs" and "vendors pushing for customer lock-in" discussed above.
- 8. Inertia. Many people are comfortable with the way things are and would prefer not to change. A project challenge is to get these people to see how the change will be smoothly implemented and that the new world will be a better place for them.
- 9. Our situation is unique; standards hinder us. This is a common belief that needs to be openly worked through. Experience suggests that in almost all cases, industry standards can support these special needs with only a modest amount of extension. These claims usually dissipate when someone with sufficient expertise about the standards is part of the team.

If the CIM and associated standards were finished and stable, a utility might be able to start off with the minimalist view and later switch to the strategic view. Unfortunately since the CIM glass is only half full, the amount of "some assembly required" is still significant. There is a considerable amount of wiggle room in how the CIM and associated standards can be implemented; and with so many parties involved, deliverables from disparate projects will not properly fit together. Therefore, significant rework will almost certainly be required before CIM-based artifacts from disparate projects can be aligned to contribute to the enterprise information management strategy. The best way to deal with this is to proactively plan EIM around the CIM and other relevant information standards.

Which Way to Go?

A utility needs to have a clear understanding of the goals it intends to accomplish with the CIM before it decides when and how to go about using it. To do otherwise would result in a poor price/performance ratio for its integration investments. The safest bet is to use a "minimalist" approach until the utility has truly come to grips with its information management objectives. This happens when a utility's management gets serious about managing data so that it becomes a business enabler rather than an inhibiter. To implement this strategic approach requires business units and IT to look at data from the perspective of Enterprise Information Management (EIM).

Using CIM in the context of EIM would ensure that a utility's service providers would each accomplish their deliverables in a manner that positively contributes to enterprise information management objectives. But because data integration involves so many internal and external organizations, there will be plenty of opportunities to derail meaningful progress. So, when the time comes to implement this strategic approach, the utility management will need to convey to various stakeholders that it is serious about information management by having solid, but not overly burdensome, governance in place.

As the CIM will play a key role, EIM planning should only be done with working CIM knowledge on-hand, because at the core of EIM is the management of industry standardsbased semantics. So the utility should have team members that have significant experience in: (1) applying the CIM in the context of EIM and (2) successfully applying the CIM on utility projects that have gone into production. Since the CIM will continue to evolve, ideally these team members would have active ties with IEC working groups responsible for CIM development. Since

information management is so strategic, mistakes will ultimately be costly and frustrating. So take the steps to be informed and ensure you have a good handle on how to suitably leverage the CIM. <<

Greg Robinson is a co-founder and President/CEO of Xtensible Solutions, which provides enterprise information management and integration solutions and services to the energy and utility industry. Greg is the international convener of IEC TC57 Working Group 14, which is extending the industry standard Common Information Model (CIM) for enterprise-wide messaging. He has a BSEE from Georgia Tech and a MBA from the Florida Institute of Technology.



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he power industry buzzes with talk of transformer prices. Sometimes, the issue gets laid at the feet of the metals industry; sometimes not. It depends entirely on whom you ask.

So, bottom line: What wounded the transformer market? Is there a single reason for the rise in transformer costs?

According to our experts, it's more an amalgamation of issues rather than a single silver bullet—or, a single steel bullet. Steel prices might be getting the blame, but they aren't the only culprit.

No Single Bullet Wounded the World Transformer Market

By Kathleen Davis, associate editor

"Transformer prices have risen for both demand and manufacturing input cost reasons," said Gerry Yurkevicz, managing director in Global Insight's worldwide Energy Group. "Global Insight views transformer prices as a function of both production costs and market activity, where costs are assumed to exert the dominant influence over transformer prices through time."

So, yes, the steel prices figure in the equation. But, other factors exist: the increasing price of other metals, the rising demand for those metals in other industries, increased economic growth in the Middle East and Asia and the increased power demand that creates (let alone the increased demand on the aforementioned metals)—as well as the immediate and demanding need for some utilities to replace older transformers that have served well past their limitations.



The factors wind together and intertwine without a real single cause to be pulled from the mix. But, however many and varied the causes, the single result remains: a very costly transformer that's very, very hard to get.

"Based on my conversations with member companies, the market is very expensive and very tight," stated Steve Rosenstock, energy solutions manager at the Edison Electric Institute. "Lead times to obtain transformers, especially larger ones, have tripled or quadrupled over the past five years. Prices for transformers have skyrocketed well above the rate of inflation."

Stats, Data and a Trip to the Other Side of the Globe

To get an idea of how metal prices, increased Asian economic demand, and other factors might be impacting the

transformer market, we need to first get a grasp on the market itself-from large transformers down to the distribution variety.

According to Chuck Newton at Newton-Evans research, for size ranges of 2 MVA and larger, the global sales of large transformers was running in excess of \$2 billion in 2005, and the annual growth rate since 2005 has topped 10 percent. The North American region accounted for about \$400 million of that \$2 billion slice. (In terms of units, that's about 8,600 units worldwide, with 1,900 units in North America.)

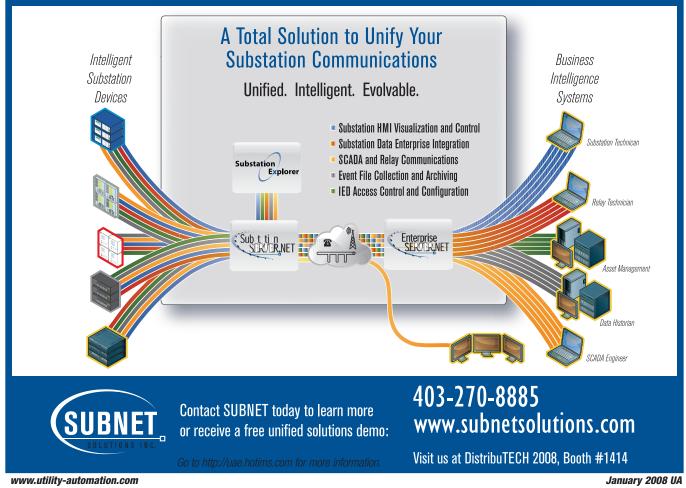
Chuck Newton tells us that the "market range estimates from multiple sources indicate current annual global power transformer sales range from \$14 billion to \$20 billion." But that's for the whole shebang. When taking in just the 2 MVA slice from 2005, Newton

figures in a range of \$2.5 to \$2.9 billion for that market these days-an expansive growth of 25 percent to 50 percent of the original 2005 market

China, Mexico, Sweden and Germany are the biggest exporters of large power transformers with the U.S., Mexico and China being the biggest importers of large power transformers.

According to Newton, "The Far East appears to be the largest market this year for very high end transformers."

In fact, demand from the Far East is a leading factor in the great gray area of transformer cost causes. It figures prominently into the transformer market equation for many of the experts interviewed for this article, including Rosenstock, and on both the materials side and the end-product side of the equation.



"There are several reasons [that transformer prices have skyrocketed], but the main reason that I have seen is the explosion in demand for commodities and economic transformation in developing countries in Asia and the Middle East, where economies are growing at 8 percent to 10 percent plus per year," Rosenstock said.

Yurkevicz agreed on both the prices and Asian demand factor, saying that their market analysis suggests a 60 percent increase in overall transformer prices from 2001 to 2007—or more than 8 percent per year. But, that's the overall average; according to Yurkevicz, slices of the power equipment market have increased far more

"These price increases resulted from worldwide demand increases over the same period of over 5 percent annually and cost increases for the bundle of labor, materials, and capital inputs needed to produce transformers of over 6 percent annually," he said.

He continued, "As everyone is well aware, input cost increases for manufacturing materials and commodities, such as steel, copper, and aluminum, have risen greatly over this period, driven by worldwide market demand. China's economy alone expanded by 81 percent from 2001 to 2007 vs. just 17 percent for the U.S."

That's the materials side of the equation. Rosenstock also presented an "end-result" glimpse of how growing Asian and Middle Eastern economies are impacting prices.

"In terms of transformers, overseas demand has been exploding. For example, I have seen news reports that over 10 percent of the world's cranes are located in Dubai. All of those high-rise buildings need electricity and transformers," he inserted.

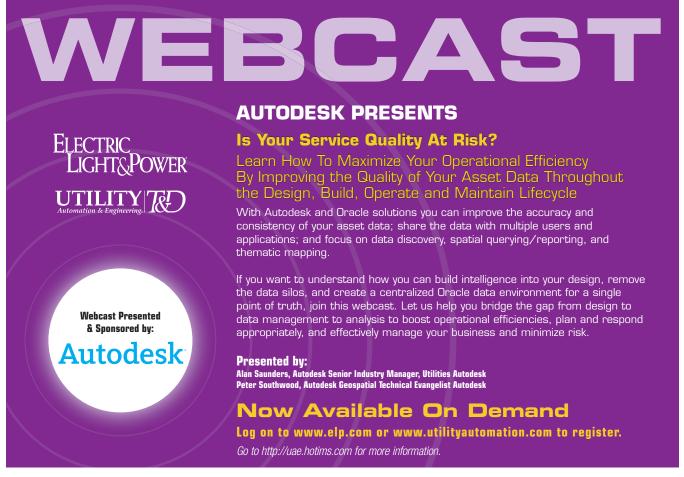
According to Rosenstock, this particular factor—we'll call it the modernization factor—stretches all the way back to 2002 or earlier.

"Ironically, at a time when commodity prices were below their historic averages. Copper was about \$0.70 per pound, and, historically, it had been about \$1.10 per pound," he commented.

But when that modernization factor began to butt up against those already rising commodity prices—well that particular template started quite the pricing fireball.

A Peek at Metal Prices

"There is a direct relationship between steel, copper, aluminum, and other prices and the price of transformers, since they are made up of cores and coils and any



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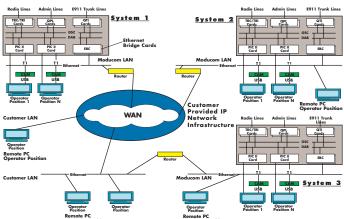
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outer protection," Rosenstock said.

Yurkevicz added, "Material cost for such inputs as core steel, enclosure steel, copper wire and strip, and aluminum wire and strip represent over 70 percent of the cost structure."

"The replacement costs of new transformers are increasing significantly," agreed William H. Bartley, P.E., an electrical specialist with Hartford Steam Boiler. (Hartford Steam Boiler is one of the largest equipment-breakdown insurers in the industry, especially of transformers.) But, he disagreed with Rosenstock and Yurkevicz that metal prices, especially copper, are such a high percentage of the end-result transformer costs. "Some people have blamed this price increase on the increase in the price of copper. My response has been this: The total cost of copper content in a transformer is small, and a copper price increase would be



insignificant. For example: If the copper in a transformer is 10 percent of the cost, and copper prices double, the cost of the total transformer would only go up 10 percent. Likewise, if the copper cost in a transformer is 20 percent of the total, and copper prices double, the cost of the total transformer would only go up 20 percent. But, we are seeing transformer costs increasing by 200 percent to 400 percent."

So, if copper isn't the issue, could it be steel? Could it be both? Could demand play a significant factor not just directly into the market of transformers but also into the immediate area of raw materials?

Indeed, as both Rosenstock and Yurkevicz pointed out, the power industry isn't the exclusive user of these metals, and increased demand inside our market, paired with a steady or also increasing demand outside of our market, can only lead to more issues with pricing the commodities required to mold a good transformer.

Tom Stundza, executive editor of *Purchasing Magazine*, provided a glimpse at the market for electrical steel specifically. He authors the magazine's "Steel Flash Report," a monthly online update on the steel market. Like the overall issue with transformer prices, steel prices are a mixed bag. It's not just the raw material cost. It's the production costs, the surcharges and the demand all mixed together.

Stundza laid it out simply, "Purchasing of electrical steel had gone through three years of decline before it rose 2 percent in 2004 and increased 2 percent again in 2005 before an explosive 8 percent growth in 2006. In 2007, buying has been on a pace to improve by 1 percent to 444,000 net tons, based on nine-month market data."

When asked if steel prices have skyrocketed, Stundza didn't agree with that terminology. Instead, he gave us an explanation of the layering of steel prices and how the real problem lies in a mill hedging its bets.

"Silicon electrical steel prices haven't really skyrocketed," he said. "Pricing

depends on the grade of steel, of which there are a few dozen based on their electrical conductivity. The mills want an average \$70/ton in increase on early 2008 shipments to offset higher production costs. It is the alloying-metal surcharges atop the purchase-order prices that have exploded. Just as stainless steel mills want to offset nickel costs with their surcharges, the electrical steel mills want to offset their silicon costs. That metal cost \$0.92 per pound in January 2007 but now is around \$1.55."

According to Stundza, this increase in steel prices—or, specifically, steel surcharges—began in December 2003 in reaction to October 2003 raw material purchase prices, alloy purchase prices, energy costs, and production, leading to overall steel prices that could be characterized as "high and volatile."

He added, with a touch of hope, "The costs will remain elevated this year, but the analysts believe the sharp increases seen in recent years may dissipate."

Whether or not prices stop rising so sharply in line with analyst predictions, Stundza pointed out that certain manufacturers are expanding early in anticipation of even more rising domestic demand attributed to aging transmission equipment. In fact, American steel manufacturer AK Steel has plans to expand capacity to make an additional 335,000 tons/year of electrical steel. They noted the replacement of transmission equipment as a factor in the expansion.

Will the Real Culprit Please Stand Up?

So, we have steel prices and other metal prices rising. We have the modernization factor, and, as the note about AK Steel pointed out, both of those existing factors will be impacted by yet another factor: aging equipment that needs to be replaced by an industry traditionally rather unable or unwilling to do so.

Bartley with Hartford Steam Boiler explains: "Over the last 20 years, the utility industry has been in a capital investment doldrums. Consequently, the worldwide transformer manufacturing

capacity has been shrinking. Many U.S. transformer factories have closed their doors, or sold out to competitors.

"In the last year, however, the global utility industry (including China) is now investing in power. Today, we live in a global capital environment. In supply and demand economics, two things have occurred: the demand has increased globally; and, at the same time, the supply (the number of factories in the world) has decreased. The result is a significant increase in the equilibrium prices."

Will the market adjust for this? Absolutely. But, Bartley points out, it will take some patience.

"As the suppliers catch up to this new demand, we may see transformer prices fall again, and delivery times improve. But that is not going to happen overnight. If the demand remains stable, it will take several years for the suppliers to catch up," Bartley said.

Rosenstock isn't sure if that market will stabilize at all, however. There are other factors at play, he said, including a U.S. DOE rule that mandates efficiency standards for liquid-filled distribution transformers to take effect Jan. 1, 2010.

"These rules could have an effect on transformer prices, since more efficient transformers tend to use higher grades of steel and copper," he added. This, of course, loops us back to increased metal prices again.

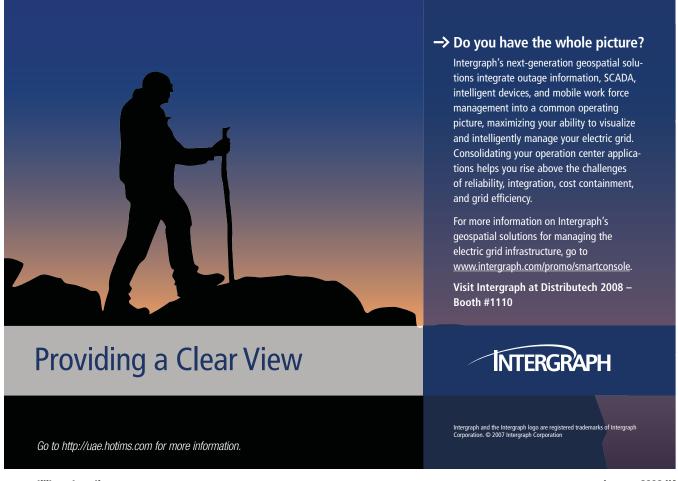
Rosenstock agrees with Bartley, but, again, brings increasing demand back into the equation.

"It really depends on overseas demand," he said. "If demand for transformers overseas keeps growing at a 10-percent-plus per year pace, then the market will still stay tight, and prices will keep rising or stay at their current plateau.

"If there is an overseas 'bubble pop' effect with commercial construction, and building/electric demand suddenly stops growing, then there may be some price relief in the U.S."

Whether you focus on Rosenstock's "pop" hypothesis or Bartley's leveling philosophy, one thing remains clear: High transformer prices will stick around for awhile. And that's just the way it is, according to Yurkevicz. In fact, Global Insight predicts an annual price increase ranging from 1 percent to 3 percent over the next five years.

"We wish that Global Insight could send a message that transformers will become 'more affordable,'" he said. "However, the message that we can deliver is that prices should increase less in the future. High prices are here to stay. Utilities will continue sourcing in a high-cost transformer market." "



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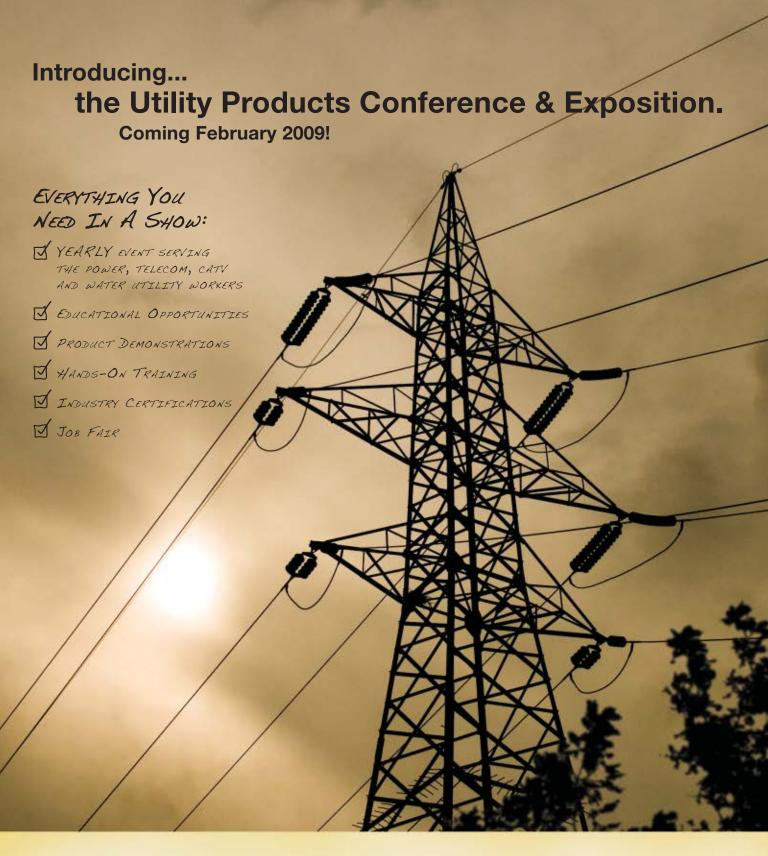
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TechAdvantage 2008 Conference & Expo, NRECA, www. techadvantage.org, Anaheim, Calif.

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Geospatial Infrastructure Solutions Conference 31, Geospatial Information & Technology Association, www.gita. org, Seattle Wash.

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Wind and Transmission Workshop, AWEA and CanWEA, www.awea.org, Detroit, Mich.

May 4-7, 2008

UTC Telecom 2008, Utilities Telecom Council, utctelecom2008. utc.org, Orlando, Fla.

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CS Week Conference 32, www. csweek.org, San Antonio, Texas.

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Metering, Billing/CIS America 2008, Spintelligent, www. spintelligent-events.com/ mam2008, San Diego, Calif.

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Wind Power 2008, AWEA, www. awea.org, Houston, Texas.

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PowerGrid Europe 2008, PennWell Corp., www. powergrideurope.com, Fiera Milano, Milan, Italy.

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EEI Annual Convention/Expo, Edison Electric Institute, www.eei. org, Toronto, Ontario, Canada.

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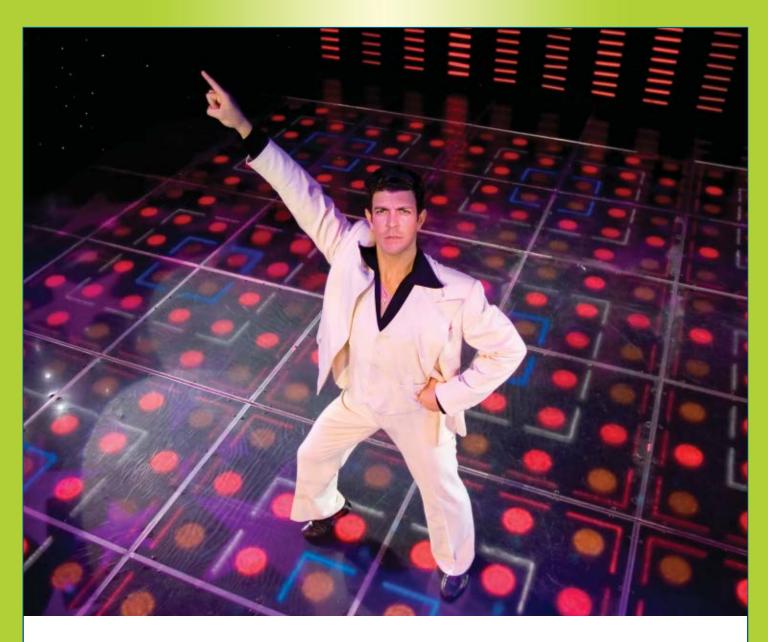
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