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Electric Energy T&D MAGAZINE

In this Issue

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The Human Infrastructure: Changes and Challenges

By: Francis Bradley, Vice-President,
Canadian Electricity Association, bradley@canelect.ca

Significant attention has recently focused on the need to replace the aging electricity infrastructure in Canada and the U.S. Typically, when the word 'infrastructure' is used in an industry context, it is assumed to refer to the equipment and systems that generate, transmit and distribute electricity. But infrastructure also refers to the underlying structure of the industry, which is composed of more than machinery. It is composed of people, and they too are aging.

The Canadian Electricity Association was first alerted to the aging workforce issue in 2002 when some of its members expressed concern that their own workforces were composed of a significant proportion of 'baby-boomers'. The concern was strong enough that a preliminary study of the employee age composition of CEA members was undertaken with the support of the Government of Canada. The results were troubling: nearly 40% of member employees were eligible to retire by 2014. In response to the serious implications the results posed, the industry sought additional funding to undertake an in-depth study of the Canadian electricity employee population. Thanks to generous funding provided by the Government of Canada and an equal amount matched by industry labour and services donations, the Electricity Sector Study was initiated in 2003 and concluded in 2004. The results, published in the comprehensive report "Keeping the Future Bright", were released in the first quarter of 2005.

The objectives of the Electricity Sector Study were to:

1) Develop an electricity industry human resources profile;
2) Determine the root causes of identified human resources issues;
3) Identify industry 'best practices' with respect to human resources planning; and
4) Provide recommendations for a human resources strategy for the industry sector.

The study methodology was based on extensive research that included employer and employee surveys; surveys of educational and training institutions offering relevant electricity sector courses; interviews with key stakeholder groups, including industry and labour leaders; focus groups with management and operational employees, as well as youth across Canada; and a review of secondary research sources such as Statistics Canada data.

Human Resource Profile

Labour force estimates from the Electricity Sector Study indicate there are currently 75,777 electricity-related employees, well below the levels of employment 10 years ago. Women are underrepresented in the sector accounting for only 25.4% of employees, significantly lower than the Canadian average where women represent 46.9% of the workforce. Visible minorities make up only 7% of workers in the electricity sector as compared to 12.6% of the national workforce, and Aboriginal workers account for 2.2% of the electricity workforce.

Employees surveyed were very satisfied with their work environment with just over 80% expressing satisfaction with their general working conditions and approximately 90% with safety. 69% of employees rated the electricity sector as a good or excellent career choice when compared to other industries.

Employees are well compensated against the Canadian average, earning 11% more than utilities workers in general, and nearly double the combined 'all industries' figure. 100% of companies surveyed provided pension plans, extended health care and parental leave while a majority of companies provided additional program support such as paid apprenticeship, relocation support, flexible work, in-house training, additional variable compensation incentives and reimbursement of costs for educational programs.

Large companies indicated that voluntary turnover including retirement was 4 % with the highest turnover, 7%, reported by firms whose primary line of business is generation. Industry representatives reported no large barriers to inter-provincial mobility of labour, and utilities did not identify significant employee losses to other provinces or to other countries. The majority of new hires reported were replacement positions, with only 1.3% of electricity-related new hires identified as related to growth. A majority of employers hire summer students and co-operative education students; however only slightly more than half hire apprentices. Industry representatives reported current shortages of power engineers, nuclear engineers, geological engineers, nuclear operators, power line technicians and, protection and control technologists.

Preparing Future Workers – Education and Training

In general, youth consulted had little or no awareness of the electricity sector as a career option and perceptions of the industry were frequently inaccurate. In focus groups, youth said teachers generally did not discuss careers in the electricity sector. Focus groups from all communities (managers, employees and youth) felt that shift work and safety risks were factors that might prevent young workers from choosing the industry as a career. Salary and benefits were seen as positive for the sector and the industry was seen as a good opportunity for those who liked “hands on” work.

The top challenge to support the industry was the cost of electricity-related technology and equipment, while the most common gap reported was a lack of placements, whether co-op or apprentice. Other challenges identified included an insufficient number of students enrolling in industry-related programs and technology change in the sector. Manager focus groups identified the industry hiring slow down of the 1980’s and 90’s as a factor in training program shutdown. They expressed concern over industry capacity to train workers to meet pending retirements. Employers reported certifications and credentials as important and expressed a preference for hiring fully functional workers who did not require substantial in-house training. Mandatory training per employee averaged 37.7 hours and discretionary training averaged 22 hours Canada-wide.

Retirement Projections

The age demographic results identified in the Electricity Sector Study demonstrate that retirement is a serious and impending issue for Canada and could pose significant risk to the future of the industry. Current estimates show that 17,066 trades, engineering and managerial staff are expected to retire within the next nine years. Estimates provided by employers indicate that over 17% of the existing workforce will be eligible for retirement in the next five years and almost forty percent (37%) by 2014. Further, more than half of decided employees stated they would not work for their current employer past the date they qualified for retirement. Based on the employee survey data, there are relatively few options that would encourage employees to work past their eligible retirement date.

Succession planning is a vulnerability within the industry. Nearly one-third of large companies surveyed either did not have or did not know whether they had a succession plan. This suggests that a substantial percentage of utilities could be unprepared for, and vulnerable to the effects of upcoming retirements.

The level of future retirement is pervasive across every region of Canada and across diverse business lines in the electricity sector. Based on the number of estimated retirements, the sector will need to fill nearly 9,000 vacancies in technical positions over the next four years and more than 17,000 vacancies over the next nine years. These new hires will require significant in-house training, supervision and mentoring. While utilities currently recruit for a few positions per year (i.e. 4% turnover on average for the industry), in the future, large-scale turnover in electric utilities will place considerable strain on existing staff to train and mentor new workers, and to support the transition of existing staff to more senior roles. While some utilities have historically relied on recruiting trained employees from other utilities or provinces, in the future, the need to hire a substantial number of new employees in every region will mean that utilities will be forced to draw upon recruits with no experience.

Key stakeholders, senior industry leaders and associated labour organizations expressed concern over the impact of pending retirements on the electricity sector. Risks identified include: infrastructure projects slowed or stopped; lessened reliability; increased cost of production; a greater or earlier reliance on automated systems; potential impact to neighboring firms; and a

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possible negative impact on safety performance. Worker retirement was identified as a top issue by over 90% of the industry leaders interviewed.

Next Steps

Retirement, combined with re-skilling needs due to technology change, will require utilities, labour groups, educators and government to collaboratively develop human resources strategies to maintain a viable electricity sector in Canada. Based on study findings, four main recommendations were developed in consultation with CEA.

1) Develop strategies to mitigate risk to the industry due to the aging workforce.
2) Develop a collaborative, cross-industry strategy for providing training to prospective and existing staff in the electricity sector.
3) Adopt a targeted marketing and promotion campaign to attract individuals from qualified groups of potential new entrants.
4) Establish a mechanism to ensure greater collaboration between utilities and other groups in the electricity industry.

Supporting the recommendations are a series of 17 strategies developed to assist organizations and agencies in better planning for current and future human resources challenges.

Partnering for Change

Collaborative partnership remains a critical element in ensuring a bright future for the Canadian electricity sector. Recently, members of the CEA Human Resources Committee met with industry labour leaders to identify how best to join forces in addressing sector needs. The International Brotherhood of Electrical Workers, the Power Workers Union, the Canadian Union of Public Employees and, the Society of Energy Professionals have agreed to partner with CEA to develop a strategic initiative to mitigate the impact of pending retirement. The development of a collaborative industry partnership framework is planned to be launched in November 2005. ■

For more information or to view the study online, visit www.BrightFutures.org.

Power Play Overcomes Invasive Birds

By R.W. Delaney, Business Writer

What do you do when 6,000 starlings precipitously invade your power plant? Run for cover!

"Last fall," relates Dave Sheetz, mechanic at PacifiCorp's Dave Johnston Power Plant in Wyoming, "thousands of starlings began roosting all over our power generating units. Their droppings covered the units and dripped all the way down from top to bottom." To make matters worse, Sheetz adds, the starlings were fond of nearby Russian olive trees, so hundreds of coated olive pits littered the place as well.

Sheetz, who has been with investor-owned electric utility PacifiCorp for 25 years, considered this a serious issue. Enter Richard Bates, a 30-year veteran of PacifiCorp and longtime Supervisor of Operations. "The starlings blackened the sky when they came in flocks of a thousand or more," Bates confirms. "They'd roost on our electrostatic precipitator and on four steam generators ranging in size from 150 feet to 210 feet tall."

"We tried hazing methods using noise as a deterrent," Sheetz says. "The birds would leave temporarily, but they always returned."

What To Do?

Bates consulted the company's environmental engineer and began directing research. "I was concerned about the health issues related to the bird droppings," he notes. "Fungus grows in moist conditions, and airborne particles can cause infection." Bates knew that the situation would not be acceptable to PacifiCorp's management at any level.

PacifiCorp is among the West's largest and lowest-cost producers of electricity. With headquarters in Portland, Oregon, PacifiCorp serves 1.6 million customers in six western states; operating as Pacific Power in California, Oregon, Washington and Wyoming, and as Utah Power in Utah and Idaho. Like any conscientious company, PacifiCorp needs to keep its premises in good working order and its atmosphere healthy for workers and visitors.

Research led Bates to Chicago-based Bird-X, Inc., the manufacturer of an array of bird deterrence products and systems.

"I spoke with a Bird-X consultant, who recommended the BroadBand PRO unit," says Bates. The unit was sensibly priced, so he could purchase four of them from his Small Tools budget, he recalls.

The BroadBand PRO uses the latest sonic technology to repel pest birds. It is the first device to combine varying species and volumes of high-intensity bird sounds in a multi-tasking mode. That is, the BroadBand PRO features distress cries to indicate danger to starlings, pigeons, gulls and other species while also reproducing the cries of predators like falcons and hawks to add the dimension of extreme threat to the broadcast. The BroadBand's "repertoire" also includes general bird harassment vocalizations and ultrasonic waves.

Outfitted with four portable speakers, a single unit covers up to 10,000 square feet. The unit is programmable to generate random timing, volume and frequency aimed at annoying birds.

Bird-X indicates that this powerful sound attack forces birds to depart for good, yet doesn't harm the birds or the environment. The latter is especially important, says Jeff Hymas, Communications Specialist for PacifiCorp, because "PacifiCorp's corporate mission includes being a responsible environmental steward and wildlife preservationist."

"I installed two of the units directly on the structural steel on top of power units #1 and #2," Sheetz explains.

Power unit #4 was taller than the others, so Sheetz placed the BroadBand PRO aboutthree-quarters of the way up the structure, and the fourth unit under the floor of the elevated precipitator. The 60' X 150' structure is raised about 20 feet off the ground. "Starlings were nesting underneath the precipitator," Bates describes.

The BroadBand PRO kit from Bird-X also includes a Terror Eyes globe, a Prowler Owl aerofoil-wing predator and Irri-Tape holographic ribbon as visual supplements to reinforce the audible scare tactics. But Sheetz decided not to use them, due to wind conditions in Wyoming.

Power Up.

Sheetz turned on the unit on the #1 power generating unit. "The whole flock of birds flew away. I assumed they might come back," he says. And some did. So Sheetz adjusted the settings for frequency and volume, and he re-positioned the speakers to encompass a larger area.

Bates explains how the birds were alsoroosting in the power unit's scrubber section, where exhaust gases and emission controls are housed – perhaps providing a warm and cozy spot for nesting. By directing the speakers toward the scrubber, Sheetz successfully bounced the birds back outside. Bates is noticeably pleased.

Besides the annoyance factor, he continues, "we've significantly reduced the health hazards for our employees and contract workers."

Now the birds are no bother. Sheetz changes the programmable settings about once a month, but isn't sure he needs to. "Birds don't seem to adapt to the sound."

Accrued Benefits.

During the initial barrage of birds, the crew was washing off the excessive bird droppings. Days later, the buildup would require another washdown. Bates is happy to have eliminated the frequent re-washings, saving labor costs and time and employee exposure to unsanitary droppings.

Also, he notes, the acidic content of bird droppings could eventually eat through the paint on the power generating units, allowing rust to develop. Bird control is, therefore, preventive maintenance. "It's a way of maintaining structural integrity," Bates says.

In summary, Bates says that the units certainly resolved "enough of the problem enough of the time." He continues: "The birds have relocated away from the powerhouse and gone back into their natural environment. They're not seeking shelter in our plant areas."

But Sheetz reminds Bates: "We need at least two more BroadBand units to protect the transformers and switchgear in our substation," he says. The substation is a natural attraction to birds since it includes wires, beams and transformers – all desirable perching spots for fly-ins. ●

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Challenging Minnesota Re-conductor Project a Success

Xcel Energy crews recently completed a large conductor replacement/installation project in the suburbs of Minneapolis, MN. The project included the replacement of 10 miles of 115Kv conductor with new, higher capacity 3M conductor over environmentally sensitive DNR and wildlife management areas. In addition to the challenges posed by the environmentally sensitive work areas, crews also contended with spring vehicle road weight restrictions, a substation with limited space and low overhead clearance and urban under-build including building structures, interstate highways, roads, parks, home sites and energized distribution lines. To complete the project, Xcel turned to overhead and underground cable installation equipment manufacturer Condux International, Mankato, MN for technical support.

According to Condux national accounts manager Ernie Neilsen, the Xcel conductor installation project called for a specific piece of equipment. Neilsen said, "Because we needed to meet strict conductor handling requirements and wanted to minimize any environmental impact on the right-of-way, we had to make sure we selected the right puller-tensioner for the job. In this case it was two AFB 506 puller-tensioners."

The AFB 506 puller-tensioner provides up to 20,000 lbs of pulling force on a single pull. With its pair of bull-wheels and completely independent controls, the unit is able to string one or two ropes or bundled

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conductors. According to Neilsen, properly handling the new conductor was a top concern for the Xcel project.

In order to facilitate the replacement of the old conductor and the installation of the new conductor, Xcel crews did both tasks simultaneously. The new 3M conductor was connected to the existing 115Kv conductor. As the old conductor was removed, the new conductor was strung in its place. The existing conductor was placed on reels and banded as it was removed.

The Xcel Energy project was completed on time and on budget. According to Neilsen, everyone involved was pleased with the results. He said, "We were able to complete the project with minimal environmental impact as well, which was a concern. The Xcel management team and construction crews were very impressed with the performance and ease of use of the puller-tensioner. The 3M representatives were equally pleased at the way the machine met the specific requirements for handling the 3M conductor. Overall the project was a great success."

Caption: Approximately 10 miles of conductor was replaced as part of the Xcel Energy project. Crews used an AFB 506 puller-tensioner from Condux International to remove the existing conductor and install the new conductor simultaneously. ●

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Opsens Announces The PowerSens Fiber optic Temperature System Specially Designed for Transformer Hot Spot Monitoring

Quebec City, QC, Canada (August 3, 2005) –

Opsens, a leading developer and manufacturer of fiber optic sensors, today announced PowerSens, a complete fiber optic temperature solution dedicated to the power transformer industry.

The PowerSens solution offers new sensor features and advanced signal conditioning capability to existing GaAs technology available in the industry; a complete system with innovative solutions from sensor installation to system operation.

"Sensor reliability and cable management have always been a challenge to the transformer manufacturers. Now with ruggedized construction and packaging, the PowerTemp sensor offers a higher tolerance for extreme mechanical stress," said MengChe Looi, Sales Director of Opsens. "Opsens' winding connector is the key to installation success. It provides complete flexibility with sensor cable lead as short as 10cm from the hot

spot. Sensor installation without the cumbersome cable spool handling reduces significantly sensor damage."

Opsens offers a small handheld unit as well as a multi-channel system with extended user interface features for field monitoring use. The PowerSens multi-channel signal conditioner is available with 256 kB of memory storage capacity, offering a simple integration to various networks using industrial common Modbus or SCPI type protocols. Combined with PLC or other control systems, the user is now able to consider hot spot temperature measurement in alarms, fans and pumps controls. The PowerSens is also available in cost competitive OEM module.

About Opsens:

Opsens inc. is a leading developer and manufacturer offers a wide range of fiber optic sensors of different measurands for use in EM, RF, nuclear and harsh environments.

For more information on Opsens' products, visit our website at www.opsens.com or call +1-418-682-9996. ●

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Managing the Value of Information

Utilities face many ongoing challenges when managing technology, people, and assets. You encounter volatile costs, an aging infrastructure, and increasingly complex environmental, operational, and safety regulations. But perhaps the greatest challenge is managing the information that ties everything together — from the designs created in the field to the decisions made in the office.

The value of information is closely tied to its ability to be shared. Information's value quickly diminishes when it must be duplicated, updated, or reformatted as it passes from one user or application to another. On the other hand, single-sourced information that is readily shared throughout a utility can lead to increased productivity and faster, more accurate decision making.

For example, Iowa Lakes Electric Cooperative (ILEC) turned to Powel-MiniMax's Utility Decision Support Platform (UDSP) to help improve the accuracy of field data collection and provide seamless field-to-office work order integration.

According to Steve Erickson, ILEC Supervisor of Operations Administration, linking field design and GIS will immediately streamline work order processes that rely on manual data entry. "Essentially, we want to stake a job in the field and move the data into our GIS maps automatically," said Erickson. "With the StakeOut field operations module and GIS module of UDSP working together, we will accomplish this goal. The effects on productivity, cost-efficiency, and customer service will be considerable."

Many utilities already automate many operational processes such as control, monitoring, and safety. Depending on the size of the utility, transactional business processes such as billing, payroll, and financials now typically share enterprise information on a common platform.

However, many utilities still conduct operations support functions — such as work order management, engineering analysis, field design, and asset optimization — using a combination of legacy systems, individual point solutions, and traditional paper-based processes. While these systems may be able to share data at some level, there is still a significant "integration gap" between real-time field data and enterprise information systems characterized by:

- slower customer response time and reduced productivity
- cycles of rework as field data passes back and forth to design and analysis
- overlapping databases, with the increased potential for errors
- increased cost and complexity as IT departments manage multiple systems
- lack of operational data to support strategic decision making

As a result, many electrical utilities pay a high price for maintaining this variety of information and decision systems — and miss opportunities to create greater value for members, investors, or customers.

"With the Powel-MiniMax UDSP solution, we can virtually eliminate these problems and spend far less time cleaning up our data," Erickson said. "We will also be able to process billing much faster and spend more time responding to customer needs — both of which will significantly improve service levels."

After the GIS module is fully implemented, Erickson and other ILEC executives will consider adding UDSP business functionality. UDSP features a scalable design that enables utilities to customize a solution that meets current business needs, and then integrate additional modules later to further automate operational processes and connect to enterprise-wide systems. Each UDSP database is configured to the utility's specific needs, allowing for customized access to all critical business information. ●

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PCB Containment Technology Inc. would like to announce the recent acquisition of AF White Ltd.

PCB Containment Technology (Kitchener) Inc. of Ayr, Ontario would like to announce the recent acquisition of AF White Ltd. of Brantford, Ontario. This acquisition will expand the transformer oil services of PCB Containment. PCB Containment provides the service of PCB transformer disposal, removal or retro fill. The service package of AF White Ltd. will expand the ability to perform retro fill work and further oil treatment in the field. AF White Ltd. sells transformer reconditioned oil as well as providing Field Vacuum filling services and oil treatment.

In addition, AF White Ltd. is proud to announce the addition of Jay Sherlock to our Team. He will be acting as Director of Operations Manager for oil processing. His years of experience in transformer manufacturing and service will greatly contribute to the company's ability to provide continued quality products and assist in clients technical oil needs. ●

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With the signing of the 2005 Energy Bill, a robust and responsive system is needed to handle the time-based rate and demand response requirements. This system will require specific hardware functionality along with reliability and repeatability to ensure the accuracy and availability of data. The Energy Bill also demands quick response from utilities. DVM™ enables customers to cost effectively address the 2005 Energy Bill provisions on demand response and smart metering. Whether it is time-of-use, critical peak or real-time pricing…DVM™ can support.

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MCM Structures launches a unique and memorable first within the infrastructural world.

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MCM Structures holds the rights on Canadian, USA and international patents on the products with head offices located in Canada. You are invited to visit their web-site www.mcmsystem.com or call the Master Distributor at 1-888-485-8111 to obtain any further information regarding accessing their product lines. ●

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PureTech Systems Inc.

PureTech is a leading-edge developer of advanced wide-area surveillance and intrusion detection systems that provide life and asset protection for firms and governments with expansive outdoor and geographically distributed operations. Using Geographic Information Systems (GIS), advanced scene analysis, and policy-based detection rules and notification technology, PureTech's PureActiv solution equips security personnel with specific alarm information, including the exact location and type of security threat. This allows them to proactively manage the entire perimeter security system from one unified source.

PureActiv is a robust wide-area surveillance solution for detecting security breaches at facility perimeters and in outdoor environments at airports, seaports, utilities, prisons, and other facilities with critical infrastructure. PureActiv detects security threats according to the detection rules that security personnel establish and turns standard security cameras into intelligent detection sensors.

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With headquarters in Phoenix Arizona, PureTech Systems serves national and international markets. PureTech is a wholly owned subsidiary of Pure Technologies Ltd (TSX-V:PUR). To find out more about PureTech Systems Inc. or its parent company, visit our website at www.puretechsystems.com or contact Jan Broderick at 602-4249842 or e-mail us at info@puretechsystems.com. ●

Circle 100 on Reader Service Card

What is(n't) Asset Management?

By Michael A. Marullo, Contributing Editor

Asset Management is a term that has been tossed around quite a bit lately. For over a year now, no matter where I look – conference abstracts, trade press editorials (like this one!), feature articles, or newsletters – it seems like everyone is talking about it. However, as I would eventually learn, talking about A/M is one thing; doing something about it is different story…

So, about 18 months ago, I set out to see what the buzz was all about by doing a little informal research among people I felt certain would be able to educate me about why A/M has suddenly become such a big deal in the utility business and how it might impact the utility automation field. What I found was that everyone I talked to had at least a slightly (if not drastically) different view on the increasingly ubiquitous use of the term: Asset Management.

One of the first things I learned was that A/M enjoys a very well established presence in the central plant environment (e.g., power generation plants). Upon further investigation, I found that the body of A/M knowledge in this centralized plant context was equally grounded among gas and water/wastewater utilities. However, when I asked what A/M meant in the distributed assets context, that's where it got a whole lot more interesting.

It seems that no one is too sure about what asset management means in the distributed asset environment. Well, maybe a better way to say it is that everyone has a different idea about what A/M is in that context and how it relates to a particular area of interest, a current application focus or, in some cases, the project-of-the-week. By contrast, what almost everyone does seem to agree on is that A/M is going to be huge and that it will be a part of virtually everything they do – someday.

From all indications so far, A/M (again, in the distributed environment) is widely viewed as a huge market opportunity that no one can seem to define very precisely; a great market research challenge, indeed. However, as is often the case, buzzwords and acronyms abound as people struggle to add context and substance to the elusive definition of A/M. Some areas where the people I've talked to say asset management has a future include:

- CMMS- Computerized Maintenance Management Systems
- CBM- Condition-based Monitoring (aka Condition-based Maintenance)
- CBI- Condition-based Inspection
- RCM- Reliability-centered Maintenance
- Compliance Management (e.g., regulatory, contractual, etc.)

Interestingly, which areas occupy the top slots really varies, depending on whom I ask. Most T&D people are getting tuned in to CBM and RCM right now, but in other market areas (e.g., the gas and water/wastewater sector), more often than not CMMS seems to be at the top of their list.

Then, there is the question of hardware/software platforms. Some folks contend that there is no need to create yet another data repository dedicated to storing and manipulating asset management information. Ask a CIS (customer information system) person, and s/he will tell you that CIS is the rightful place for it; ask a GIS (geospatial information system) jock and you'll get a predictably different answer. Ditto for SCADA practitioners, etc., etc.

If you were hoping for a clear definition, I won't attempt to provide that just yet as we've only recently begun the formal research process. Eventually, we will put a fine point on that issue while also addressing the interrelationships between asset management and the world of utility automation. So far the indications are that the definition will be very broad and comprehensive; probably not a neat little sentence, but perhaps a paragraph or two. In the meantime, it may be easier to say what asset management is NOT rather than what it is. Stay tuned…

PS Any input you might like to offer on this subject is welcome. Please send your emails to me at the address shown below. - Mike ■

About the Author

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

INTERVAL DATA – KEY TO DIAGNOSIS

By: Tom Knutsen, LCRA

Interval data meters provide wholesale and distribution utilities information that can help them operate their systems economically in today's increasingly competitive electric markets. The Lower Colorado River Authority (LCRA), a wholesale power supplier serving public power and one investor-owned utility in Central Texas, assists 33 of its customers -- and its own internal operations -- with metering and meter data services for major accounts.

De-regulation in Texas does not require public power utilities to participate in the competitive retail market, and to date only one of LCRA's customers has chosen to do that. Also, legislation prohibits LCRA from owning or operating retail facilities or seving retail customers. Faced with the possibility that any customer's board may vote to "opt in" to competition and open its consumers to other generation providers, LCRA has developed a Key Accounts program affording its customers metering, meter services, and daily data collection and Web presentation of meter data. Daily meter reading helps detect failed equipment before it can cause operational or revenue problems. Interval data also provides information that helps LCRA's managers address power plant and irrigation system operations.

LCRA's staff and manages interval data from two discrete MV-90 meter reading and data translation systems. First, LCRA has its own MV-90 data translation system for its substation-based wholesale billing meters. Second, it uses Hunt Power, in Arlington, Texas, to read approximately 300 electric meter-recorders daily for its wholesale customers' key accounts. After retrieving data with its MV-90 system, Hunt Power verifies its accuracy and posts the data to its PowerPriceTM Web site. Each participating consumer and wholesale customer has access to its own secure site showing data current through the early morning of each day. LCRA's staff, then, has access to interval data for approximately 600 wholesale and another 300 retail meters, to assist internal and external customers with billing, metering, and other operational questions.

Phantom MW

One of the most perplexing of those questions arose not long after the Texas electric market began its competitive retail operations. In setting up the market, Texas' system control operator, the Electric Reliability Council of Texas (ERCOT) concluded that all generators in the system must be metered to record their generation and consumption. And as with all loads of one megawatt or greater, the power plant meters record data at 15-minute intervals. Both ERCOT and the entities responsible for installing and maintaining the plant recorders read them and net their production against their consumption for each of 96 daily intervals. Plant owners are credited with net generation and billed for net consumption.

During normal maintenance of an LCRA coal-fired plant, staff retrieved data from the plant's meters during an outage to trace generation shutdown and ensuing operation. Plant meters in ERCOT uniformly record consumption on channel one and production on channel four. At the beginning of the shutdown, data from channel four predictably showed a rapid drop to zero as data for channel one -- power in to the plant – showed a sudden rise to a plateau of about five megawatts (MW).

Six hours into the repairs, channel four began registering about three megawatts steadily. This curve made no sense: How could a dismantled turbine be generating electricity? The load curves perplexed plant managers. After reviewing the data, they called the plant electrician, who investigated the anomaly and found that the ground cables, two for each of three phases in the switchyard, produced electromagnetic fields that the lines' current transformers sensed as active

generation, recorded in the meters as generation. The plant crew moved the cables and the meter channel fell to zero.

Only because of the new market did the mystery megawatts matter. ERCOT would see the load and credit LCRA with generation that didn't occur. The sum was too small to affect the system, but it did show that traditional maintenance had to be changed owing to a new and different set of measurement.

"What the Hey, a Light Bill?"

Billing power plants presented a new challenge, too. Under ERCOT rules, plant metering is the responsibility of the transmission and distribution service provider (TDSP). At LCRA, a transmission affiliate manages substations, where LCRA transfers the ownership of power to its distribution customers. It is there that LCRA measures wholesale power sales for billing. So when the re-regulated market approached, LCRA staff decided to treat power plants as substation billing points subject to a specific power plant price and the associated transmission tariffs. The plant bills are included in the appropriate wholesale customers' monthly wholesale power bills. The customers recover their costs by billing the plants for the full generation and transmission costs and a nominal distribution charge.

Almost overnight, plant managers saw traditional parasitic loads turned into monthly power bills. They'd never seen a retail power bill, and yet now they had to pay demand, energy, and transmission charges.

The plants became a set of new, internal customers, so staff worked to educate operators about billing. Controlling electric use was not new to the plant managers, for starting in the mid-1990s they'd established procedures for shedding internal systems during summer peak hours to reduce their plant consumption and increase output. By subscribing to a power plant indexing service, the managers of LCRA's coal-fired plants mangers track their plants' parasitic loads against similar units around the nation and consistently have reduced internal use so that they rank among the lowest consumers of their kind in the country.

Nonetheless, a price signal put a new value on outage operations. The major obstacle for controlling the power bill at LCRA's Fayette Power Project Unit 3 is that it has a system of emission scrubbers that run after the generator trips. In the first outages after the market opened, demand at the plant was high, largely because the scrubbers, essentially a slurry of limestone, can't stop. If they did, the slurry would quickly dry into cement.

So, after studying outage load curves and their interaction with demand charges, the plant's operation group identified additional systems it could turn off in the event of a failure. Easiest to identify is the set of water pumps that pull water from the nearby Colorado River uphill to the plant's cooling pond. Alone, the pumps account for about 3 MW.

As FPP worked to manage its load over two years, the energy the plant uses when it trips has declined gradually by approximately 30 percent, an efficiency improvement that translates into power cost savings for its customers.

Phases Out, Phases In

At the transmission level, too, interval data reveal and help resolve otherwise undetectable events. A perplexing question arose in August 2004 when interval meters at two businesses in Shiner, Texas, continued to record energy use after the substation meter failed. How could manufacturers be receiving power when the substation was down? Only a close look at intervals for all meters resolved that mystery flagged in the middle of monthly billing. At first the imbalance appeared improbable; however, interval data extracted from the Key Account MV-90 system showed that while the demand dropped at the consumers' meters, load continued to flow for almost an hour after the outage before falling to zero. An hour later, interval data showed normal operations had resumed.

The data trails came to a logical end with the transmission outage report. Two transmission lines feed the Shiner Substation. On that Saturday morning, an LCRA crew shut down the one normally used and switched service to the other line. When the shift occurred, two of three line jumpers failed, leaving Shiner with only single-phase service. The phase that powers the substation meters went out, but the phase for the consumer meters remained. Furthermore, while the city's few three-phase customers would have been under-powered, as the key account meters showed, single-phase requirements were met. Only when service was switched back to the usual line did the plants' meters fall to zero, for a lightning arrestor failed at the substation. Forty-five minutes later, the arrestor was removed and power restored.

For billing purposes, LCRA allotted a percentage of the load from the second feeder to Shiner's monthly generation charges. The experience proved useful because a similar even occurred at another substation two months later. LCRA has learned to use its key account, consumer metering to back up data from substations, which helps billing and system management.

Gin-Soaked

Another benefit of the metering and management of interval data is illustrated by the overnight loss of kWh at a cotton gin in Lockhart, about 40 miles southeast of Austin. The gin runs only in late summer and fall after the cotton harvest. A major account for the city's utility, it also is one of a few gins remaining in Central Texas, providing a valuable service to the region's cotton farmers. From the time the first loads of raw cotton arrive in August, the gin's cutters run almost non-stop, pushing out cleaned cotton fiber while filling the air with a snowy mixture of cotton lint and stem dust. When wet, it congeals into a paste not unlike papier-mâché.

On an October Friday, one of Texas Meter & Device's technicians completed an annual test of the metering service for the gin. An integral feature of the key account service, annual tests verify the integrity of potential and current transformers (PTs and CTs), phase balance, and the meter's internal pulse and kWh multipliers. Before leaving a test site, meter technicians call Hunt Power to ensure that the meter is functioning properly. All that took place on Friday, yet starting the next morning Hunt Power pulled no data from the meter.

Curious, LCRA staff went to the gin the next Tuesday and found that a weekend rain had left the PTs under a layer of wet cotton waste that had shorted service across the instruments' caps. Leads to the current transformers had cooked in two, and several wires were still sizzling. The gin ran, for its service had not been interrupted. The city was delivering un-metered, and therefore, un-billable power. Lockhart's electric utility crew promptly fixed the service, but LCRA concluded the site needed permanent protection. An LCRA distribution engineer worked with TMD to relocate the PTs, protect them with an insulating blanket, and moved the meter outside the tight enclosure where it had been set.

Without daily reads and data verification, the shorted instruments would have gone unnoticed until they started a larger fire or were seen by a meter reader. In addition, normal monthly register reading would have forced the city to estimate un-metered power, always an embarrassment.

Irrigation – Where Electricity and Water Meet

In the summer of 2004 the electric customer service group used interval data to help another internal customer, LCRA's irrigation operations. LCRA owns and operates three irrigation districts in the region west of Houston called the Coastal Plain. From pump stations on the river, LCRA lifts water into earthen canals where it flows to rice and cotton farmers under contract for service. The districts are separate systems of pumps and canals, each integrated network of canals and ditches. The Lakeside District, centered in Eagle Lake, pumps water from the Colorado at a station called River Plant and delivers it to two lift stations, Prairie and Lake Plant, which pump it to a network of irrigation ditches.

The irrigation sites are in the service area of an investor-owned utility, AEP Texas Central Company (formerly Central Power & Light), a participant in ERCOT's competitive retail market. LCRA buys generation service from a third party while AEP is the TDSP, responsible for delivering and metering power. Under an agreement with AEP, LCRA has Hunt Power read the nine major pumping loads in the districts and post the data daily to the Web.

To help the crew at Eagle Lake manage its power costs, staff calculated how much energy each of the three pumping stations used to move one acre-foot (ACF) of water. An acre-foot is a common unit of measure, the amount of water needed to cover one acre one foot deep. Other volumes of water are sub-sets of an acre-foot. The first step was simply to determine kWh/ACF by station. Next, using schedules for each pump site's individual motor operations, kWh/ACF was calculated by motor.

Those results led to further inquiry, for the initial analysis showed that energy use at River Plant shot up when two motors ran and dropped when they didn't. Modeling their nameplate ratings against operations showed that those motors are inefficient in comparison with the others. When the river's level fell, those pumps' efficiency fell even faster. Interval data was critical for the project, for it enabled the analyst to match measured energy against pump operations recorded by their time blocks.

The analytical conclusions supported the informal observations of the Lakeside operators. The result is that they will replace those two pump motors as a part of the refurbishing of another plant.

In each of these cases, interval data made detailed analysis possible, and may have prevented a fire or explosion in Lockhart. With the changing world of re-regulated, competitive markets, keeping up to date with metered data throughout a system assists in managing processes and serving customers. ■

Elster Electricity's EnergyAxis® System with Intelligent Two-Way Communications

Elster's REX® meter and A3 ALPHA® meter/collector

In today's highly competitive global arena, the utility industry faces challenges and opportunities never seen before. Change has become constant, with innovation the standard rather than the exception. Reducing costs, enhancing customer service, and improving operational efficiencies are business strategies common to every company looking to remain competitive and operate profitably.

As a world-class provider of electricity metering products, communication solutions, and metering automation systems, Elster Electricity is a company aggressively pursuing those challenges. According to Ronald B. Via, vice president of sales and marketing, "Our goal is to increase customer revenues through innovative solutions and reduce costs through streamlined operational strategies. The introduction of our EnergyAxis System represents a major advance in network metering communications and extends beyond typical automated meter reading solutions. It reflects our continued commitment to these goals and enables our customers to compete effectively in a changing environment."

The Power of Two-Way Communications

Built on 900 MHz unlicensed radio communications technology, the EnergyAxis System's, fully automated, intelligent two-way communications makes on-request meter reads and server-initiated commands a reality. Its powerful two-way communications, coupled with Elster's electronic single-phase REX® meter, enables utilities not only to read meters, but to change energy, demand, or time-of-use rates as needed, as well as start or stop load profile interval recording, or initiate a service disconnect. To further enhance a utility's customer service capabilities, the system can automatically receive neighborhood power outage or restoration data, local voltage conditions, outage counts and other information.

Engineered for optimum flexibility and functionality, the EnergyAxis System supports targeted deployments of hundreds or thousands of meters, up to full-scale multi-million point installations. Its flexible two-way communications architecture assures greater wireless coverage through the implementation of a "mesh network" in which individual REX meters can function as repeaters. Since each meter can be designated to receive and transmit messages from other meters, the EnergyAxis System works in areas where obstacles exist.

Meter Readings When and Where You Need Them

Locked gates, unleashed pets, or indoor meters all reduce operational efficiencies, drive up metering costs, and reduce revenues. With the EnergyAxis System, these barriers as well as associated problems of estimated bills or rescheduled meter reads are eliminated. High turnover areas, like apartment complexes, universities, and military housing, represent costly service areas, requiring repeated trips to obtain move-in and move-out meter reads, or to provide disconnect and reconnect services. The on-request reading function and the remote operation of Elster's optional disconnect switch improves the utility's ability to connect or disconnect service reducing operational costs and improving customer service.

Rapid Change Requires Intelligent Metering Products

"With the utility industry experiencing unprecedented change, market pressures have made sophisticated pricing methods for electricity a growing necessity. Our system has been built with advanced features that offer utilities optimum metering and billing flexibility for addressing these issues," says Garry January, Elster Electricity's residential meter product manager.

At the heart of the system is Elster's single-phase, residential electronic REX meter with built-in EnergyAxis System communications. Innovative in design and multi-tasking in function, the REX meter provides highly accurate kWh consumption, kW demand, time-of-use metering, critical tier pricing, and load profile interval data, all on command. These features reduce costly site visits and eliminate the need for new metering hardware. Utilities can adjust prices daily, a distinct advantage during peak energy demand periods.

The unique design of the REX meter and the intelligent two-way network architecture enables meter self-registration within the network for true "plug-and-go" capability. This feature eliminates the need for on-site programming, making installation and operation both easy and economical. Once installed, each meter automatically registers with the network. Should local conditions change, meters reregister via alternate paths.

The communications network of the EnergyAxis System utilizes spread spectrum frequency-hopping technology to provide secure, reliable communications between meters and collectors. This technology enables individual meters to be designated as repeaters, creating a dynamic path that optimizes signal strength and maximizes communication distances. Communication distances between meters and collectors are increased, and the number of collectors required is dramatically reduced, improving system economics. The system architecture uses Elster's A3 ALPHA meter as the host for local data collection from the REX meter, making collector installations simple while reducing costs.

For more information on Elster's EnergyAxis System with intelligent two-way communications, contact us today!

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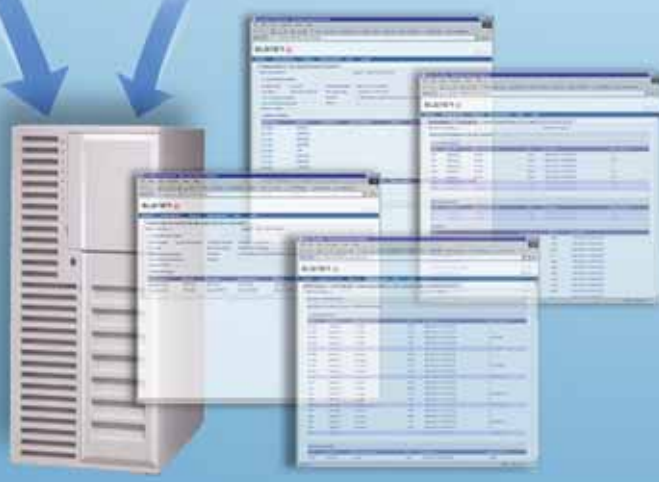

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Brooks Utility Products Group working with industry to meet evolving needs

FARMINGTON HILLS, Mich., U.S.A. – Continually evolving technology is changing today's electric meter – and its potential functionality for tomorrow.

Brooks Utility Products Group is in a unique position in that its products serve as the link between the meter and the new technologies evolving in and around the meter.

"The meter socket serves as the 'gateway' to the home, and we provide meter adapters and interbases that accommodate new technology," explained Jeff Hanft, vice president of Brooks UPG. "But there are also other ways that we approach technology. Our approach runs the gamut from our role in programs like Smart Metering and AMR, to how we can help utilities operate more efficiently and effectively around the meter."

Brooks UPG offers a full range of metering-related products, including seals, locking devices and other security products, meter adapters and extenders, safety and test equipment, prewired sockets, enclosures and other accessories.

For new metering technology, Brooks UPG's range of adapters, interbases and other meter interface devices allow utilities to offer AMR, remote disconnect, load control, auxiliary power, as well as KYZ and even telephone connectivity. These Brooks UPG products include A-base and B-base to socket adapters, K-4 and K-7 socket conversion adapters, EK, EK-D and LP series extenders.

Listening to the industry

In developing its products offering, Brooks UPG pays close attention to feedback from utilities through one-on-one meetings and group panel discussions.

For example, Brooks UPG invites customers across the country to its annual "metering roundtable" forum. The forum is an opportunity for utility representatives to openly discuss the metering, security, customer service and other issues they face in day-to-day operations. In recent years, two dozen utilities have participated.

A lot of Brooks UPG's new developments have come from individual contact with customers. The Snap2™ transformer-rated meter panel is one such example.

The Snap2 meter panel was introduced in summer 2004 after discussions with a Texas utility about ways to speed meter installations. The Snap2 panel is an innovative two-piece, pre-wired electric meter socket that significantly reduces installation time while lowering inventory costs.

Utilities save money using the Snap2 meter socket by allowing contractors to install an empty meter enclosure ahead of the actual meter service date. Then, utility personnel take a pre-wired meter panel to the job site, and snap it into place. This reduces installation time from hours to a matter of minutes. It can also reduce the chance for time-consuming and costly field mistakes and coordination problems because the meter panel is interchangeable and can easily be removed.

Securing the technology

Along with advances in metering and services, there are still those who want something for nothing. That's where Brooks UPG's security products come into play. Brooks UPG manufactures a full line of security and revenue protection products, from tamper-evident seals to high-level hardened alloy products for electric, gas and water utilities.

For the vast majority of meters, security seals alone are an adequate deterrence to keep homeowners honest. Brooks UPG provides a variety of durable clear acrylic and other plastic seals that are tamper resistant and provide evidence of tampering. Most are available with bar coding and customization options.

One such example is the straight wire version of an Enduro seal to give customers more flexibility as well as durability in sealing applications. The unique Straight Wire Enduro Seal has a patent-pending fishbone insert design, and can fit any sealing aperture as small as 1/16".

For more hard-core security, Brooks UPG provides snap and screw-type sealing rings for ring-style meters, brass padlocks with indicative seals, and security devices for ringless-style meter sockets.

The answer . . . . for integrating technology at the meter socket

I"Brooks Utility Products Group is backed by a proven history in R&D, product quality and close customer ties," Hanft said. "Our Brooks Ekstrom, Brooks Meter Devices and Brooks Security Products divisions are well-known in the industry.

"Combined, we have the resources to link utilities and their customers with the new technology and services available today."

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Minnesota Power Realizes Unexpected Benefits from AMR Deployment

In business, nothing beats good timing, especially for an investor-owned utility trying to stay one step ahead of the regulators.

Minnesota Power (MP) recently completed a major deployment of an automatic meter reading (AMR) system. The utility made the decision to invest in AMR technology in 2001. About the time MP began exploring AMR options, the Minnesota Public Utilities Commission was in the process of outlining service requirements for the accuracy of meter reads. The new standards required a regulated utility to read 80 percent of its electric meters from December to March, and 90 percent the rest of the year. Bottom line: estimated reads were no longer good enough.

"The new rules limited the practice of estimating meter reads for billing purposes," said Sue Thompson, MP's manager of customer service. "We had a high customer-read meter population and a high percentage of those reads resulted in estimates."

Other regulatory mandates included a requirement that utilities read "hard-to-reach" meters after hours or on Saturdays or Sundays if requested by the customer, which for MP would greatly increase overtime costs; and an "80-20" rule for answering customer calls, a requirement that 80 percent of customer calls be answered within 20 seconds of being received.

In addition to meeting regulatory requirements, MP determined an AMR system would reduce field service costs, increase billing accuracy and improve overall customer service. Based in Duluth, MN, the utility serves a mixture of cities and rural townships across a 26,000-square-mile area. It provides power to 135,000 retail customers, and sells wholesale power to 16 cities.

Power Line Carrier

After considering factors as geography, cost, and capabilities, MP decided a power line carrier AMR system was the most logical choice. "When we began looking at AMR, we were very interested in daily reads," said Thompson. "Considering our service territory, we knew a power line carrier system would be the most efficient."

MP chose the TS1 Turtle® System from Hunt Technologies, Inc. Hunt's power line carrier-based technology insured reliable daily reads with cost-effective installation costs across both rural and urban areas. The utility began deploying TS1 well before receiving any regulatory directives. "We had the foresight to anticipate that all regulated utilities would face new service requirements," Thompson said. MP set a two-year window for deploying the system to the majority of its customers, and was able to stay on that schedule. The deployment started in July of 2002 and was completed at the end of April 2004.

Unexpected Benefits

In addition to staying current with regulatory compliance, MP counted on a solid return on investment. The improved meter reading accuracy and related cost savings produced an even greater return than anticipated. MP estimates the system will pay for itself in less than four years.

"As the amount of AMR meters in the field increased, we saw a steady increase in megawatt hour sales. In our case, a change of a half-percent in accuracy resulted in significant savings," said Joe Burton, supervisor of meter reading for MP. "We've seen more efficiency in the way time and money are spent in the field."

From a staffing perspective, implementation of the TS1 System has reduced the amount of "windshield time" employees spend on the road, reduced environmental and safety risks, and fully satisfies regulatory compliance.

Customer Response

AMR also improved response to customer calls, helping the utility maintain compliance with the "80-20" rule. As soon as the system was deployed, MP saw a decline in high-bill complaints and total customer calls. It saw the largest decline in call center activity as soon as deployment was complete. While call volume has fluctuated since then, total volume is lower than before AMR.

The call center now has been able to identify changes in power usage and use this information to explain to customers when the usage occurred. The ability to pinpoint the day on which power use increased is a big benefit in resolving customer complaints.

The benefits of a proven AMR system add up fast, especially for a utility operating in a changing regulatory environment. "We finished the deployment wondering why we hadn't done it sooner," Thompson said. "It's had a positive impact across the entire organization."

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Autovation 2005: The AMRA International Symposium takes a fresh look at automation strategies for utilities of all types and sizes. The educational programming, networking events, roundtable discussions and exhibit hall at Autovation will ensure you leave California with the knowledge that will help you make the most of your utility's AMR investment.

This year's symposium features:

- General Session speakers:
  - Joseph Desmond, Chairman of the California Energy Commission
  - Terry Jones, Founder of Travelocity
  - Christopher Garner, Director of Long Beach Energy and Oil Properties
  - Joseph Thomas, General Manager–Client Fulfillment for United Illuminating Co.
  - Lisa Schwartz, Senior Analyst for the Oregon Public Utility Commission
- Break-out sessions that address macro- and micro-level issues specific to water, gas and electric utilities
- Utility-only forums on Wednesday, Sept. 21, where delegates can share experiences and brainstorm about common challenges
- Ten in-depth Pre-Autovation Courses focusing on key issues for forward-looking utilities
- Exhibitor Showcases, where attendance is limited to utility delegates so you can ask detailed questions specific to your situation
- An exhibit hall showcasing all major advanced metering product and service providers at a single venue
- Numerous networking events including daily activities in the exhibit hall

We're sure you'll find Autovation to be a refreshing, invigorating learning experience that changes the way you think about AMR and its role in optimizing strategies, communications and operations across the utility.

Schedule at a Glance

		Room
Saturday, Sept. 17		
3 – 6 p.m.	Registration	Convention Center Concourse Level Foyer
Sunday, Sept. 18		
7 a.m. – 5 p.m.	Registration	Convention Center Concourse Level Foyer
7:15 – 8 a.m.	Pre-Autovation Course Continental Breakfast	Hyatt – Seaview Foyer
8 a.m. – Noon	Pre-Autovation Course 1: AMR Full-Scale Residential Technologies for Realistic Business Cases	Hyatt – Seaview A
8 a.m. – Noon	Pre-Autovation Course 2: Best Practices: The Deployment and Operation of an Advanced Metering Project	Hyatt – Seaview B
8 a.m. – Noon	Pre-Autovation Course 3: Pre-Assessing Communications Technologies for AMR and Value-Added Applications	Hyatt – Seaview C
1 – 5 p.m.	Pre-Autovation Course 4: How to Achieve Enterprise-Wide Business Optimization and Benefits Through AMR	Hyatt – Seaview A
1 – 5 p.m.	Pre-Autovation Course 5: Implementation and Use of ANSI AMR Communications Protocol Standards for the Transfer of C12.19 Data Tables	Hyatt – Seaview B
1 – 5 p.m.	Pre-Autovation Course 6: AMR Procurement: How to Know When; How to Get it Right	Hyatt – Seaview C
Monday, Sept. 19		
7 a.m. – 6 p.m.	Registration	Convention Center Concourse Level Foyer
7:15 – 8 a.m.	Pre-Autovation Course Continental Breakfast	Hyatt – Seaview Foyer
8 a.m. – Noon	Pre-Autovation Course 7: Practical Guide to AMR Project Management — From Feasibility Though Installation	Hyatt – Seaview A
8 a.m. – Noon	Pre-Autovation Course 8: AMR Systems for Water Utilities	Hyatt – Seaview B
8 a.m. – Noon	Pre-Autovation Course 9: AMR Communications Model Based on ANSI C12.22: Protocol Specifications for Interfacing to Data Communication Networks	Hyatt – Seaview C
8 a.m. – Noon	Pre-Autovation Course 10: Telecommunications Solutions for AMR — Home-Area/WAN, Public and Private Links	Hyatt – Seaview D
10 a.m. – 1 p.m.	Exhibits Open	Convention Center Hall B
11:30 a.m. – 1 p.m.	Lunch in Exhibit Hall	Convention Center Hall B
1 – 3 p.m.	**Opening General Session** Joseph Desmond, California Energy Commission Chris Garner, Long Beach Energy and Oil Properties Joe Thomas, United Illuminating Co. Lisa Schwartz, Oregon Public Utility Commission AMRA Awards Presentation	Convention Center Ballroom Level 2
2:30 – 6 p.m.	Exhibits Open	Convention Center Hall B
5 – 6 p.m.	Reception in Exhibit Hall	Convention Center Hall B

Macro-Level Perspectives

Educational Session 1
Monday, Sept. 19
3:30 – 5 p.m.

A Taking AMR Technology to the Next Level
Room: 201A-B

Hear lessons learned from a successful project as well as how one utility is using fixed-network technology and interval data to achieve improvements in outage detection/verification, proactive distribution asset management and revenue assurance. Attendees also will get a review of the business and societal case for AMI in California; specifically, how the state can provide customers with choices and improved service quality using advanced metering networks.

Bernie Bujnowski, PPL Utilities
Dennis Stephens, Xcel Energy
Mike Messinger, California Energy Commission
Chair: Jim Andrus, Elster Electricity LLC

B Trends and Developments in the U.S. Water Industry
Room: 203B

The first speaker will discuss why long-term increases in the cost of water make technologies that enable enhanced water services a wise investment. Next, hear the challenges and successes experienced before, during and after one AMR project. Then, get an overview of the U.S. water market, including key drivers behind the recent growth and consolidation of the industry.

Jack Hoffbuhr, American Water Works Association
Lew Adkins, City of Richmond, Va.
Steve Maxwell, TechKNOWLEDGEy Strategic Group
Chair: Bruce Lackey, Badger Meter Inc.

C Technology Is the Key to Success for Future-Minded Utilities
Room: 202A-B

This session addresses the process and outlines issues that utilities should consider before choosing an AMR technology. Speakers will review how to build a business case and maximize internal investment, then discuss issues related to deploying and operating hybrid systems. The ultimate goal is to improve customer service, launch advanced applications, and surpass internal and external expectations.

Steve Carrico, Lee Lake Consulting
David Glenwright, PECO Energy
Glenn Pritchard, PECO Energy
Chair: Sandy Fernstrom, TWACS by DCSI

= gas focused session = electric focused session = water focused session

Schedule at a Glance

Tuesday, Sept. 20

		Room
8 a.m. – 5 p.m.	Registration	Concourse Level Foyer
8:30 – 9 a.m.	**AMRA Annual Business Meeting** **AMRA Awards Presentation** **Autovation Prize Drawing**	Ballroom Level 2

Educational Session 2 — Tuesday, Sept. 20, 9:15 – 10:45 a.m.

A — System Planning, Room: 201A

Using AMR Data for Load Research: Fact or Fiction
Curt Puckett, RLW Analytics Inc.
Erin Puryear, Dominion Electric Cooperative

Building Network and Metering Technology Into Company Strategy
Bruce Carpenter, Portland General Electric Co.

Transformer Load Management Benefits From AMR
Andrew Sugg, Ameren

Chair: Rob McEver, Cellnet

B — Outage Management, Room: 201B

Using AMR to Detect and Map the Extent of Outages
Randy Shephard, Diverse Power
David Haynes, TWACS by DCSI

Mapping the Way to Improved Outage Response
John McClaine, Puget Sound Energy

Outage Management Program at Gulf Power
Brian White, Gulf Power Co.

Chair: John Brett, Tantalus Systems Corp.

C — Business Case Results, Room: 202A

Benchmark of AMR Usage Applications at Rural Electric Cooperative Utilities
Greg Johnson, Katama Technologies Inc.
Henry Cano, NRECA National Consulting Group

One Company's Story — Maine Public Service
Rodney Leach, Maine Public Service Co.

Comparing Benefits of AMR Alternatives
Rick Hackett, Central Vermont Public Service Co.
Steve Hadden, PlexusResearch Inc.

Chair: Vicki Trees, Hunt Technologies Inc.

10 a.m. – 6 p.m.	Exhibits Open	Hall B
Noon – 1:30 p.m.	Lunch in Exhibit Hall	Hall B

Educational Session 3 — Tuesday, Sept. 20, 1:30 – 3 p.m.

A — IT/Systems Integration, Room: 201A

AMR at Southern Company
Kevin McDonald, Georgia Power Co.
Ed Fischler, Southern Company

Increasing Operational Efficiencies Through AMR Interfaces: The Central Georgia Example
Kevin Reeves, Central Electric EMC
Jeff Greeson, Central Electric EMC
Lisa Williams, Hunt Technologies Inc.

Chair: Vicki Trees, Hunt Technologies Inc.

B — Demand Response, Room: 201B

State Regulators — The Gateway to an Advanced Metering Market?
Dan Delurey, Demand Response and Advanced Metering Coalition

The Role of AMR in Demand Response and Reliability
Craig Boice, Boice Dunham Group

Chair: Ed Malemezian, Ed Malemezian Consulting Inc.

C — Standards, Room: 202A

EPRI Metering and Intelligrid℠ Architecture Development
Joseph Hughes, Electric Power Research Institute

Implications of NERC Critical Infrastructure Protection CIP-002-009 on AMR
Ron Chebra, PA Consulting
Mike Hewitt, CISSP
Additional speakers TBA

Chair: Jim Andrus, Elster Electricity LLC

3 – 3:30 p.m.	Refreshment Break	

Educational Session 4 — Tuesday, Sept. 20, 3:30 – 5 p.m.

A — Billing/Revenue Services, Room: 201A

Installation and Meter Refurbishing
Bruce Sisson, Wellington Power

Using Route Optimization to Manage the Transition to AMR: Leveraging the Benefits
John Burke, Cognyst Consulting LLC

Importance of Meter Installation Data Collection Procedures
Christopher Boyle, US Metering and Technology

Chair: Dick Preston, Converge Inc.

B — Demand Response, Room: 201B

Preventing the Next Crisis in Southern California via Automated Smart Thermostats and Effective Metering Analysis
Mark Martinez, Southern California Edison Co.
Steve Metcalf, Hunt Power LP

Residential Advanced Metering System (RAMS) at the City of Anaheim
Linda LeDuc, City of Anaheim PUD
John Brett, Tantalus Systems Corp.

Mega Load Management System Pays Dividends
Dennis Brandt, Florida Power & Light Co.

Chair: Tim Wolf, Itron Inc.

C — Value-Added Services, Room: 202A

Quality, Management and Reliability — AMR's New Frontier
Ed Malemezian, Ed Malemezian Consulting

AMR Systems Are Not Just For Reading Meters
Oliver Price, Rappahannock Electric Cooperative

Reaching Beyond Ontario's Smart Metering Goals
Hugh Bridgen, Chatham-Kent Hydro Inc.
Terry Manso, Chatham-Kent Hydro Inc.

Chair: Rob McEver, Cellnet

5 – 6 p.m.	Reception in Exhibit Hall	Hall B

D Planning and Deployment Room: 202B

AMR Installation at Metro Water Services
Gary Ragland, Metro Water Services

Implementation Plan for AMR
James Harris, Charlotte-Mecklenburg Utilities

Ready to Grow — The Sunrise Water Authority Story
Cassandra Lashbaugh, Sunrise Water Authority
John Thomas, Sunrise Water Authority

Chair: Tom Galuska, Sensus Metering Systems

E GIS Room: 202C

Employing New Tools to Optimize AMR System Performance
William Armstrong, Dominion

Optimizing AMR With GIS
Brian Crow, ESRI
Bob O'Connell, ESRI

Chair: Tim Wolf, Itron Inc.

F Meter Installation Room: 203B

Delivery and Payment of Utility Bills via Secure E-mail
Garin Toren, Striata Inc.
NSTAR Speaker, TBA

Metering at the Transformer — The Elimination of Theft of Power
Paul Elliot, Whitby Hydro Energy Services Corp.

Enhanced Bill Information Improves Demand Response to Critical Peak Rates
MarkMartinez, Southern California Edison Co.
Harvey Michaels, Nexus Energy Software

Chair: Peggy Richmond, Landis+Gyr Inc.

Exhibitor Showcase Rooms: 104A, 104B and 104C

9:15 – 9:45 a.m.
AMRON Technologies Inc. 104A

Neptune Technology Group Inc. 104B

Motorola 104C

9:45 – 10:15 a.m.
BLP Power & Utilities 104A

Comverge Inc. 104B

Terasen Utility Services 104C

10:15 – 10:45 a.m.
Itron Inc. 104A

Badger Meter Inc. 104B

Telenetics Corp. 104C

D Post-Deployment Benefits Room: 202B

Evolution Toward AMR in a Medium-Size Water Utility
Mark Cross, Peoples Water Service Co. of Florida

AMR and the City of West Palm Beach
Jeff Stewart, City of West Palm Beach

Batteries vs. New Technology
Daniel Mikesell, City of Aurora, Colo.
Robert Morphis, City of Aurora, Colo.

Chair: Bruce Lackey, Badger Meter Inc.

E Communications Room: 202C

Mesh Networks: PGE's Mesh Metering Tests
Bruce Carpenter, Portland General Electric Co.

Technological Advancements and AMR: Data Collection via Satellite
Leon Henderson, Lower Colorado River Authority
Steve Kearny, Hunt Power LP

The Benefits of Solid-State Metering
Dave Mundorff, Entergy Corp

Chair: Garrett Johnston, KEMA Consulting

F Case Studies Room: 203B

Hybrid AMR for Gas and Electric Customers
Darrin Johnson, Wisconsin Public Service Co.

Managing California's Statewide Pricing Pilot
John Wambaugh, eMeter Corp.

Maximizing the AMR Infrastructure; Gas, Water and Electric AMR Operating Experience
Sid Mathur, ATCO Electric

Chair: Steve Hadden, Plexus Research Inc.

Exhibitor Showcase Rooms: 104A, 104B and 104C

1:30 – 2 p.m.
Hunt Technologies Inc. 104A

RIO Tronics Corp. 104B

Olameter Inc. 104C

2 – 2:30 p.m.
Cellnet 104A

Cannon Technologies Inc. 104B

Master Meter Inc. 104C

2:30 – 3 p.m.
Tantalus Systems Corp. 104A

Silver Spring Networks 104B

Information Intellect 104C

D Post-Deployment Benefits Room: 202B

Can Manual Meter Reading Be Justified After AMR?
Bruce Tait, City of Moncton

How AMR Helps Utilities Meet Growing Demands and Reduce Operating Costs
David Lopez, Eastern Municipal Water District
Chuck Rathbone, Eastern Municipal Water District

Beyond Billing — Value-Added Services Attainable Through Fixed-Network AMR
Charles Kiely, DC Water and Sewer Authority

Chair: Mike Koutelis, Intelligent Flow Systems

E Advanced Applications Room: 202C

Mesh Network Technology and Its Application in Advanced Metering Systems
Mikhail Zavorovskiy, Lenenergo
Dmitry Kirin, Lenenergo
Vladimir Rizberg, Eka Systems

District Heating and Cooling: Utility's Challenges With Metering, AMR Communications, Billing and CIS
Thomas Anderson, District Energy St. Paul Inc.

Wireless AMR: Metering and Beyond
Venkat Bahl, Ember Corp.
Elizabeth Park, NURI Telecom

Chair: Tom Galuska, Sensus Metering Systems

F Advanced Applications and Customer Service Room: 203B

AMR Payback — Unique and Positive Applications
Stephen Fifrick, Wisconsin Public Service Co.

Improving Customer Service With AMR at We Energies
Ken Vlasek, We Energies

Beyond AMR at PSE
John McClaine, Puget Sound Energy

Chair: Sandy Fernstrom, TWACS by DCSI

Exhibitor Showcase Rooms: 104A and 104B

3:30 – 4 p.m.
Sensus Metering Systems 104A

SpeedRead Technologies 104B

4 – 4:30 p.m.
Elster Electricity LLC 104A

Intelligent Flow Systems 104B

4:30 – 5 p.m.
TWACS by DCSI 104A

= gas focused session = electric focused session = water focused session

Schedule at a Glance

Wednesday, Sept. 21

		Room
7:30 – 8 a.m.	AMRA Annual Business Meeting	204
8 a.m. – Noon	Registration	Concourse Level Foyer

Educational Session 5
Wednesday, Sept. 21
8 – 9:30 a.m.

A Utility-Only Roundtable: Electric
Room: 201A

Looking at AMR as an energy data collection system, this utility-to-utility forum will cover a range of topics for electric utilities. The power of AMR comes to light when it is used as a high-value tool to support demand response, outage programs, engineering/planning initiatives and energy supply issues. The session will include a special focus on how AMR professionals have planned and navigated through cultural difficulties that hamper the acceptance of AMR for a variety of solutions.

Moderator: Dave Scott, Northeast Utilities

B Utility-Only Roundtable: Water
Room: 201B

With so many water utilities now deploying at least pilot projects for AMR, what additional benefit can utilities derive that goes beyond meter reading? That question, more and more, remains top of mind for utility professionals who champion AMR. Water conservation through demand management, monitoring unusual consumption patterns and using AMR data to detect leaks are just a few examples of the subjects for this utility-to-utility exchange. Participants will get the most from this session when they are willing to talk about experiences and subjects of interest to them.

Moderator: Mark Cross,
Peoples Service Co. of Florida Inc.

C Utility-Only Roundtable: Electric and Gas
Room: 202A

We've all heard about the many benefits associated with deploying AMR solutions, from meter reading cost savings to having actual monthly reads. But have you ever had the opportunity to hear first-hand from your fellow utilities the gains and pains of their AMR deployments? If your answer is no, now you have the chance. Come join us for an interactive, utility-only open-forum discussion to share and learn about real-life deployment experiences, technology constraints, battery issues, business case development, supplier choices and network options. This is one session you won't want to miss.

Moderator: Jack Griffin, NStar

9 a.m. – 12:30 p.m.	Exhibits Open	Hall B
9:45 —10:30 a.m.	**General Session in Exhibit Hall** Terry Jones, Founder of Travelocity	
11 a.m. – 12:30 p.m.	Lunch in Exhibit Hall	

Educational Session 6
Wednesday, Sept. 21
11:30 a.m. – 1 p.m.

A Focus on Broadband Over Powerline
Room: 201A

Panelists will cover the development and deployment of BPL in the last 10 years, discuss its potential as a broadband Internet access conduit for consumers, and delve into the circumstances in which BPL could become a backbone element of some AMR installations. Attendees will consider governmental actions and realistic applications now and in the future.

Brett Kilbourne, United Telecom Council
Ralph Abbott, Plexus Research Inc.

Chair: John Brett, Tantalus Systems Corp.

B Focus on Technology Integration
Room: 201B

A common challenge when automating business processes is incongruent data from various systems and applications. Panelists will discuss disparate technologies, standards for integrating data, and how a coherent body of information can optimize customer service, outage management, distribution operations and other utility activities.

Wayne Carr, Moilsoft Utility Systems
Larsh Johnson, eMeter Corp.
Wendy Lohkamp, Itron Inc.
Scott Neumann, UISOL
Greg Robinson, Xtensible Solutions

Chair: Tim Wolf, Itron Inc.

C Focus on Trends
Room: 202A

Three esteemed AMR market researchers will discuss recent trends in investment strategies, deployment tactics and technology selection, as well as how utilities are using AMR systems to provide fundamental and advanced services, enhance operations and build business.

Patti Harper-Slaboszewicz,
UtiliPoint International Inc.
Garrett Johnston, KEMA Consulting
Howard Scott, Cognyst Consulting LLC

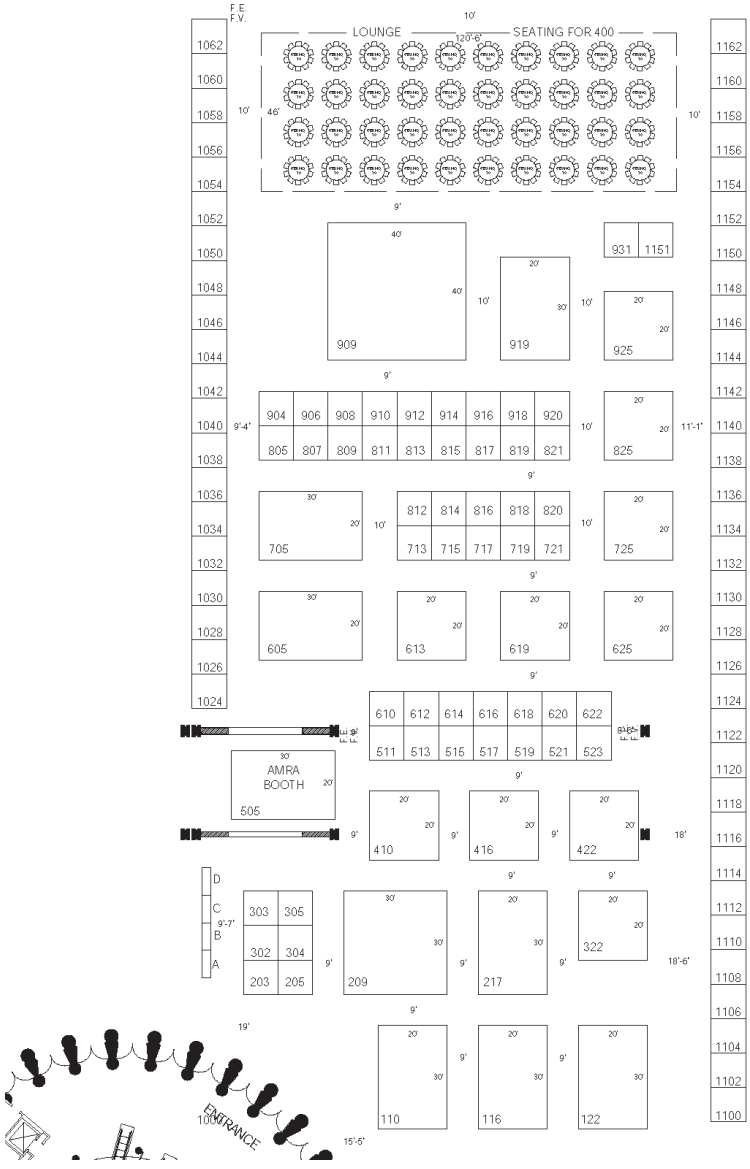
Chair: Peggy Richmond, Landis+Gyr Inc.

= gas focused session = electric focused session = water focused session

Autovation Exhibitors

Company Name	Booth #(s)
Advanced AMR Technologies	610
Advanced Metering Data Systems Inc.	1116, 1118
AMCO Automated Systems	416
AMCO Water Metering Systems Inc.	116
AMETEK Power Instruments	904
AMRA	505
AMRON Technologies Inc.	122
ArKion Systems	618
Badger Meter Inc.	304, 305
BLP Components Ltd.	811, 813
Blue Tower Communications	818, 820
Brooks Utility Products Group	713, 715
Cannon Technologies Inc.*	619
Caprock Mfg. Inc.	622
Carina Technology Inc.	809
Cellnet*	705
Chartwell Inc.	517
Comverge Inc.	919
Data 911 Mobile Computer Systems	1046
Data Comm for Business Inc.	203
Datamatic Ltd.	625
DFW Plastics Inc.	1114
Eka Systems Inc.	1042
Electric Energy magazine	**1048**
Elster Electricity LLC	209
Energy Markets	1140
Energy One Electronics Inc.	1134, 1136
EnergyICT Inc.	1038
ESRI	807
FirstPoint Energy Corp.	1044
Flow Metrix Inc.	1126
F.S. Brainard & Co./Technolog Ltd.	812
GE Energy	1130
GLOBALSTAR	620
GMI Composites	816
Hersey Meters	1040
Hexagram Inc.	925
Honeywell Utility Solutions	1034, 1036
Hughes Supply Inc.	912
Hunt Power	821
Hunt Technologies Inc.*	110
Information Intellect	815
Intelligent Flow Systems	920
Itron	217
Landis+Gyr Inc.	825
Locate Technologies Inc.	1104
MARS Co.	1024
Marwell Corp.	916
Mass Installation Inc.	914
Master Meter Inc.	613
Maxell Corp. of America	616
Metretek Inc.	303
Metrum Technologies LLC	817, 819
Motorola Inc.	725
National Metering Services	1142
Neptune Technology Group Inc.*	605
Nexus Energy Software	1146
Nicor Inc.	1056
Nighthawk Systems Inc.	1120
Northrop Grumman	805
NRECA	1102
NURI Telecom Co. Ltd.	906, 908
Olameter Inc.	515
Performance Meter Inc.	814
Public Utilties Reports Inc.	1148
Radix Corp.	614
RIO Tronics Corp.	521, 523
RouteSmart Technologies Inc.	717
Saft America	302
Screamer AMR Technologies Inc.	Table A
Segway LLC	113
Sensus Metering Systems Inc.*	410
Shenzhen Kaifa Technology Co. Ltd.	612
Silver Spring Networks*	931, 1151
Specialized Technical Services Inc.	1112
SpeedRead Technologies	1110
Spintelligent/Metering International	1128
T&D World Magazine	1138
Tadiran Batteries	1028
Tantalus Systems Corp.*	422
Telenetics Corp.	511, 513
Terasen Utility Services	205
Transparent Technologies Inc.	918
Trilliant Networks Inc.	322
Tru-Check Inc.	1100
TWACS by DCSI*	909
United Telecom Council	1054
US Metering & Technology	1108
Utility Automation & Engineering T&D WaterWorld	1026
Verizon Wireless	1106
Vitzrocell Co. Ltd.	719, 721
VSI Meter Services	519
Water & Wastes Digest	910
Xeno Energy USA	1050

FLOOR PLAN



End-Use Technology – Where it All Begins!

By: Mr. Phil Elliott, Technology Coordinator of CEA Technologies' End-Use Technologies Interest Group, info@ceatech.ca

End-use technology – where it all begins for the electricity and gas industry! It is the ability to convert all forms of energy, electricity, natural gas, and oil, into the useful work that drives our economy. The ability to use the technology to produce goods and services that consumers value, is what cranks the economic engine of our society. But the conversion of this energy to useful work is often wasteful and, because of its complexities, is often not understood by these same consumers. Yet, pleasing the consumers should be simple; to quote an often-used expression, "all the consumer wants is hot pizza and cold beer."

This ever-spiraling consumption of goods and services is depleting our supplies of conventional fuels, and the wasteful byproducts of energy conversion are contributing to greenhouse gases and other environmental problems. The question then becomes: how do we maintain the advantages that come to society through the use of energy without exacerbating an already delicate supply issue, reduce environmentally harmful emissions, and allow for countries like China and India to grow their economies?

One of the answers is through the adoption of new and better end-use technologies. Over the past 30 years we have seen the use of transistors and integrated circuits replace the radio tube. This has led to both a significant reduction in the energy required to listen to your favorite radio station, and, it can be argued, allowed for an explosion of new communications devices that would have been impossible had they been required to be tethered to the end of a 120 volt cord and carried around by a weight lifter. In the last 15 years we have seen the ubiquitous incandescent lightbulb being replaced by compact fluorescent lamps – again a marriage of integrated circuit technology and innovative manufacturing technology, yielding a 75 % reduction in the energy needed to produce the same light output. For motors, the workhorse of our manufacturing economy, innovations in materials and their applications have seen the introduction of high-efficiency motors – the ability to do more with less energy.

Even with the plethora of new technologies that do more for less, whether for new or existing applications, successful penetration into the marketplace has been slow, painful, and all too often unsuccessful. The freely operating marketplace needs to be tipped to give these products a chance. The compact fluorescent bulb now widely available at competitive prices has only been able to gain a foothold in the marketplace because of the wide scale deployment of utility-based Demand Side Management programs in the late 1980s and early 1990s.

End-Use Technologies

The continuation of the quest for new and innovative end-use technologies goes on. Research and development continues. The questions that must be answered before these products go to market include:

- How do we ensure that new products work with the energy consumption and other attributes claimed?
- How are these technologies being introduced to the marketplace?
- How can we overcome the pricing barriers that often plague the introduction of new technologies until they achieve economies of scale?

It is the collaborative role of electric utilities, natural gas utilities, governments, and manufacturers to work together in an attempt to tip the marketplace with the ultimate goal of getting these new energy-consuming products into widespread use with attributes that support and enhance the effective use of energy resources. The ability to accelerate the introduction of improved products is the lifeblood of our economy in a time of dwindling energy supplies and recognition of the impact of greenhouse gas emissions on our environment.

The End-Use Technologies Interest Group of CEA Technologies Inc. (CEATI) has as its mandate to "…develop, demonstrate and commercialize technologies that present potential new loads, facilitate automation, and enhance efficiency and performance and that will also adapt easily to industrial applications, improve competitiveness and sustainability, and

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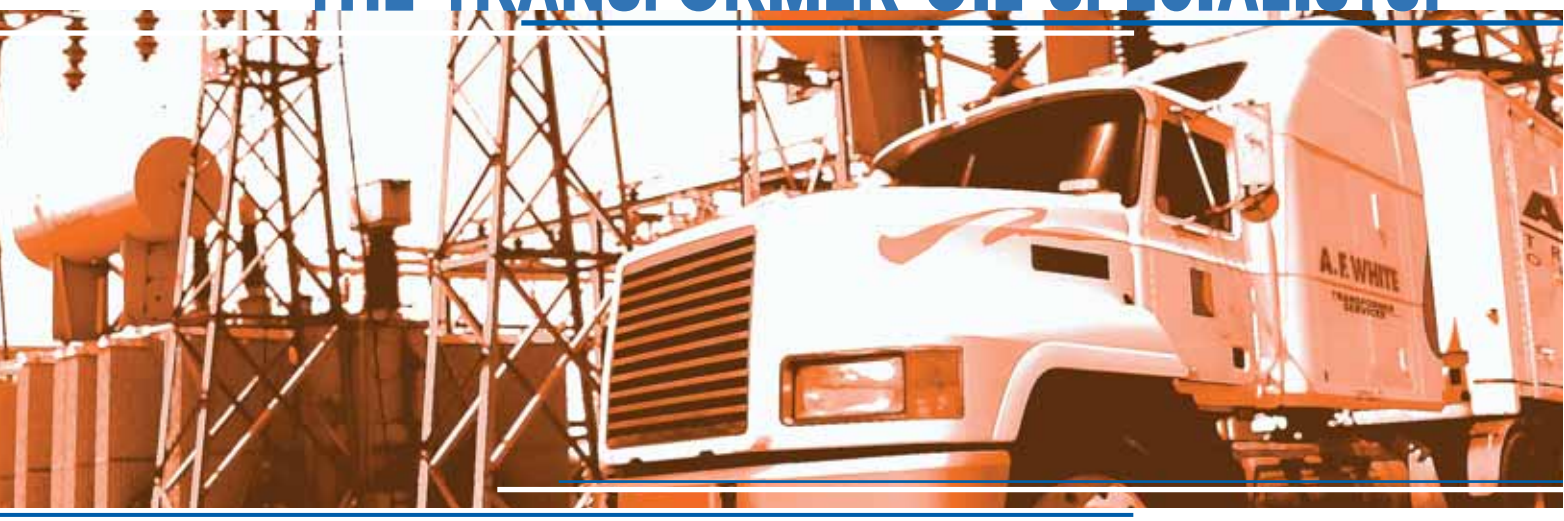

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address environmental concerns." The group has identified 6 key areas of general interest that include:

- DSM Applications
  - Load Management
  - Energy Conservation
- Regulations and Standards
- Best Practices and Guidelines
- Efficient Customer Generation
- Customer Green Energy
- Advanced Innovations

The final leg of the continuing quest for market penetration of these technologies comes together in what we might call the 3 pillars of End-Use Technology innovation and dissemination:

- Efficient End-Use Equipment
- Information
- Pricing and Regulation

Pillar 1 – Efficient End-Use Equipment

Simply stated, there must be a pipeline of new and innovative technologies coming out of research labs and manufacturers' facilities. The marketplace does not have the ability to analyze, verify, compare, and demonstrate to a wide audience the advantages of an efficient technology (efficient in use and efficient in when and how it uses this energy). Currently available products, profitable to manufacturers, dominate the advertising and promotion budgets and leave little room for the innovative product, particularly during its infancy when its price remains high because economies of scale in production have not been achieved.

It must be the role of groups such as CEATI's End-Use Technologies Interest Group to:

- Verify the end-use data of the new and innovative equipment or process;
- Provide opportunities for actual field trials of the product or process;
- Help introduce the new product into the marketplace through the utility customer base;
- Help to develop product or process performance standards to ensure that the consumer can be assured that the product has a consistent performance standard; and
- Work with health and safety standard organizations to develop appropriate standards in these areas.

Pillar 2 – Information

Information is obviously a key component of product and process dissemination in the marketplace. The successful communication of information requires more than the simple presentation of basic energy and demand savings. The limited success of the Demand Side initiatives in energy efficient product adoption in the marketplace in the early 1990s demonstrates that energy and demand savings alone will not lead to wide scale deployment.

The information pillar has in fact many components. These include:

- Identification of the energy and demand savings as well as other attributes of the product. This is a basic necessity.
- Product Information and comparisons to help the lay consumer get an understanding of how the innovative and efficient product is better and lowers energy and demand consumption.
- Workshops to help inform industrial and commercial customers of ways to grow production and productivity at a lower per unit energy cost and have the ability to shift demand to lower costs further.
- Regulation is often required to try to tip the marketplace towards the adoption of new and innovative products. Simply stated it could be a better way to keep the beer cold, at less cost. Governments are working hard in this area. At the Federal level, the use of the Energuide label in Canada, the Energy Guide in the USA and the Energy Star labelling are all working to attempt to set standards for efficiency and where possible provide regulation. But more work needs to be done at the provincial, state, and municipal levels to set regulations in place that ensure the energy efficient product is supported in the marketplace.
- Daily energy information. This is probably the weakest link in the drive for new, innovative and efficient end-use technologies. For most customers, across all rate classes, there is no daily or next day consumption information.

At the residential level the customer gets a 60-day bill approximately 10 days after the end of the 60-day period. They have no idea what happened 60 or even 3 days ago. This class of customer needs daily consumption information if they are to truly understand the impact of their consumption patterns and, ultimately, their decision to buy energy efficient and/or demand-shifting product. From the demand perspective there is no information on the peak demand even though the price of energy delivery has a time value for the manufacture and/or delivery of electricity and gas. This is beginning to change in some jurisdictions as smart meters and real-time information devices are being introduced.

At the commercial level, except for the few very sophisticated customers, consumers have no idea of their energy or demand consumption until approximately 5 days after the end of the 30-day billing period. Many questions, such as, "When did the demand occur?" "What caused the peak demand?" and "What drove the energy costs?" remain unanswered from the utility bill. As a result the energy purchase cost is off their radar until something drastic happens and even then it is only after a long search process do they begin to understand how the purchase and use of energy impacts their bottom line costs.

At the industrial level, for large industries where complex business decisions are made, much of the energy and demand information is available and solid business decisions are made to adopt new and innovative technologies. The small manufacturer spending their time managing the production of their products, however, unfortunately runs into the same problems as the commercial customer.

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Pillar 3 – Pricing Signals

The adage that 'money talks' continues to be true. For new technologies to be successful in the marketplace, appropriate price signals need to be introduced to encourage the consumer or user to adopt the innovation.

In order to allow the price signals to filter through to the customer, the utility should consider changing their pricing structure such that all classes of customers be provided with time-value pricing of electricity and gas. This would provide all consumers with a link between the use of energy-consuming products, the efficiency of use, and when and how they use the product. This would also help energy-efficient and time-shifting technologies gain a foothold in the marketplace and hopefully tip the level playing field towards new and innovative efficient products.

Another important initiative would be the elimination of Federal, provincial, state, and municipal taxes on the differential cost of these new products. Generally efficient and time-differentiated products cost more on a first-cost basis. The differential between the new product and the established product should be tax-free. Eliminating the taxes on the differential cost between a high efficiency gas furnace and a mid-range efficient furnace, for example, would help sell the higher efficiency product.

Finally, we can examine the introduction of Demand Response strategies that financially reward consumers, in addition to utilities, for program participation and for adopting new and innovative technologies, whether it is an actual end-use product or an advanced communications strategy that is of benefit to the utility and the consumer.

Conclusion

End-use technology research, development, and demonstration – the innovative process – must continue! As the 3 pillars of technology, innovation and adoption for end-use technologies have demonstrated, with the exception of the items that are clearly the role of government policy and regulation, widespread support for this process must come from the collaborative effort of utilities, governments and manufacturers. End-use technology innovation, and the adoption of new and better ways to do things, continue to be the ultimate enablers in the drive to mitigate the demand for fuels and reduce greenhouse gas. Support for the efforts of research, development and demonstration must continue, and even accelerate, with broad and collaborative participation if the global community is to reduce per unit energy consumption and find a better way to make hot pizza and cold beer.

End-use technology, where it all begins. ■

About the Author

Mr. Phil Elliott, a professional engineer with an MBA, leads the End-Use Technologies Interest Group (EUTIG). As a consultant, and during his 25 years of utility experience at Nova Scotia Power, he has spent a significant portion of his career involved with electric end-use technologies, including demand-side management and the marketing of energy efficiency. He has held positions as Director and President of the Canadian Committee on Electrotechnologies and served for several years on a wide variety of CEA committees, including the R&D Utilization Committee, the DSM Task Force, and the Energy Efficiency Committee. He has also been a member of the Task Force on Lighting and Electric Power Requirements for the National Energy Code (National Building Code of Canada). For more information, please contact info@ceatech.ca or visit www.ceatech.ca.

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New England's Transmission System and Its Impact on Reliability

In addition to securing the network, securing access to SCADA system components will provide a further defense layer.

By: Steven G. Whitley, Chief Operating Officer, ISO New England

All across the United States stressed bulk transmission systems are threatening the reliability of the nation's electric power system. In some parts of the country reliability in heavy demand centers is adversely affected by an inadequate amount of locally produced electricity coupled with a bulk transmission system that is ill equipped to bring in surplus power from other regions. Even though there is widespread recognition of the seriousness of this issue, investment has been non-existent and local opposition in state siting processes has set tremendous hurdles.

Here in New England, where it might be expected to be especially difficult to build new transmission lines given our population density, environmental regulations and public emphasis on environmental protection, we're actually getting things done. Five major projects as well as a host of smaller ones scattered throughout the region, have been approved and one major effort underway. The total projected transmission investment has surpassed $1.5 billion.

It hasn't been easy. Political and community opposition, as well as uncertainty concerning financing, has put critical transmission projects in limbo for quite some time. Rather than continue to fight unwinnable battles, utilities did what they could to patch the system, but accomplishing large-scale upgrades had become nearly impossible.

To mitigate this problem, ISO New England and the New England stakeholders developed a winning formula that brought major projects out of hibernation and identified critical needs giving transmission owners and regulators a road map to improve the system. We believe this approach can act as a model for other areas of the country where needed transmission improvements are lagging. Our approach relies on the following critical elements:

- A planning process that is regional and independent
- Active stakeholder participation throughout the planning and siting process;
- A cost allocation process that brings clarity and certainty to those who pay for needed projects.

This article will explore the progress New England has made in each of these areas and the challenges that lie ahead with particular emphasis on the importance of a regional (and inter-regional) planning process to identify needed investment and the need to speed the siting of critical transmission facilities.

Inaction Left System Vulnerable

At the start of the deregulated power markets, the historical lack of transmission investment left the power system ill equipped to move power around New England efficiently. Three key areas with rapidly growing economies - Southwest Connecticut, Northwest Vermont, and Greater Boston - faced an energy future much like California's recent past, including tight supply, constrained transmission and the potential for shortages.

The newly deregulated wholesale markets resulted in more than $6 billion of investment in new power plants, but investment in new transmission lagged far behind. The addition of a more than a dozen new power plants increased supply by more than 30 percent; however, many of these new plants were located outside areas of high electricity demand. Transmission investment

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continued to lag behind, leaving the existing system overtaxed. This mismatch of increased production and limited transmission led to bottlenecks, where surplus electricity was stranded in low demand areas such as Maine and Rhode Island. As a result, system operators have been forced to call on older, more expensive generators located close to demand centers to run "out of merit" and led to Reliability Must Run (RMR) agreements to keep older plants operating past their normal retirement age. Right now in New England, 17 percent of our peak power is produced by generating plants on RMR's. All totaled, these inefficiencies add more than $350 million annually to the cost of power in the region.

Clearly something had to be done to ensure that needed transmission projects progressed. Without new transmission lines, sooner or later the peak demand of a hot summer day or a cold winter night would trigger a breakdown - disrupting the economy, endangering public safety and driving residents and businesses from the region in search of reliable power.

A Regional and Independent Planning Process

In 2000, the Federal Energy Regulatory Commission (FERC) gave ISO New England the authority for long-term planning and we developed an annual, comprehensive planning process to assess and identify transmission system needs. The first Regional Transmission Expansion Plan (RTEP) was published in 2001 and identified more than $1 billion in needed investment. Today's planning document is now called the Regional System Plan (RSP) and is slated to be issued later on this year.

In the years prior to the initiation of RTEP, no appreciable transmission projects were on the books. Since 2002, we have made significant progress toward upgrading the system: seventy-five projects have been completed. Our most recent plan, published last fall, identified nearly 250 regulated transmission projects needed throughout New England at a total estimated cost ranging from $1.5 billion to $3 billion over the next ten years. We have demonstrated that timely completion of these transmission projects is critical to preserving and improving reliability region-wide and is key to solving reliability problems in the region's load pockets.

The most important of these projects are five 345kV lines located across the region that will greatly improve the efficient transmittal of electricity: Greater Boston, Southwest Connecticut, Northwest Vermont and an interconnection between New England's bulk power grid and New Brunswick. These projects have all been approved by state siting councils and will be brought into service between 2006 and 2009. A sixth project, which would create an important link between Southeast Massachusetts, where there is surplus power, and Connecticut, is in the early planning stages.

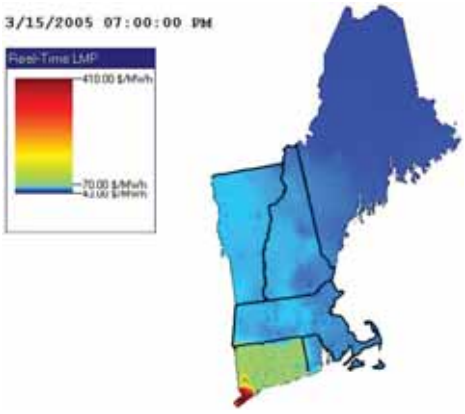
The key element in moving these forward is our active role in the process beyond planning. We not only identify system needs, but we conduct in depth technical studies, testify at state siting hearings, and determine whether costs can be regionalized.

By working with utilities, state and local governmental bodies, as well as engaging the public discourse through press releases, media interviews and letters to the local newspapers, a greater understanding of the region's power system needs has resulted in significant upgrades to New England's transmission system in the most critical areas. Five major transmission lines receiving local siting approval from four separate

states-in less than two years is proof positive that our formula works.

How does the process work? The RSP is a comprehensive assessment made up of numerous studies and analyses of the region's bulk electric power system that identifies the location and nature of projected system needs. ISO New England also identifies system problems by conducting technical transmission planning studies with input and analytical assistance from the transmission owners. The system plan is updated annually to reflect both market responses and changes in system or market conditions. Load growth, resource additions and retirements, timing of transmission upgrades, new technologies, and regulatory developments are all examples that have a potential to impact system performance.

In the planning process, ISO New England uses a power system model that includes all generators, transmission facilities, and loads. Simulations address physical issues such as thermal loading, minimum voltage, voltage regulation, transient stability, dynamic oscillations, harmonics and short circuit interrupting capability.



Transparency and feedback are an important part of the planning process. ISO New England conducts and directs studies with input and review from the Planning Advisory Committee (PAC). The PAC is open to any interested party and is composed of a wide variety of regional stakeholders, including market participants, governmental representatives, state agencies, representatives of local communities and consultants. The PAC meets regularly throughout the year. ISO New England posts the meeting minutes and presentations on its Web site. Seven meetings were held throughout New England during the 2004 process. We also solicit input via a public meeting conducted each year by the ISO New England Board of Directors before approval of the annual plan.

Assistance to Localities in Siting Proceedings

ISO New England's approach to local siting proceedings has been critical to attaining site approvals. Our input provides neutral, unbiased expert testimony on the regional bulk power system needs. Because our bottom line is reliability of the power grid, our testimony at state siting hearings has clout-and has moved contentious discussions past the rhetoric and into productivity. In Connecticut, for example, the need for new transmission infrastructure has been apparent for years, but local opposition made it nearly impossible for utilities to move ahead with major projects. Our work in Connecticut provides a good case study for the importance of an active role by an impartial entity.

Although Southwest Connecticut's transmission system has long been recognized as woefully insufficient, the area has become a major financial center supporting the nation's international financial community. Nevertheless, Connecticut had not made much progress in siting new transmission upgrades to correspond to Southwest Connecticut's growing economic presence. Northeast Utilities (The

Connecticut Light & Power Company) and The United Illuminating Company proposed to upgrade the system with a 345kV "loop" that ran from Bethel to Norwalk and Norwalk to Middletown in Southwest Connecticut making it easier to transport power from other parts of New England to that part of the state. The project was deemed essential to maintain reliability not only in Southwest Connecticut, but also throughout the region.

ISO New England engaged in a comprehensive public information campaign to emphasize the importance of these proposals. In addition, we acted as an expert witness during Siting Council proceedings and commissioned studies demonstrating the necessity of the project and the consequences of inaction.

The project was opposed by members of the Connecticut Legislature, which passed legislation placing a moratorium on any upgrades, and the Attorney General, who initially said it was too costly and unnecessary.

ISO New England provided supportive, expert testimony before the siting council and provided factual information to the state legislature about the need for new transmission facilities. Over a three-to-four-year period, debate over the necessity for this project shifted to how much of it could be placed underground, as a result of a legislative change that occurred in the middle of the siting process.

After ISO New England warned the Council that placing large portions of the line underground would threaten the reliability of the new line, we participated in a special study group, hired independent consultants and international experts and filed reports with the Council that led to a resolution on the issue.

While this process continued, ISO New England initiated short-term fixes for emergency demand periods by contracting for temporary generators to be placed in Southwest Connecticut in case of failures on the system. In addition, we aggressively marketed our demand response programs to alleviate stress on the system by decreasing demand. These programs compensated large-scale users for not using electricity during peak periods. More than 500MW of power is currently participating in these programs.

Taking a lead role as an independent arbiter between the utilities and the political and regulatory system was essential in moving this project to a fruitful conclusion. Working with siting Councils throughout the region, ISO New England is able to provide engineering information about the projects, factual details about requirements, an evaluation of alternative solutions, and public discussion about what will and will not work.

Cost Allocation Process

Equally important is the cost allocation process that provides for sharing costs on a pro rata basis among the six New England states. If the project provides benefits to the bulk power system, the region shares in the cost; if the benefits are largely local, the costs stay local. This process brings cost certainty to the industry. This transparent and participatory process to determine and allocate costs has been instrumental in moving projects from the planning stage to final approval and, ultimately, to construction.

Major Projects Identified, Planned, Approved

The RTEP planning process has made explicit and specific the ways in which the

mismatch of resources, demand and geography result in reliability problems in the heaviest demand centers in New England. The following projects planned for the most critical areas will help to mitigate cost increases as well as increase reliability over the next several years.

Southwest Connecticut Reliability Project: The Southwest Connecticut Reliability Project will provide adequate import capability to meet load and reserve requirements and will accommodate generation expansion plans consisting of repowering of existing units, as well as construction of new units, within the area beginning in 2008. This project includes a number of system reinforcements and a 345 kV loop between Bethel and Norwalk and Norwalk and Middletown to connect Southwest Connecticut to surplus power in other parts of New England. The project has been proposed in two phases:

Phase I: In July 2003, the Connecticut Siting Council approved a combination overhead/ underground upgrade for the 20-mile Phase I Project from Bethel to Norwalk. Construction has begun and the line is expected to be put into service in 2006.

Phase II: This 69-mile project includes a combination overhead/underground 345kV line from Norwalk to Middletown and completes the "loop" to reinforce the transmission system in Southwest Connecticut. The Siting Council gave final approval to the project in April. Cost allocation and permitting processes continue.

Northwest Vermont Reliability Project: This region has outgrown its ability to meet its own power demands over the existing transmission system. The project includes a new 345 kV line along with improvements to equipment and stronger ties to New York and Canada. State approval came in early 2005. The project is expected to be placed into service by 2007.

NSTAR 345 kV Transmission Reliability Project: ISO New England reliability studies identified the critical need to improve the reliability of the bulk electric power system in the Boston area. The construction of a 345 kV station and three new 345 kV lines south of Boston will allow for surplus power in Southeastern Massachusetts and Rhode Island to be brought into Greater Boston. The $217 million project will reduce the need to shed up to 400 MW of load for line outage contingencies. Two of the new lines are expected to be operational by the summer of 2006, the remaining one in 2007.

Northeast Reliability Interconnect Project: This project consists of a 345kV transmission line connecting a substation in New Brunswick to a substation in Northern Maine. This tie will improve the flow of electricity from Canada through Maine and into high demand areas throughout New England. Access to relatively lower cost generation in New Brunswick is estimated to result in approximately $9 million in annual savings in addition to reliability benefits. Current plans are for completion by 2007.

Southern New England Transmission Reinforcement Project: The final major project currently in the planning phase is intended to build a strong tie across southern New England to improve conditions in Connecticut and Western Massachusetts. A major portion of the New England demand is in Southern New England - near the coastline. The project's purpose is to move power to and from Southeastern Massachusetts into Connecticut. This will help service the growing demand in Southwest Connecticut and alleviate pressure in Western Massachusetts. The project is estimated to be in service by 2011. It will provide 800-1000 MW of improved east-west transfer capability.

Further Challenges in New England

Even with these planned transmission upgrades, additional resources or re-powering of existing resources will be needed within areas of high demand to offset potential retirements and meet growing demand. The particular unit characteristics that are needed in New England are flexible/quick start type capacity that responds to changing system conditions and contingencies - providing 10 and 30-minute reserves.

New England has come to the end of its building boom for new power supply sources. Moreover, some existing generating units needed for system reliability are in jeopardy. There is a potential for over 1,600 megawatts of generator deactivations or retirements. Several of these generating units are located in heavy demand centers.

Five major factors contribute to the risks to reliability:

- Continued growth in electricity use;
- Proposed generating unit retirements;
- Continued transmission bottlenecks;
- Inadequate development of new resources, i.e. new or re-powered generation and demand response programs;
- Heavy reliance on natural gas-fired generators that are subject to interruptions of fuel supply, which poses potential reliability issues for winter peak load periods.

Both short-term and long-term steps are essential to meet the challenges we face in New England. ISO New England has already applied "Band-Aids" to minimize risks of power outages. These include implementing agreements to keep older power plants (less efficient and less environmentally friendly) operating, securing emergency generation sources for peak periods, and encouraging conservation through demand response programs.

Long-term solutions require further investment in both new transmission and generation to meet future demand. ISO New England has again taken the lead proposing several market-based solutions to encourage investment in these needed resources. We are working to ensure that investment in transmission and generation goes hand in hand - with neither lagging behind.

Transmission System Progress via Inter-Regional and Inter-Industry Planning

We believe that successful transmission investment also depends on the recognition that planning activities must be coordinated on an inter-regional basis to ensure the long-term reliability of the nation's system. ISO New England has established close communications and a healthy information exchange with neighboring ISOs and their stakeholders.

Inter-industry cooperation is equally important. New England has become heavily reliant on natural gas to produce electricity. During the "cold-snap" of January 2004, many generators in New England could not run their plants because of the heavy demand for natural gas to heat homes. Immediately after this crisis, we established task forces that led to a closer working relationship with the gas industry. Task force recommendations resulted in 2,000 megawatts of additional power being available during peak periods this past winter.

Conclusion

Finally, encouraging transmission investment is all about improving reliability. We believe that our three-pronged approach helps us to get transmission built and maintain good relationships within the region as a whole and to continue to move forward working with industry, government and the public.

New England has demonstrated that an ISO can make real change through new investment in transmission that makes the grid more efficient, thus moving cheaper generation to market. We will continue to remain active in identifying problems and moving solutions forward to improve the electric power system in New England. ■

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ICUEE traces its beginnings to 1964 when Illinois Bell invited 12 trencher manufacturers to demonstrate equipment on the same day in the same field in Elburn, Illinois as a means of solving an equipment evaluation and communications problem. The event was a huge success and continued to grow through the late 1960s and early 1970s. Because of its increasing size, Illinois Bell dropped sponsorship and it was run by a professional exposition management firm. The event continued to be known as the "Elburn show."

The show took its current name in the late 1970s. One of AEM's forerunner groups provided industry direction and in the late 1980s bought the show and began functioning as its sole owner and manager. The show moved to Kansas City, Kansas, in the late 1970s and to its present home of Louisville, Kentucky, in 1987.

For more information contact ICUEE: phone 866-236-0442 (toll free) or 414-272-0943, fax 414-272-1170, e-mail info@icuee.com or visit the show website at www.icuee.com.

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September 27-29, 2005

Seminar Agenda

Tuesday, September 27, 2005 8:00 - 9:15 am

T11 Profitability: Do the Drill Right the First Time
Organized by: UCT

T12 New Technology and Equipment at ICUEE
Organized by: UCT

T13 Mini-Excavator Basics: Five Most Important Steps to Keep Your Machines Operating Productively
Organized by: UCT

T14 The Construction Equipment Institute
Organized by: Construction Equipment Magazine

T15 Renting vs. Buying: Making Informed Decisions
Organized by: ICUEE

T16 Keeping Your Equipment Safe & Sound
Organized by: Equipment World Magazine

T17 Powerful Leadership Practices
Organized by: ICUEE

Tuesday, September 27, 2005 9:30 - 10:45 am

T21 Water & Sewer: Opportunities for HDD
Organized by: UCT

T22 Market Directions Impacting Utility Contractors
Organized by: UCT

T23 Skid Steer Basics: Five Critical Steps for Productive Underground Operations
Organized by: UCT

T24 The Construction Equipment Institute (continued)

T25 Safety, Reliability, and Service Quality: Factors in Utility Success
Organized by: ICUEE

T26 One-Call State Laws — An Overview
Organized by: ICUEE

T27 Infrared Thermography: Powerful Predictive/Preventative Maintenance Tools for Utilities
Organized by: ICUEE

Wednesday, September 28, 2005 8:00 - 9:15 am

W11 Mini-Mud School: Avoiding Frac-Outs & Hydrolock
Organized by: UCT

W12 Protecting the Underground Utility Infrastructure
Organized by: UCT

W13 Advances in Pipe Replacement Methods & Moles
Organized by: UCT

W14 More Aerial Device Standards... Clarifying the Confusion
Organized by: ICUEE

W15 Field Force Automation — Business Drivers and Implementation Strategies
Organized by: ICUEE

W16 NFPA70E FR Clothing — Arc-and Flame-Resistant Clothing Update
Organized by: Incident Prevention

W17 I LOVE My Job—Retaining & Motivating Employees
Organized by: ICUEE

Seminar Agenda (Continued)

Wednesday, September 28, 2005 9:30 - 10:45 am

W21 HDD Methods to Meet Rock Challenge
Organized by: UCT

W22 The OSHA File: New Rules & Regulations Impacting Underground Construction & Utilities
Organized by: UCT

W23 Trencher Basics: Five Most
Organized by: UCT

W24 From the Top Down: Reducing Crane Incidents
Organized by: ICUEE

W25 Working with Your Cross-Cultural Workforce
Organized by: ICUEE

W26 Ground-to-Ground Rubber Glove Rule
Organized by: Incident Prevention

W27 Lean Contracting 101
Organized by: ICUEE

Thursday, September 29, 2005 8:00 - 9:15 am

TH11 After-Effects Of Utility Hits–What's the Worst that Could Happen?
Organized by: UCT

TH12 The Latest Production-Enhancing Tools for Compact Equipment
Organized by: UCT

TH13 Is There a Pending Labor Shortage?
Organized by: UCT

TH14 Meet Your Profit Goals this Year… Every Year!
Organized by: ICUEE

TH15 Telecommunications Boom: Will it Last?
Organized by: ICUEE

TH16 Five Cost-Saving Strategies to Tighten Your Belt & Boost Your Profits!
Organized by: ICUEE

TH17 It's All in Your Plan—Essentials in Crisis Management
Organized by: ICUEE

Thursday, September 29, 2005 9:30 - 10:45 am

TH21 Excavators Locate Underground Utilities – Who is Responsible?
Organized by: UCT

TH22 Keyholing Increases VacEx Opportunities
Organized by: UCT

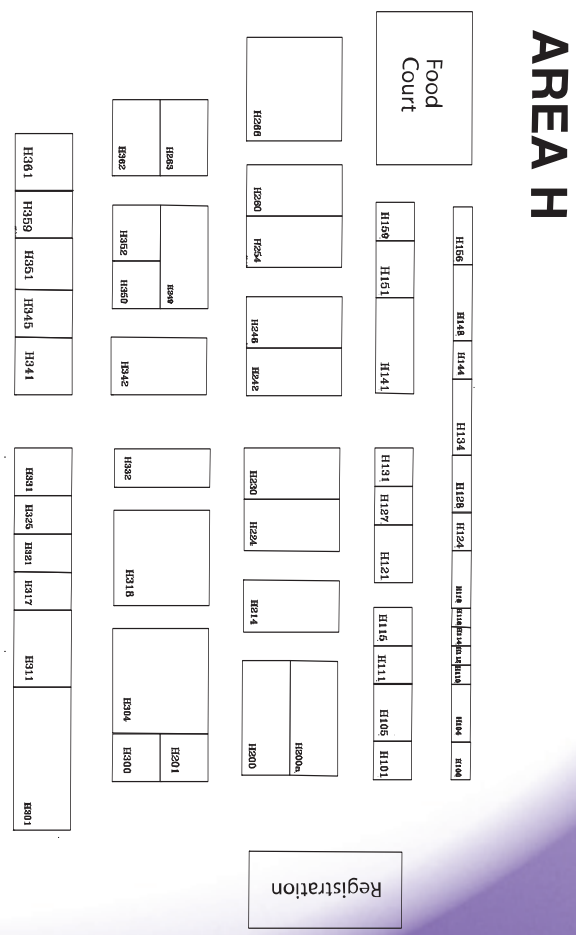
TH23 Sell More Than Price! How to Build Loyal Customer Relationships
Organized by: ICUEE

TH24 Key Elements of Supply Chain Management
Organized by: ICUEE

TH25 Strategies for Internal Utility BPL
Organized by: ICUEE

TH26 Uncovering What's New in Erosion Control
Organized by: ICUEE

TH27 Effective Internal Bucket Truck Training Programs
Organized by: ICUEE



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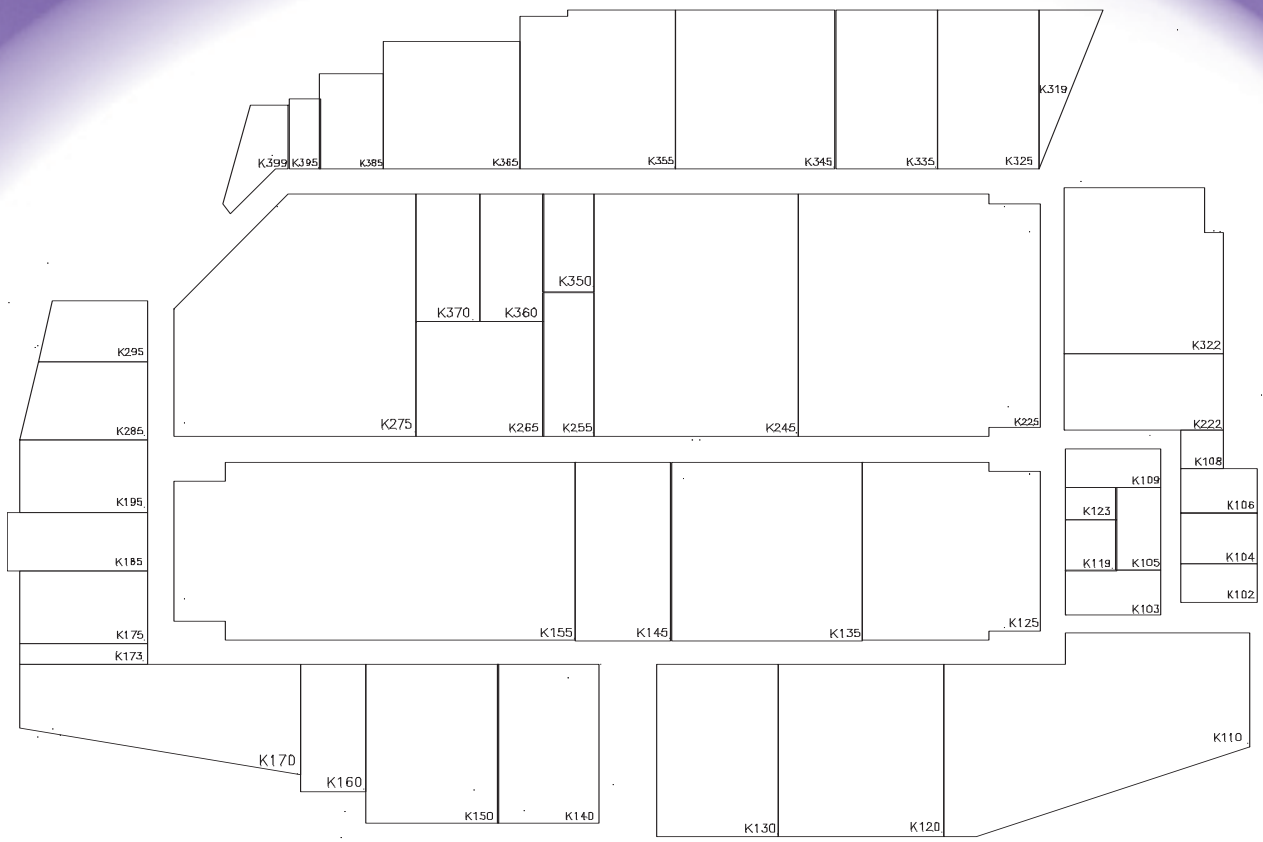
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3M Company	3047
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A.L. Hansen Manufacturing Comp	1058
A.R.E. Inc	J210
ABS National Auto Services Inc	3007
ABS/CH & E Dewatering Div	H321
ACA Conductor Accessories	1528
ADI Tools Div of TOL Inc	1215
Adrian Steel Company	L369
AEM (Association of Equipment Manufacturers)	3225
AEP (American Electric Power)	3036
Aircraft Dynamics Corporation	L483
Airmate Company Inc	3206
Akkerman Inc	K104
Alaskaug Inc	1326
Alliance Equipment Co Inc	920
Alliant Power	450
Allied Construction Products LLC	K175
Allied Pump Rentals	H124
“Allied-Gator, Inc.”	H318
Allison Transmission	L465
Allmand Bros	K370
Altec Industries Inc	L365
Altec Industries Inc	L165
Altec Industries Inc	L366
Alturnamats Inc	1516
Aluma-Form/Dixie	3179
Alum-Line Inc	L275
American Cranes and Transport	816
American Eagle Accessories Group	729
American Innotek	111
American Midwest Fleet	1821
American Pipe & Plastics	125
American Pneumatic Tools	1558
American Polywater Corp	1125
American Power Technology	3012
American Products Inc LLC	H159
American Safety Utility Corp	3231
American Safety Utility Corp	3040
American Test Center	3109
AmeriQuest Transportation	222
Amerisafe	3107
Ammbusher Inc	1216
Anglo American Enterprises	1557
Apache Technologies	1635
Aqua-Tronics Inc	1518
Aries Industries Inc	1656
ARNCO Corporation	L390
ARNCO The Tire Flatproofing Experts	1115
ASA Hydraulik of America	614
Ashley Sling	3052
Associated Construction Publications	3028
Astec Underground	K125
Astoria Industries of Iowa Inc	L306
Astro Optics Corp	1809
ASV	K319
Atlas Copco BHMT	1354
Atlas Copco Construction Tools	L115
ATS Asset Tracking Services	1224
Auburn Gear Inc	241
Auto Crane Company	J421
Auto Driveaway Company	3215
Auto Truck Group	827
Automotive Resources Inc	H230
Automotive Resources International	3315
Avistar Inc	L205
AW Direct	1864
AW Sperry Instruments	1349
Bacou-Dalloz	3243
Bad Dog Tools	1427
Baker Financial Rental and Leasing	1214
Ballantine Inc	1219
Bandit Industries Inc	J215
Barbco	K102
Baroid Industrial Drilling Pro	1225
Bashlin Industries Inc	3031
Baum Publications	3125
Benjamin Media Inc	3309
“Bigfoot Construction Equipment, Inc.”	3070
Blackburn Manufacturing Co	1954
BLS Enterprises Inc	929
Blue Demon Company Inc	1247
Blue Diamond Industries LLC	3091
Bobcat	K325
Bondioli & Pavesi Inc	135
Bone Safety Signs	1956
Bor-It Manufacturing Company	L463
Bosch Rexroth Corporation	235
Boss Industries	L475
Bott USA Inc	H118
Bradco/McMillen/The Major/FCC/Sweepster	J422
Bradco/McMillen/The Major/FCC/Sweepster	K145
Braden Carco	835
Brand FX Body Company	L237
Brewis Direct Ltd	817
Bridges Electric Inc	3173
Bridgeview Manufacturing Inc	H127
Brigade Electronics Inc	1063
Bri-Mar Manufacturing	H351
Broderson Manufacturing	J221
Bronto Skylift	J238
Brooks Brothers Trailers	J324
Brown Manufacturing Corp	J136
Brown Wood Preserving Co	3281
Brush Technology	1362
Bryant Air & Hydraulic Inc	1119
Buckingham Manufacturing Co	1835
Bulwark Protective Apparal	1723
Burndy Products an FCI Company	1535
Burndy Products an FCI Company	L461
Butler Trailer Manufacturing	J326
Buyers Products Company	748
C.R. Brophy Machine Works	941

Outdoor Exhibit

Exhibitors	Booth #
Caldwell Group (The)	1051
Camoplast	J315
Cantex Inc	3080
Cargobody International	1207
Cargobody International	H141
Cargotec Inc	J312
Carhartt	3316
Carhartt	H332
Carlon Electrical Products	3268
Carson Industries LLC	3065
Case Corporation	K275
Cast Products Inc	1815
Caterpillar Inc	K170
CC Tools Inc	1662
CDR Systems Corp	3282
Cembre Inc	3095
Cementex Products Inc	1419
Central Mine Equipment	K295
Central Plastics Company	3068
Century Wire Products Corp/ETCO Specialty Products Inc	3183
Cervis Inc	547
Channell	106
Checkers Industrial Products	3131
Chelsea Products Div of Parker Hannifin Corp	L166
China PacifiCarbide Inc	1464
Chrisnik Inc	427
Cintas	3121
Cipp Corporation	1364
Civil Infrastructure Magazine	
Clean Seal	725
Cleveland Hardware	1064
CMC/ESP Utility Products	3064
Coast Machinery Inc	J413
Comer Industries Inc	615
Command Controls Corp	624
Common Ground Alliance	3025
CommScope	1028
Composite Mat Solutions	H131
Comsonics	1109
CONAM/QSL-Plus	3010
Concast Inc	H121
Conduit Repair Systems Inc	3188
Condux International Inc	L300
CONEXPO Asia	3225
CONEXPO-CON/AGG 2008	3225
Consolidated Fleet Services	3039
Construction Business Owner Magazine	1049
Construction Equipment Guide	3222
Construction Equipment Magazine	3027
Construction Europe	816
Construction Guide Inc	3217
Contemporary Products Texas	1141
Contractors Equipment	3325
Contractors Hot Line	715
Conveyor Application Systems	1307
Conveyor Application Systems	H362
Cooper Hand Tools	1718
Cranesmart Systems Inc	719
CraneWorks	
Crosby Group	735
Crosslink Technology Inc	3086
Crysteel Manufacturing	J225
Cummins Inc	609
Custom Composites Inc	3259
Cygnus Business Media	3219
D & S Sales/Western Mule	820
Dakota Bodies Inc	L127
Dale North America	3043
Danzer Industries	L289
DCD Design & Manufacturing Ltd	1341
Delta Mobile Testing Inc	3218
Deutz Corporation	L473
Dew-Eze Manufacturing	529
Dexter Axle	747
DH Supply Company	756
DICA	3030
Dicke Safety Products	1719
Diesel Progress	3017
Digital Control Inc	1335
Dimensions Unlimited Inc	228

Outdoor Exhibit

Exhibitors	Booth #
Distribution Contractors Assoc	3013
Ditch Witch	K265
Ditch Witch	K155
Diversified Inspections	3021
Diversified Product Develop	1806
DiversiTech Corp	1324
DODGE	845
Double D Manufacturing LLC	H345
DP Winch	1035
DRB Boring Equipment Company	H110
DrillingWorld	1327
Dur-A-Lift Inc	L180
Dura-Line Corporation	3162
Durham Company	3297
Dust Control Technology Inc	H201
"Dyna-Drill, Inc."	508
Dynamic Power Source LLC	1007
Eagle Line Tools	1627
Earthwave Technologies	3314
East West Manufacturing LLC	3098
Eastern Metal	3230
Eberhard Manufacturing Co Div of The Eastern Company	855
ECCO	1735
ECHO Incorporated	1601
EDN (Electrical Distribution Network)	351
Effer/North American Lifting Equip	J415
ELASCO Tool Supply	L356
Electrical Advertiser	1651
Electricity Today Magazine	3006
Electromark Company	1823
Elk River Inc	3134
Elliott Equipment Company	L435
Elliott Machine Works Inc	L355
Energy Manufacutring Co/ Williams Machine & Tool	308
Enginaire Clean Air Systems	464
Enrange LLC	152
Equipment Lock Company	924
Equipment Technology Inc (ETI)	L315
Equipment Today	3219
Equipment World	3120
ERB Industries Inc	3238
ERICO Inc	3081
Erin Rope Corporation	3079
Eskridge Inc	1218
"Espar Products, Inc."	562
Estex Manufacturing Co Inc	1634
Eureka Chemical Company	248
Evertire Inc	608
ExhibitingAs	Space.
Expander Americas Inc	150
Express Blower Inc	1255
Exxon Mobil	657
Eye Lighting International	629
Fabco Power	1726
FAE USA Inc	H200a
Fairfield Resources Intl	3026
Fairmont - Greenlee Textron	1755
Famic Technologies	551
Faster Incorporated	535
Fecon Inc	1446
Fecon Inc	J328
Federal Pacific	L114
Federal Signal Corp Emergency	3142
Feterl Manufacturing	L281
Fibrobec/Spacekap	L455
First Gear Inc	3018
Fisher Research Laboratory	1511
Fleet Electrical Service Inc	L361
Flir Systems	3283
Flo Draulic Group/Hydrocontrol Inc	419
FOF Products Inc	1611
Force America Inc	441
Ford Commercial Truck	J202
Foremost Industries LP	1400
Forester Communications	3129
Formex Manufacturing Inc	1100
FRE Composites (2005) Inc	3092
Freightliner Corporation	J114
Freightliner Custom Chassis Co	H254

Outdoor Exhibit

Exhibitors	Booth #
Fuelmaster/Syn-Tech Systems	3114
"Fuse Buddy, LLC"	1706
Gardner Denver - Blowers	1358
Gardner Denver - Hydraulics	446
Gasboy	1340
Gator Rock Bit Inc	L342
GDS & Associates Inc	1724
GE Commercial Finance	3220
GE Security	1250
Gear Products Inc	341
General Machine Products	3072
Genie Industries	
Georgia Underground	914
Geotek Inc Pupi Division	3186
Getec Inc	1025
GM Fleet and Commercial	J120
Go For Digger	K108
Go Power! Electric Inc	527
Goldak Inc	1748
Golight Inc	1714
Goodall Manufacturing	1056
GovPro Media	3011
GRA Services International	H300
Gray Automotive	J427
Great Lakes Power Products	200
GrimmerSchmidt	L332
Grindex Pumps	1727
Grote Industries	1818
Gunnebo Johnson Corporation	1154
Guoshenglong Real Estate Co Ltd	H114
Hagglunds Drives Inc	154
Halco America Inc	1241
Hall Manufacturing Inc	H317
Hall's Safety Equipment Corp	1817
HammerHead (Earth Tool Co LLC)	
Hannay Reels	1429
Hansen International	1149
Happ Controls	121
Harford Manufacturing Ltd	H341
Harger Lightning & Grounding	1425
Harrison Hydra-Gen	824
Hastings Hot Line Tools & Equipment	1547
Hatz Diesel of America Inc	126
Havis-Shields Equipment	1057
HAWE Hydraulics	136
HBC-radiomatic	J226
HCSS - Heavy Const Sys	3323
HD Electric Company	3145
HDW Electronics Inc	1610
Head Equipment Inc	616
HED	224
Heiden Inc	115
Helac Corporation	K105
Hella Inc	856
Hercules Bulldog Sealing Products	264
Hercules Industries Inc	3236
Hetronic USA	L227
High Voltage Inc	1707
Highline Products	3059
Highway Manufacturing	J138
Hipotronics Inc	H115
Hirschmann Electronics Inc	1146
HISCO Inc	1320
HIT Tools USA	3284
Hogg & Davis Inc	L156
Holland Hitch Company	1147
Holmbury Inc	347
Homac Companies (The)	3189
Hook International Inc	3032
Horizon Fleet Services	954
"Hub City, A Regal-Beloit Co"	249
Hubbell Power Systems	3196
Hughes Brothers Inc	3182
Huskie Tools Inc	1614
Hydraforce Inc	141
Hydraulics & Pneumatics Magazine	3224
ICEUS Inc	618
Icorp-Ifoam Specialty Products	3160
ICS Blount	L425
Identec Solutions Inc	H116
IFPE 2008	3225

Outdoor Exhibit

Exhibitors	Booth #
IHI Compact Excavator Sales	K160
IN STOCK NOW! Inc.	3249
Incident Prevention	1711
Ingersoll-Rand Construction Equipment	K335
Innovative Utility Products	1827
InPower LLC	251
“Interchange, LLC”	515
International Cranes	816
International Truck & Engine	J400
Iowa Mold Tooling	J228
Isuzu Motors America	206
ITS Compliance Inc	3016
ITT Flygt Corporation	1626
J J Kane Auctioneers	3022
J.L. Matthews Company Inc	1846
J.R. Merritt Controls Inc	246
Jameson	3195
Jarraff Industries	J412
JCB	K135
Jeffrey Machine Inc	923
Jemrack Equipment	846
Jet-Lube Inc	564
Joey Bed Inc	958
John Deere Construction & Forestry	K245
John Deere Power	L176
Joseph Industries	163
Jotto Desk	3127
JWF Technologies	222
K&H Industries Inc	3077
Kaeser Compressors Inc	L101
Kar-Tech Inc	655
Kassbohrer All-Terrain Vehicle	J410
Kawasaki Motors Corp	524
Ken Cook Company	3024
Kenco Corporation	J224
Kennametal	1249
Kershaw Div of Progress Rail	1229
Kershaw Div of Progress Rail	J420
KHL Group	816
Kiefer Industrial Trailers	L138
Kinshofer Liftall	J229
Klann Tools Inc	1550
Klein Tools Inc	1663
Knaack Manufacturing	L357
Knapheide Manufacturing	L199
Kodiak Kutters LLC	H249
Komatsu America	K365
Korte Utility Services Inc	3119
Kubota Engine America	155
Kubota Tractor	K222
Kundel Industries	1201
Kunz Glove Company Inc	3035
KYB America LLC	329
Laminated Wood Systems	3178
Lanair	1559
Land Improvement Contractors Association	3111
Landoll Corporation	J333
Lang Tool Co.	1462
Larson Cable Trailers Inc.	H246
Laser Technology	1450
Leggett & Platt Inc/Masterack	L146
Lewis Manufacturing Company	1619
Leyman Lift Gates	1124
Liebherr Construction Equip	K355
Lift Applications & Equipment	814
LIFT-ALL Div of Hydra-Tech Inc	L171
LIFT-ALL Div of Hydra-Tech Inc	L293
Liftmoore Inc	J130
Lincoln Electric	L107
Line Equipment Sales Co Inc	3048
Line Ward Corp	K395
Little Mule/Coffing Hoists	1615
Littlestar Products	H104
Load Systems International	850
“Lockmasters, Inc.”	362
Loegering	K195
Logan Clutch	555
LoJack Corporation	1729
Lombardini USA Inc	435
Lug-All Corporation	3166
Lumax Lubrication Equipment	1659
Lun-Yuan Enterprise Co	1501
Lynn Ladder & Scaffolding	1156
Maclean Power Systems	3170
Macrotech Polyseal Inc	348
Madewell Products Corp	H359
Maintainer Corporation	L249
MALA GeoScience USA Inc	1525
Manitex	J104
Marmon Herrington	L384
Martin Fluid Power	156
Master Lock	3257
Matrix Diamond Blades	1664
Mattracks Inc	J337
McElroy Manufacturing	1435
McFarland Cascade	3168
McLaughlin Mfg Co	K120
MCM International Inc.	1459
McNichols Company	1811
MCR Safety	3044
MDI-Traffic Control Products	1841
Medi-Rub USA	1763
Megger	3242
Melfred Borzall	1235
Mesco Inc (Aero-Lift)	L345
Metrotech Corporation	1641
MGS Incorporated	L471
Michelin North America	918
MICO	434
“Microtronics Controls, Inc.”	727
Mid-America Precision Products	1507
Mile Marker Inc	647
Miller Electric Manufacturing	J431
Milspec Industries	1607
Mincon Inc/Hardrock HDDP	1301

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Outdoor Exhibit

Exhibitors	Booth #
Mobile Matt (PJS Products)	3062
Mohawk Lifts	841
Monarch Hydraulics Inc	L190
Monroe Custom Utility Bodies	L493
Monroe Truck Equipment Inc	L299
Moore Industrial Hardware	346
Moose River Publishing	3110
Morgan Olson	J314
Mory Inc	H105
MSA	1808
MTE Hydraulics	425
MTS Systems Corporation	940
Multiquip Inc	H325
Muncie Power Products	142
Murphy FW	128
Mustang Co	3034
MY-TE Products	563
Nagy FleetNet	3234
Napco Products Inc	1654
Nasco Industries Inc	3248
NASTT	3218
National Assn of Trailer Mfrs	3108
National Crane Corporation	J302
National Rural Electric Coop	3207
National Truck Equipment Association	3112
Nationwide Auction Systems	3216
NBB Controls	247
NECS-National Energy Control Services	3123
Nehrwess Inc	3063
Neptco Inc	1546
Nesco Sales & Rentals	834
New England Ropes Inc	755
Next Hydraulics Srl	J406
Nojitech Corporation	3083
Nordic Fiberglass Inc	3159
Nord-Lock Inc	149
North American Hydraulics Inc	K399
North American Hydraulics Inc	K399
North American Signal Company	3235
North American Wood Pole Council	3015
NUPLA Corporation	1524
Nu-Way Utility Concepts LLC	3042
O'Brien Manufacturing	L110
OilAir Hydraulics Inc	541
OK Champion Corporation	L201
Okonite Company	3267
Omaha Standard Inc	L394
Omnex Control Systems Inc	1834
Omni Gear	649
Onan Corporation Engine Div	L491
Onspot of North America Inc	1055
Ontario Drive & Gear Limited	1014
On-Trux Ltd	H260
Osburn Associates Inc	3244
OSI Plastics	3093
"Osmose Utilities Services, Inc."	3269
Outback Power	549
Outdoors For Life LLC	1658
Overseas Metal Works Inc	1309

Exhibitors	Booth #
Pace Edwards/Leer Div. of Tag	447
Palfinger	J237
Palmieri USA	1300
Parker Hannifin	625
Parker Hannifin	L166
PCA Rock Drill	1102
Pelsue Company	L396
Pencell Plastics	3172
Pengo Corporation	1315
Penske Truck Leasing Co	821
Perfecting Coupling Co	646
Perfection Gear Inc - subsidiary of Peerless-Winsmith Inc	740
Perkins Engines	211
Perles USA	1401
Perma-Patch	3069
Permco	134
Petro Comm Industries LTD	1624
Phenix Technologies	3051
PIAB	3150
Pipehorn	3239
Pirelli Power Cables and Systems	3087
Pirtek	662
Pitman (S D) Inc	L243
Pitman Utility Products	L285
Pittsburgh Pipe & Supply Corp.	857
Plastic Composites Company	1226
Plastic Techniques Inc	3155
PNA/API	3075
Poleset Equipment LLC	J429
Posi-Plus Technologies Inc	L121
Power & Communications Assoc	3208
Power Delivery Products Inc	1655
PowerTraxx Vehicles Inc	J416
PPG Industries-Refinish Div	1118
Precision Manufacturing	J311
Preco Electronics Inc	1502
Preformed Line Products	3181
Preformed Line Products	L108
Premier Manufacturing	741
Prime Design Aluminum Ladder	1155
Pro Line Tools	1406
"Pro-Vision, Inc."	1200
PSE Amber	1814
PSL of America Inc	354
PT Technologies	955
Puget Sound Rope Co	815
Quadco Equipment Inc	511
Qualcomm	664
R & B Mfg. Inc.	H128
Racor Div of Parker Hannifin Corp	L166
Radiodetection	3046
Railhead Underground Products	1346
Rainbow Technology Corp	915
Ramsey Winch Company	757
Ratcliff Hoist Co Inc	3252
"Rauckman Utility Products, LLC"	3185
Raven Technology	L109
Rayco Manufacturing	J220

Exhibitors	Booth #
Raymar Manufacturing Inc	1114
Raymar Manufacturing Inc	H151
Reading Truck Body Inc	L155
Reed City Power Line Supply	3124
Reed Manufacturing Company Inc	1457
Reliable Equipment & Service	1409
Reliable High Performance Prdt	3152
Remtron Inc	1963
Rental Product News	3219
RFA/Minnesota Engineering	3020
Ridge Tool Company	1758
Rineer Hydraulics	146
Ripley Company	1541
Ritmo America LLC	1355
RKI Inc	L380
Robbins Company (The)	1106
Robbins HDD	K119
Robert Hydraulique Inc	751
Rock & Dirt	926
Rock Tools Inc	K385
RockHound Attachments	113
RockHound Attachments	H311
ROM Corporation	1015
Roose Manufacturing Company	828
Rotary Lift	1041
RPM Control Co	650
RS Technologies Inc	3279
RUBBLE MASTER Systems Inc	H304
Rud Chain	1148
Rumber Materials Inc	825
RWF/Bron	J425
Rycom Instruments Inc	1415
S&C Electric Company	3094
S.D.P. Manufacturing Inc	L419
Sabre Manufacturing LLC	3058
Safety Test & Equipment Co	1640
Safety-J Inc	H100
Salco Inc	3045
Salisbury	1847
Samson	3073
Sauber Mfg Co	L137
Schonstedt Instrument Company	1514
Scot-Trac North America	H342
Sellstrom Manufacturing Co	3037
SensorLink Corporation	3055
Sensors & Software	1750
Service Trucks International	L350
Sewer Equipment Company of Ame	H214
Shakespeare Composites	3190
Sherman and Reilly Inc	L373
Shinn Systems	1227
Shoemaker Inc	525
Sicame Corporation	3073
Sievert Industries Inc	1555
Skylift Inc	L479
Slabach Enterprises	K109
Slide Sledge LLC	3285
Slingco Ltd	3085
Snap tite Inc	335

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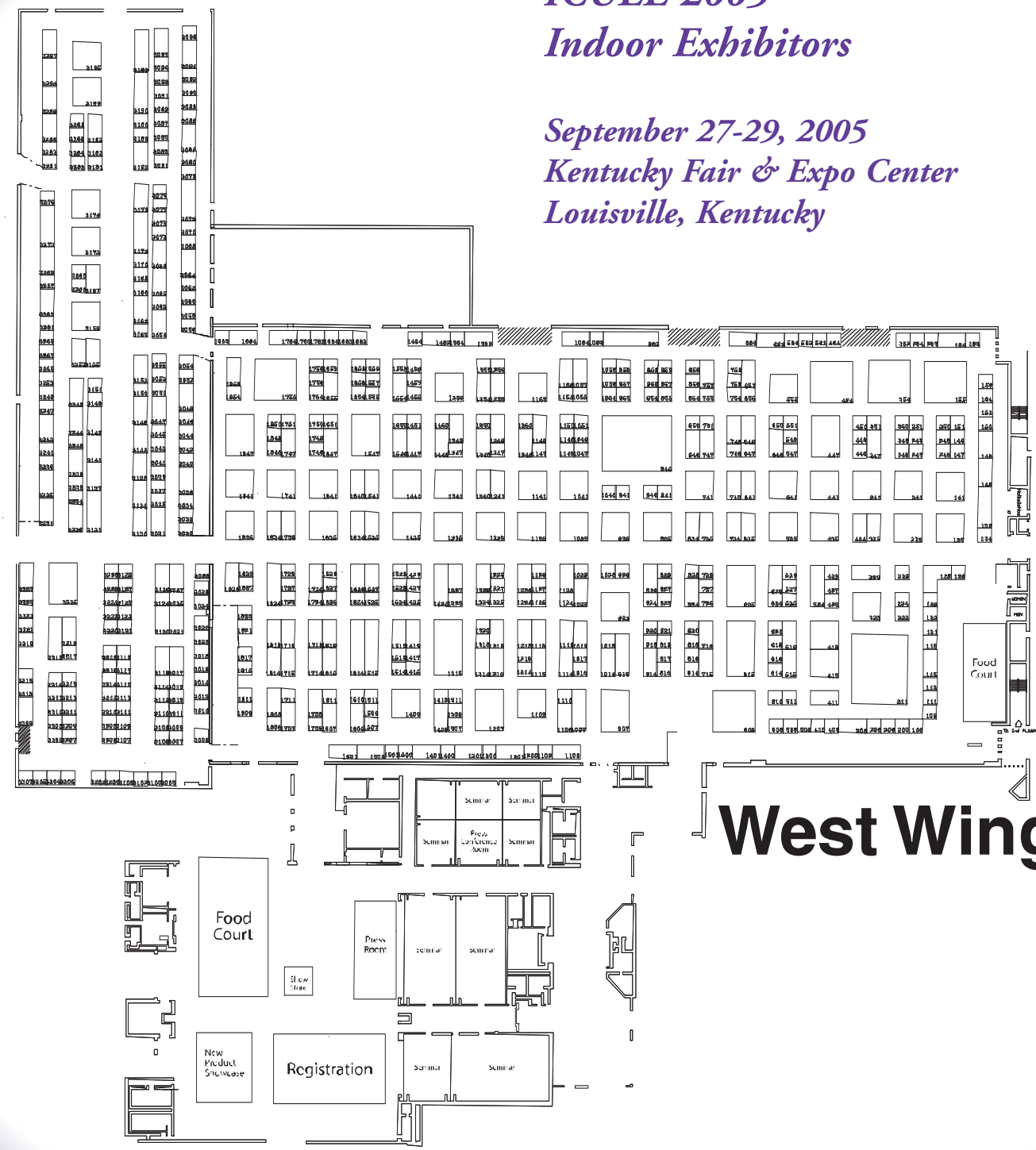
Exhibitors	Booth #
Soft Track Supply Inc	J128
SOLIDA Hydraulic Hammer Tools	1029
Solideal Tire	1129
Sonar Safety Systems	754
Sound Off Signal	3241
Southern Utility Repair	L102
Special Fleet Service Inc	1526
Speed Shore Corp	1318
Speed Systems Inc	1708
Spokane Computer	3306
Spoolmaster	1647
STAHL	J236
Stanley Hydraulic	K140
Steel Grip Inc	3054
Steelweld Equipment Co Inc	J325
Stellar Industries	J212
Sterling Hydraulics Inc	250
Sterling Truck Corporation	J322
Stertil-Koni	J424
Sto Away Power	1047
Stone Construction	K103
Streamlight Inc	1417
Strongwell Corporation	3141
Structural Metal Fabricators	L489
Stucchi SRL	519
STW Technic LP	448
Subsite Electronics	1606
Sunrise Equipment Company	758
Super Products LLC	L388
Superior Signals Inc	1715
Superior Tire & Rubber	818
SVE Sales Inc	1410
SVP Manufacturing Inc	1110
System Edstrom of Sweden Inc	L194
T&R Electric	3286
T&W Pease LLC	H350
Tadano America Corp	J320
Tags Systems	H342
Takeuchi	K150
Tallman Equipment Co	429
Tech Products Inc	1848
Techline Engineering	962
Technocrane Inc	J316
Tendaire Industries Inc	641
Terex Corp	L316
Terex Corp	L312
Terex Corp	K185
TEREX Reedrill	K130
Terex Utilities Rental	1347
Terramite	K285
Terresolve Ltd	854
Tesmec USA	K255
Texas Hydraulics Inc & Hydromotion Inc	734
The MaxCell Group	3253
ThermOweld	123
ThermOweld	H112
Thieman Tailgates Inc	L328
Thiermann Industries Inc	K360
TIMCO Inc	L100
Timco Instruments LLC	3041
Time Machine Inc	957
Time Manufacturing	L116
TKM Communications	1246
Tommy Gate	859
Tornado Advanced Systems	H242
TrafFix Devices	1824
Trail King Industries	L154
Trak N Seal	858
Transmission & Distribution	3213
Trim-Lok Inc	1019
Trinity Highway Safety Products/ Site Safe Products	H134
Triple Crown Products	3116
Trumpf Inc	1447
TSE International Inc	1127
TSE International Inc	L399
Tsurumi America	1455
TT Technologies	K110
Tuf-Tug Products	1754
Tulsa Winch	1135
Turner Electric LLC	3097
Tushogg	H224
Tyco Electronics	3273
Tyndale Company Inc	1751
UAI	3056
U-Dump Trailers	935
U-Dump Trailers	L453
Ultra Shore Products	1424
Underground Construction Mag	1314
Underground Tools Inc (UTI)	1427
Underwater Kinetics	1554
Unicord International	3060
Uni-Grip Inc	959
United Rentals	3014
Unlimited Services	829
Up-N-Atom Inc	
US Nameplate Company	506
US Radar Inc	323
US Saws	H101
USA-Lift LLC	H361
Uticom Systems Inc	3138
UTILCO	3167
Utilicor	1762
Utilimaster Corporation	L231
Utility & Telecom Fleets Mag	1150
Utility Equipment Leasing Corp	3126
Utility Fleet Management	3106
Utility Metals	3078
Utility Products Showcase	
Utility Safeguard LLC	3149
Utility Solutions Inc	1515
UTV Right Track	L386
VacStar	K123
Vanair Manufacturing Inc	L417
Vanner Incorporated	3247
Vans Electrical Systems/Sales	263
Vans Electrical Systems/Sales	L481
Vansco Electronics Ltd	620
Vantech/SafetyLine	3146
Venturo/Ferrari Truck Cranes	J321
VeriChip Corporation	1017
Vericom Technologies	3261
Vermeer Mfg Co	K322
Vermeer Mfg Co	K225
Vikimatic/TVC	3255
Virginia Plastics Utilities	1500
Vista Mfg Inc	1040
Vivax Corporation	1259
Vivid Learning Systems	3319
VMAC	L346
Voltgard Div of Saf-T-Gard	1926
Volvo Construction	K345
Von Corporation (The)	1441
Vonberg Valve Inc	635
VTE Inc	3288
Waco Boom Company	L338
Wallace Specialty Equipment	K350
Walvoil Fluid Power	907
Wampfler Inc	1756
Ward's Truck Accessories	415
Warn Industries	1126
Warner Bodies	L213
Warren Heim Corporation	1527
Water-Jel Technologies	1764
Watson Inc	J233
Wescon Products Company	626
Westex Inc	1850
Wheeler-Rex	1509
Whelen Engineering	1741
White Hydraulics Inc	350
White Rubber Corp	3137
Wilcox Bodies Limited	J313
William Frick & Company	3053
Williams Scotsman	L341
Wilson Bohannan Padlock	3151
Wired Rite Systems Inc	746
Wood/Chuck Chipper Corp	J331
Work Area Protection	H331
Workrite Uniform Company	956
World of Asphalt 2006 Show and Conference	3225
Worldwide Drilling Resource	1350
WPT Power Transmission Inc	J329
Wright Express	3327
Wylie Systems	1054
Wyo-Ben Inc	1325
Xantrex Technology Inc	1018
Yale Cordage	1746
Yanmar America Corp	454
Yanmar Construction Equipment	K106

Indoor Map

West Pavilion

ICUEE 2005
Indoor Exhibitors

September 27-29, 2005
Kentucky Fair & Expo Center
Louisville, Kentucky



West Wing

West Hall

Performance-driven Intelligence

Today electric utilities in North America face increased business challenges to maintain their profitability. Governments have increased compliance demands, consumers want increased performance and lower prices while shareholders are asking for better returns on investments. Meanwhile despite aging grid infrastructures and overloading from increased power demands – as evidenced by the recent Northeast power outage – no one appears ready to invest the billions of dollars needed for grid modernization.

Nonetheless some utilities are vastly improving grid operations for a fraction of the cost of upgrading their physical infrastructures. They are deploying highly scalable information technology to manage assets (and subsequently business processes) in real time enhancing reliability, performance and security. Here's how it works:

North American grids are heavily automated with EMS, GIS, SCADA, AMR and other automation systems. However, the massive amounts of data generated by these widely geographically dispersed T&D operations is mostly locked in legacy systems. Missing is the ability to capture, store, analyze, interpret and distribute the data enterprise-wide to operations, maintenance, engineers and management who need it to make business decisions.

Some large utilities have addressed this issue by implementing the Real-time Performance Management (RtPM™) Platform from OSIsoft, powered by the PI System™, a proven system that transforms operations data into a powerful corporate asset. The RtPM software collects the operations data from the legacy automation systems and then uses a robust set of performance management applications to disseminate actionable information, in real-time, across the entire corporation. Utility personnel at all levels can act on this information in seconds or minutes – instead of days or weeks – to continuously improve their operations.

A major utility implemented OSIsoft's RtPM software to collect data from its EMS and SCADA systems and to organize the data based on a physical model of its assets. A series of Web-enabled real-time displays were quickly deployed showing:

- the complete layout and load status of the grid
- the status of all tie lines and breakers
- active trends of substation loadings, daily forecast loads versus actual and yearly system load summaries

Web-enabled graphical one-line diagrams were also built for each substation displaying critical operating data including megawatts, megavars, volts, amperes, ambient temperatures, etc. If the loading on a transformer or feeder approached an overload condition, an alarm immediately notified operations to take action. These easy to navigate displays have greatly increased the utility's ability to monitor and control grid operations.

This utility recognized that, to compete in today's markets, they needed to build a foundation for continuously improving operations and asset utilization. Implementing a real-time performance management system to collect, distribute and visualize operating information enterprise-wide was critical to building that foundation. The result has been substantial cost reductions and increased revenues from more reliable equipment operation, higher equipment utilization, and fewer customer outages.

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A Brief History of OMS and DMS – part II

By: Martin Bass and Bob Fesmire, ABB Inc.

This article is the second in a two-part series on the evolution of Outage and Distribution Management Systems. Part I covered the development of OMS and DMS from manual, paper-based processes to streamlined operations managed with highly specialized information systems. In part II, we examine the current status of these two key components, with a view toward their eventual convergence.

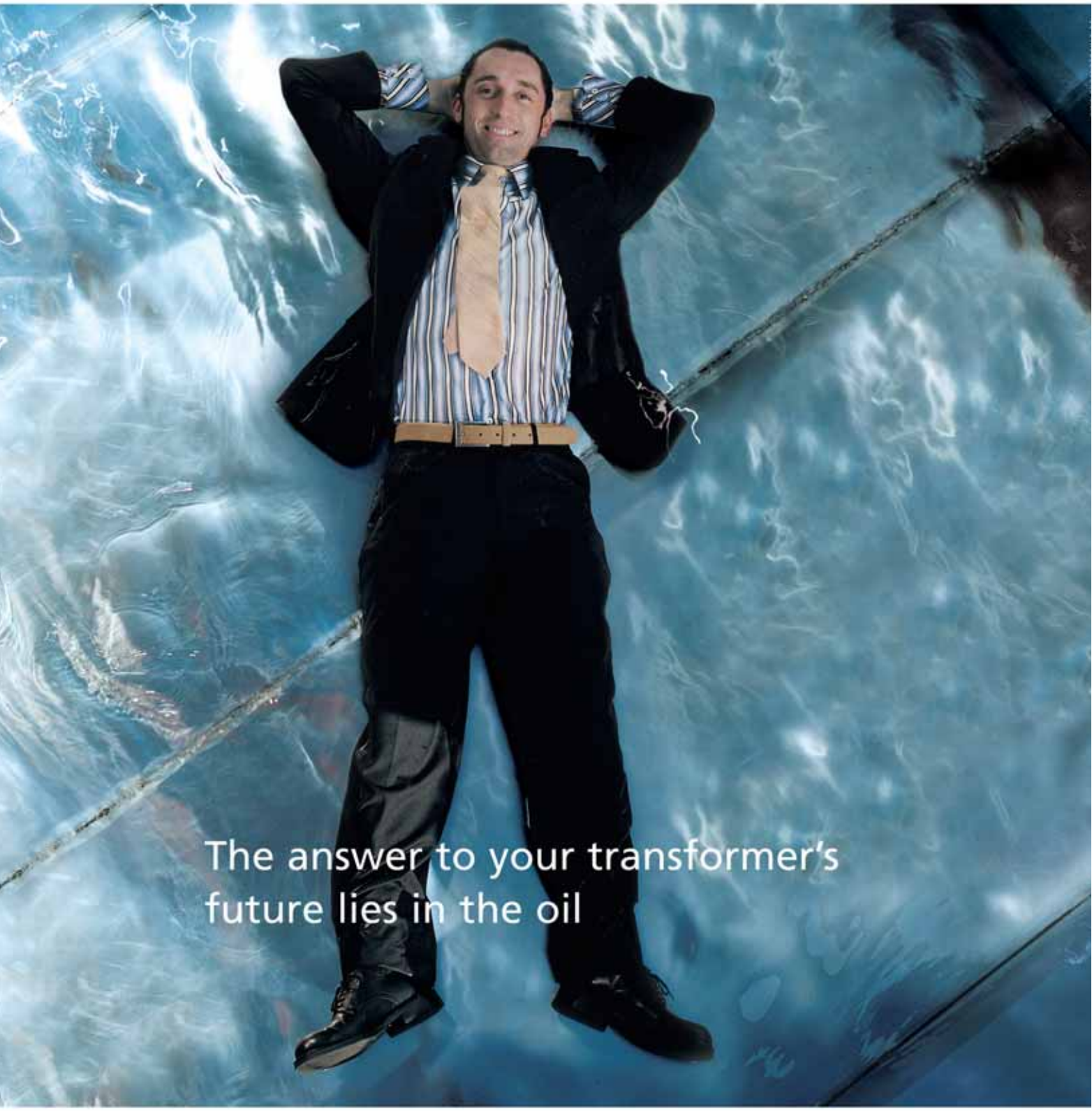
Third-Generation OMS

By the mid-90's, Outage Management Systems had evolved from trouble ticket systems to sophisticated computer programs that provided intuitive graphical displays of the distribution system. Continuing advances in computing power and OMS capabilities have produced a third generation of systems that are capable of handling enormous call volumes. Indeed, utilities today are increasing the size of the pipe that feeds the OMS with staffed call centers, automated Interactive Voice Response (IVR) systems, and third-party high call volume services. The result is that OMS call handling capacity has skyrocketed.

The recent advances in call volume are matched by the ability to analyze and group trouble calls together. The grouped calls are then sent to the graphical user interface that presents not only the location of the individual calls, but more importantly, the results of the analysis. The third generation OMS includes the capability to represent these large call volumes in a geographic display in real time, and to provide the same information to a large number of users simultaneously.

Fat Client or Thin?

To overcome performance and scaling issues in second-generation OMS systems, new client/server architectures were applied in developing the latest family of programs. The essential question here comes down to how much processing is performed by the server and how much is handled by the user's local PC, or client. A bias toward local processing is known as a "fat client" approach, whereas systems that perform relatively little at the PC level are known as "thin client".



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With the advent of more powerful PCs and the emergence of 64-bit processing power, some vendors elected to implement a software architecture that would take advantage of these advances. In a fat client architecture, the network model is maintained locally in the client PC. This means that it can perform much of the processing that would otherwise be performed on the server.

Consider the example of dynamic line coloring in an OMS world map, where the energization status of a feeder is shown according to color. When the feeder is energized, it is colored red, for example. When the feeder circuit breaker is opened, the display will indicate that it is de-energized by changing the line color to white. This means that in the user's display, every line segment downstream of the open breaker must have its color changed too.

With a fat client solution, the server tells each client that the feeder circuit breaker has opened, using very little communications bandwidth. From there, the client can color all of the downstream line segments on its own, because it has a complete copy of the network model stored in local memory. With a large number of clients and a large number of network operations, this approach reduces the server load and required communications bandwidth considerably. Therefore it is possible to add additional client workstations with minimal additional loading on the server, making the system highly scalable.

As the size of the network model increases, the time to initialize the memory copy of the network model also increases. Loading the model also takes time, especially since there may be many workstations all initializing their memory at the same time. This issue has been solved in a number of ways, typically by caching the data on a local disk on the client PC, and by using data compression techniques.

In a "thin client" approach, the server retains the network model and performs most of the calculations. In our line coloring example, the server does not tell the clients that the feeder circuit breaker has opened—it has to tell each client to recolor every line segment, which typically means greater communications traffic.

This approach is best suited to applications that do not require much local intelligence and where response time greater than one second is acceptable. Techniques for reducing the network traffic in a thin client system rely on the server only sending information to the client as needed. De-cluttering techniques are also used to limit the amount of information shown on a given display. As the user zooms in, more detailed information is sent to the client to cover the area of interest.

Thin client OMS is good for users interested in basic information, who do not need a real-time response and do not need to perform CPU-intensive functions that would tie up the server. Typical users in this category include utility executives, customer service representatives and possibly certain critical customers who need to know the current status of their outages. An additional benefit of the thin client approach is that special application software does not need to be installed on the PC, so maintenance of the application is easier. The end user only needs access to a web browser.

The local copy of the distribution network model used in fat client OMS offers an added benefit in that it enables advanced DMS functions to be performed locally on the client machine. Applications like load flows and short circuit analysis require substantial processing resources, given the size of typical distribution networks. In a fat client model, these applications can be run on individual client PCs, allowing processes to take place in parallel and greatly reducing communications traffic and processing time.

The Melding of DMS and OMS

DMS and OMS systems have continued to evolve on their own, but as the preceding example shows, there is also a cross-pollination taking place. Eventually, these two systems may converge in a single platform from which the distribution utility handles all its day-to-day operations. Following is a survey of several functional areas in which we explore this possibility.

Automation and Real-time Data Collection

While the DMS has a native data acquisition function, based on RTUs, the OMS has had to rely on data received via an EMS or distribution SCADA system.

However, the march down the feeder continues. As the benefits of telemetering at the substation level are proven with the DMS, efforts to add automated switches and telemetry further down the feeder have intensified among many utilities. This trend has accelerated with improvements in communications technologies, the availability of data concentrators at the substation, and the use of standardized protocols such as DNP3 and Modbus.

The benefits of remote controlled switches along the feeder are clear. Feeders may be reconfigured in real time to adjust to changes in loading throughout the day. The remote switches also report status and flow measurements to support switching decisions.

Automation is also improving OMS systems, which increasingly are using data from automated meter reading (AMR) systems. The main focus for automated meter reading systems is obviously to reduce the cost to read individual meters. Though the cost of 100% coverage can be steep, many utilities have implemented pilot programs that can be leveraged to great effect in an OMS context.

With a reasonable coverage of automated meters, the OMS can use these meters as addressable status monitors in order to detect outages and to confirm restoration. The ability to confirm restoration is especially valuable. This is because there may be several outages at the same location. The crew thinks that they have fixed the problem, only to find it was masking

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another (so-called nested outages). The AMR system allows the OMS to query strategic meters downstream of the original outage and report to the crew if there are additional problems in the vicinity. The time saved can be significant, and shows up in reductions to both crew time on site, and customer time without service.

Display Evolution

As we covered in Part I, outage management systems took the initial lead in developing graphical user interfaces, but in recent years additional capabilities and functions have been added to DMS displays. Improvements in the world map graphics are evident and the gap is closing between the OMS and DMS user interfaces.

Now, some OMS systems are being delivered with the capability to generate schematic diagrams of multiple feeders on the fly. The idea is not new, and many systems are capable of generating single feeder diagrams that typically look like a long line with multiple short taps emanating from one side (often referred to as 'stick diagrams'). What is new is the ability to show 20-50 feeders around 4-5 substations in a single schematic diagram. The trick is also to ensure that the diagram looks similar each time it is generated, even after changes in the network topology. Such a tool allows feeders to be reconfigured more effectively and switching plans to be written more readily. It also reduces or eliminates the need to use paper maps for switching purposes, further reducing costs.

Unbalanced Load Flow Calculations

An important tool in the decision making process for distribution utilities is the use of unbalanced load flow calculations. To date, the capability to perform these calculations has not been included in DMS or OMS, but utilities are demanding it now for a variety of reasons.

Often the distribution system was designed to have an even distribution of load across all three phases, but as the system grew, so did the level of imbalance. This could be either because the construction crew did not build what was designed, or the drawings for the phasing were not maintained accurately, sometimes making new design a matter of guesswork. Phase imbalance can also result from very high growth along a particular feeder.

Attempts to correct phase imbalance are expensive and can sometimes make matters worse unless the source data is accurate. However, the source data must be corrected in order to obtain accurate results from load flow calculations. The data requirements for unbalanced load flow calculations are higher than for balanced load flow calculations, since the size of conductors and, for overhead construction, their positioning on the pole are important inputs to the overall calculation.

Unbalanced load flow has been available in distribution planning applications for many years and it is beginning to appear in OMS. The same function, adapted from transmission applications, is also finding its way into DMS.

Short Circuit Analysis and Fault Location/Restoration

Short circuit analysis applications are also being used in both the DMS and OMS. Again the DMS is evolving from a pure calculation and a balanced model, to an unbalanced model. The OMS meanwhile is providing a user-friendly way to present short circuit analysis results in order to perform fault location functions. The idea is to use the fault current from an intelligent relay in conjunction with a connectivity model to locate the fault. The fault current and conductor impedances are used as input to a short circuit analysis. The large amounts of data produced by this process can be summarized and presented to the user as a number of "candidate" fault locations on the OMS world map.

Both DMS and OMS have combined the short circuit analysis function with the information provided by fault indicator devices to yield a more accurate fault location. The maximum benefit is gained from fault indicator devices when they are telemetered. In this case, fault indicators can provide a signal that shows whether a fault passed through the conductor that they are monitoring. Thus, if the short circuit analysis indicates several possible branches, all of which give the same fault current solution, then the fault indicators can narrow the solution down to a specific branch.

Used in conjunction with fault location, the isolation and restoration analysis functions can automatically determine the best way to reconfigure the feeder in order to first isolate the fault and then back feed and restore the largest number of customers. The function will automatically look at every combination of switches that can be operated, and perform a load flow analysis for each combination. The results are presented to the user, who can then request that a switching plan be generated from the selected solution. This function has existed in DMS for some time, and is now available in some OMS systems.

Study Mode and Simulation Mode

Both OMS and DMS currently have the capability to create a snapshot of the distribution system for performing what-if analysis. These typically are limited in the number of study cases that each user is allowed to have and can take several minutes to initialize. However, some OMS systems have the ability to run a real-time simulation mode. This allows the user to select a subset of the network model and create a memory copy of it in real time. The user can then perform any what-if studies—creating switching plans, running load flows, etc.—before executing them in the actual system. This allows the user to make more accurate decisions in a shorter time.

Looking Ahead

Both DMS and OMS are changing very rapidly, as utilities strive to make efficient use of their distribution resources. As we have seen in the foregoing examples, both systems are expanding their influence in distribution operations and utilities are relying on them more and more for decision support. An aging population within the distribution utility control room—and the lack of experienced people to replace them—will further increase reliance on such tools. As software design and the underlying technologies advance to meet the needs of distribution operations, it will be interesting to see what the next generation of OMS/DMS will bring. If the convergence currently going on in other fields is any indication, a unified system for the distribution utility may not be far off. ■

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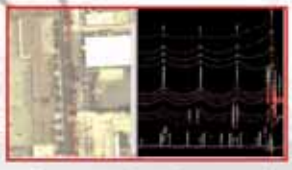

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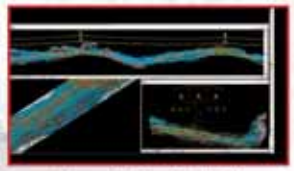
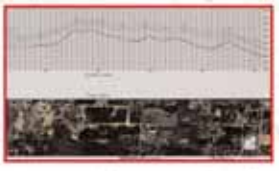


Vegetation height (color-coded)



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STEEL POLES ARE STRONG, COST-EFFECTIVE OPTION FOR DISTRIBUTION SYSTEMS

By: Dan Snyder, American Iron & Steel Institute, Manager, Market Development

The Power of Zinc and Weathering Steel Extends Steel's Service Life

The quality and inherent value of steel distribution poles is often enhanced by the process of hot-dip galvanizing, or the use of weathering-grade steel. Each of these methods provide corrosion resistance and extended service life for steel distribution poles.

The Power Of Galvanized Steel

In the hot-dip galvanizing process, steel poles are submersed in a bath of molten zinc, forming a permanent metallurgical bond between the zinc and the steel substrate. This creates a tough, uniform barrier coating both inside and out. Also, if the steel becomes exposed, zinc will corrode first, maintaining the strength and integrity of the steel pole. Zinc flows across the coating break, in much the same natural way that the human body heals a skin cut.

The Protection of Weathering Steel

Uncoated weathering steel is a solution for atmospheric corrosion control. When exposed to the environment, it forms a dense and tightly adherent oxide barrier, sealing out the atmosphere and retarding further corrosion. The embedded section of a weathering steel pole is usually coated for below-grade protection.

Below Ground Protection

A range of advanced coatings, including some for below-grade protection, further extend the life of steel poles. These coatings, which can be applied over both galvanizing and weathering steel, provide a non-leaching, sustainable corrosion barrier that can last as long as the poles – even in harsh soil conditions.

Traditionally, utilities have used wood poles to carry electric wires and cables from point to point. But the changing market is beginning to openly embrace steel distribution poles as a viable and cost-effective alternative. The number of steel poles in North America has more than tripled in recent years. Among the estimated 185 million electric distribution poles that crisscross the United States and Canada, about 600 utilities use this pole alternative.

Case in point: John Hudson of People's Electric Co-op in Ada, Oklahoma recently switched to steel poles. He said the co-op's decision was impacted when a review of their pole change-out program uncovered a high failure rate in pole tops, due primarily to two factors: woodpecker and lightning damage. The steel poles resolved both problems.

Hudson initially chose steel poles for their life cycle value. "Even today with higher steel prices," he said, "steel poles are the right choice."

Hudson said that crew adaptation to steel poles has been favorable. "The feedback I get is that the crews don't ever want us to go back to wood poles," he said.

Steel poles are pre-drilled to the utility's specifications by the manufacturer so there is little drilling in the field, making the installations quicker and easier. Hudson said they use NEC (Numerical Electromagnetics Code) ground on the base of the poles, eliminating the need to drive ground rods. Fiberglass crossarms and other hardware typically used on wood poles can be used on steel poles as well. Steel poles can by guyed using the same hardware used for wood poles. Permanent attachments can be welded into the poles for attaching guys.

Charles Guerry, the utility director for the City of Newberry, South Carolina has been using steel poles for seven years, with 250 in service and another 150 forthcoming. He said that the city initially chose steel poles for their life expectancy.

"An 80-year steel pole, verses a 30-year wood pole is a good value," Guerry said.

The city picked up on other useful benefits once in operation.

One example is that steel poles perform better during lightning storms.

"There have been very few outages during storms," Guerry said. "System reliability has significantly improved, the steel poles are better grounded and it's easier to make a good ground."

The use of steel poles also reduces the risk of catastrophic "domino effect" system failure, as can occur when just one utility pole fails. Utility poles can be dangerous if they snap or break. The poles have to carry the tension and weight of the wires, which means there needs to be enough flexibility to cope with the sudden release of a broken wire. The release of tension can cause a long line of consecutive poles to snap in a domino effect until one manages to break the chain.

Steel distribution poles have consistently proved to stand tall in the event of a pole failure. An engineered product, each steel pole is designed to meet specific strength and load requirements. The result is an extremely strong and reliable product, with uniform dimensions and strength, without twists, knots, splits, or bows – all of which can lead to failure in severe situations.

Steel Poles Can Save Time – And Money

Cost savings can be significant when the following factors are considered:

- Steel poles are at least 30% lighter than woods poles – lighter weight can reduce the cost of transportation, handling, and construction.
- Steel poles require little maintenance, greatly reducing the costs associated with upkeep – there is little need for tightening hardware to compensate for pole shrinking.
- Due to the strength of steel, in most circumstances, steel poles involved in

vehicle impacts can be repaired or changed during normal working hours, reducing the high cost of overtime pay.

- At the end of its long service life, a steel pole can be sold to scrap dealers and completely recycled – eliminating the costs of pole disposal.
- Steel poles can be taller and carry heavier loads, permitting longer spans and requiring fewer poles.

Farmers Electric Cooperative of Clovis, New Mexico realized a significant savings. In one of their installations, ease of installation became a significant factor when purchasing steel poles. The co-op's Engineering Manager Jeff Hohn said steel poles took less time to install than wood. He added materials cost less because poles were strong enough to support longer spans. They can also be taller and carry heavier loads. The co-op saved more than $50,000 on a recent 225-pole line project.

Easy to Install, Handle

There is little difference between the installation methods used for steel and wood so additional crew training is minimal. Plus, there is no need for inspections to monitor pole shrinkage or labor and material costs to re-tighten hardware because steel retains its shape and strength.

Weight reduction is also a factor in ease of use. The average steel distribution pole (40 foot, Class 4) weighs approximately 450 pounds, and is at least 30 percent lighter than a wood pole. Weight differentials can be as much as 70 percent less for steel when compared against wood structures. The weight savings make the poles easier to maneuver, reducing labor costs for transportation, handling and installation. In addition, steel distribution poles are gaining favor in rural areas because their lighter weight makes them easier to transport into rough and off-road terrain. Two-piece pole design allows transport to a job site without special permits and requires lighter hauling equipment, such as a tractor.

10 Reasons That Steel Poles Make Sense
According to AISI research, here are the primary reasons utilities are switching to steel:

- Easy to Handle
- Light Weight
- Long Life
- Cost Effective
- Low Maintenance
- Sustainable
- Durable
- Safe
- Aesthetics
- Engineered for Strength

Steel Offers Aesthetic Appeal

Guerry adds that the aesthetics of steel distribution poles are definitely a factor. "Even the public likes them better," he says. "They're just sharp looking poles."

Residential customers and local housing groups are becoming more involved in the construction process that takes place in their local communities. Some customers prefer the environmental benefits and general appearance of a uniform power line. Steel poles are available in several finishes, including zinc-coated steel, weathering steel, and pre-painted galvanized steel.

And Then Environmental Benefits

The benefit to preserving woodlands and forests is also at issue.

"It takes an entire tree to make a typical wood pole," says Charles Schmidt, chairman of the American Iron and Steel Institute (AISI) Steel Utility Pole Task Force "Yet one scrapped auto can produce more than four steel distribution poles." Schmidt — general manager of IPSCO, Inc, a steel producer in Houston, Texas — adds that a steel pole contains between 25 and 100 percent recycled content.

Steel is a unique material because scrap is an essential ingredient in the production of new steel. Each year, millions of tons of pre- and post-consumer steel products, including used steel cans, appliances, automobiles and construction materials, are recycled by steel mills to form new steel products.

A Changing Market

While steel distribution poles currently account for only a small percentage of the total distribution-pole replacement market, those who've switched to steel are staunch supporters.

"I've used wood, concrete, and composite poles," says Guerry, "but steel is trouble-free and economic. That's why we're using it exclusively now." Hudson concurs. "Longevity is the reason we're using only steel poles today," he says. "It just makes sense from a management perspective." ■

Source: American Iron & Steel Institute

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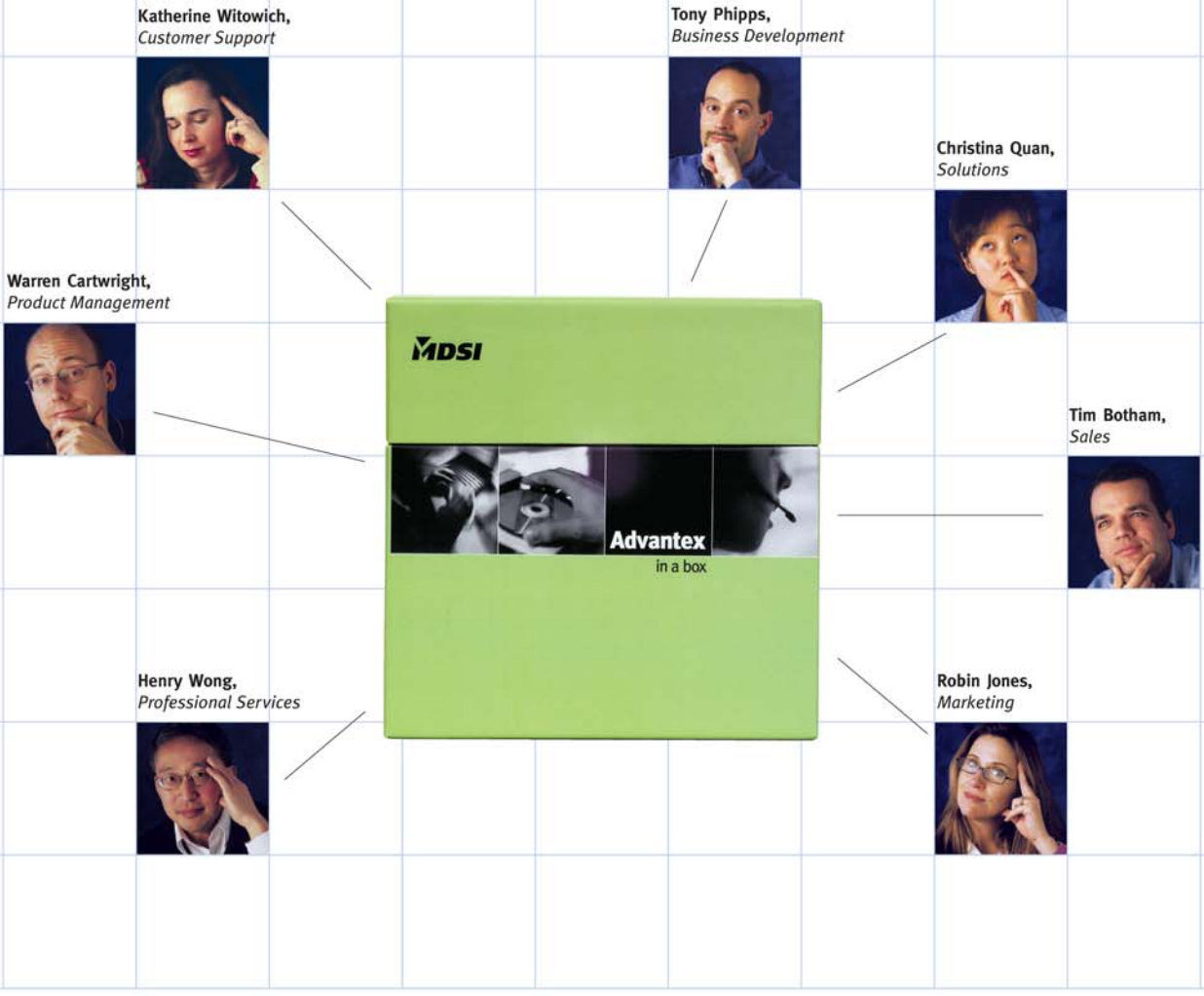

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The technical program and content is known for its consistent and continued high quality and outstanding reputation. As an attendee, you will gain authoritative analysis and critical insights into the issues you now face as a power-delivery professional. The 2005 IEEE PES T and D event allows you as an attendee to build valuable relationships with your colleagues and experts from around the world who are interested in improving their competitive position in today's rapidly evolving electric utility industry.

Student Activity

An integral part of every IEEE PES T and D Conference and Exposition is a special program devoted to the students and their innovative ideas. This year we've set aside an important block of time to recognize the best student papers on any topic related to new developments in power delivery and operations. The winning papers and students will be announced at a special Collegiate

Join the Parade of Technology in New Orleans, LA

Technology Innovation and Service is the Key Driver for the Future

Our theme for the 2005 conference and exposition, Go With the Flow…Join the parade of Technology truly reflects the electric utility industry, and in particular, power delivery as it faces an era of dynamic change. As our theme suggests the boundaries of today's industry and market are becoming increasingly hard to define.

The landscape of today's electric utility is being altered and the traditional operating procedures are continually in review. Many companies realize they can no longer continue with business as usual.

More cost-effective methods of operation are being deployed every day. New tools are increasing work management, productivity and safety. Updated equipment and management techniques are providing more efficient means of power delivery. And utility managers, engineers and operating professionals must learn about every changing aspect of the industry.

The 2005 IEEE PES Transmission and Distribution Conference & Exposition provides attendees with a comprehensive learning experience with presentations at the Opening Session focusing on the major issues of the day. The Opening Session is complemented by four Super Sessions that examine the Valuation of Transmission Assets, The Future of Wind Power, Cyber Security and Reactive Power.

The technical program is being developed through the cooperation of the countless technical committees of the Power Engineering Society.

Technical Program

Providing attendees with information about practical solutions oriented topics is the goal of the conference…included in the schedule of presentations, are highly interactive poster, technical and special panel sessions, tutorials and educational tracks, solution and info sessions and a special student/collegiate segment.

Attendees can participate in and choose from the following:

1. Nearly 200 poster and conference papers written and designed to address every conceivable subject.
2. Panel sessions detailing the latest technological innovations.
3. Educational tracks with university professors lecturing on power engineering advancements.
4. Special panel sessions which deal with current topics of general interest.
5. Info sessions that allow experts to detail the exciting dimensions of their business.
6. Collegiate papers that will be judged by a panel of engineers from industry and high learning.

luncheon on Wednesday, October 12.

Not only will your participation allow you to interact with attendees from around the world, but you will be exposed to the latest innovations and technologies from the most informed manufacturers and product service providers across the broad spectrum of product categories.

From the most advanced IT and automation systems to other related suppliers and service companies—every manufacturer who has something to offer will be at this year's event to introduce and explain their products. We project over 500 exhibitors from around the world will present and exhibit their best technological offerings Remember, your business is their business!

As a means of enhancing your knowledge-building and learning experience in New Orleans we encourage you to register for and attend one of the specially-arranged, in-depth, technical tours of various industrial and commercial centers in the New Orleans area…Lockheed Martin Space Systems—Michoud Operations, Stennis Space Center, a behind the scenes look at the Audubon Aquarium of the Americas, a tour of two facilities within the New Orleans Transmission and Distribution Operations Centers, Entergy Thermal center at the New Orleans Medical Center Complex, the 300 MVAR Static Var Compensator (SVC) at Entergy's Ninemile 230 kV Switchyard and the laser Interferometer Gravitational-wave Observatory (LIGO).

Special Meetings

Two special meetings will take place in the Hilton Riverside Hotel in New Orleans during the time of the 2005 IEEE PES T and D Conference & Exposition. The first, for those t and d professionals interested in learning about the latest in insulated conductor technology, the Insulated Conductor Committee of the IEEE PES will be meeting October 12-14, 2005.

The second, is a scheduled T and D committee meeting on October 13-14. Major issues of concern to the IEEE PES will be discussed. Attendees are invited to the committee meeting where ideas will be put forth that will contribute to the future of the IEEE PES. The meeting will take place in the Hilton Riverside Hotel in New Orleans.

CIGRE Symposium

The symposium, conducted by CIGRE and the IEEE PES is focused on the subject of Congestion Management in a Market Environment, Conducted from October 5-7, the main topics will include: operations, market solutions, system adequacy and IT. This will take place at the Hilton Riverside Hotel in New Orleans. Go to www.cigre.org for more details.

It all begins on Sunday, October 9, with the Riverfront Extravaganza at the Aquarium of the Americas. Attendees will drawn to the wailing of the sirens as our parade departs with two full-size Mardi Gras floats complete with revelers. They will lead the way as our guests strut their stuff to the tune of a 100 piece marching band.

Once at the aquarium, you can enjoy exhibits such as a Caribbean Reef and an Amazon Rainforest, food and beverage…music, from gospel to rhythm and blues, Cajun/Sidecar and New Orleans Style Jazz on the Plaza Stage. And if that isn't enough to get your heart pumping, wander onto the Kohlmeyer lawn to experience a New Orleans favorite: Rock n Dopsie Jr. and the Zydeco Twisters amidst the environment and décor of an authentic Cajun village.

This special evening concludes with a memorable fireworks display over the shimmering mighty Mississippi River and the skyline of New Orleans

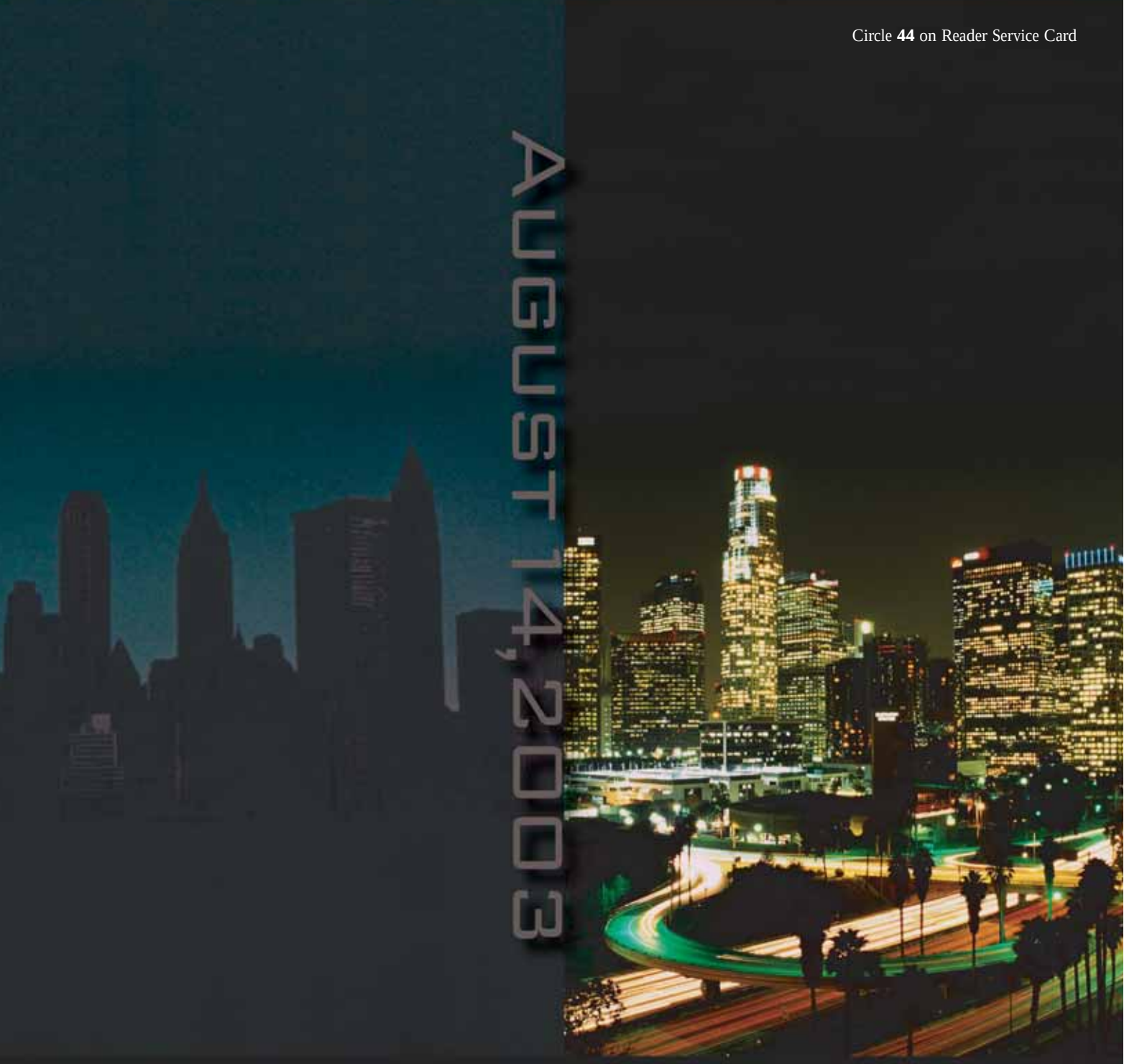
For those attendees who are being accompanied to New Orleans by a companion, entertainment has been arranged with the House of Blues, Houmas House and San Francisco Plantations, a garden City Walking Tour and Cooking Demonstration at the Culinaria, Two Fashion Shows, Louisiana Swamp and Bayou Tour

If you're staying over through the weekend following the conference and exposition, we invite you to experience the thrill and reward of Louisiana salt water fishing. What a day it will be, with a tour of the historic fishing village of Lafitte followed by fishing in some of the Louisiana Bayou's hot spots. We will follow a day on the water with live Cajun Music and a Southern Louisiana fish fry.

The 2005 IEEE PES Transmission and Distribution Conference & Exposition provides the forum for you to engage in substantive discussions of the issues that surround the drive toward increased efficiency and reliability in today's electric utility industry.

The local committee here in New Orleans, our host utility, Entergy and the hundreds of volunteers, who have dedicated their time and effort to the development of a truly unique forum for attendees from all corners of the globe, invite and welcome you to the Big Easy on October 9 – 14, 2005 ■

Tommy Mayne, P.E.
General Chairman
2005 IEEE PES
Transmission and Distribution
Conference and Exposition



WHO DO YOU TRUST?

Schedule of Events *October 9-14*

Please visit our website at www.ieeet-d.org for updates to the event schedule.

Sunday, October 9

6:00 pm-10:00 pm
Conference Reception—A Riverfront Extravaganza at the Aquarium of the Americas

Tutorial Sessions
9:00 am-5:00 pm
What Can Be Done About Reliability?

9:00 am-5:00 pm
Grounding Safety

2:00 pm-4:00 pm
Special Interest Session
Engineering Ethics for Today's Power Engineer

Companion Tours
9:00 am-12:00 pm
House of Blues Gospel Brunch

Monday, October 10

8:00 am-10:00 am
Opening Session

10:00 am-5:00 pm
Exhibition Floors Open

10:00 am-5:00 pm
Poster Sessions
Exhibition Floors, Hall G

1:00 pm-5:00 pm
Panel Sessions
Ernest N. Morial Convention Center Meeting Rooms

2:00 pm-4:00 pm
Super Session 1
Transmission Investment

Technical Tours
1:00 pm-4:30 pm
Michoud Assembly Facility

1:30 pm-4:30 pm
New Orleans Transmission and Distribution Operations Center

1:45 pm-5:15 pm
Static VAR Compensator at Entergy's Ninemile 230-kV Switchyard

2:15 pm-4:15 pm
Audubon Aquarium of America

1:00 pm-3:00 pm
Educational Track

3:15 pm-5:15 pm
Educational Track Continues

Companion Tours
9:00 am-4:00 pm
River Road Plantation Tour—Houmas House and San Francisco Plantations (Lunch served)

Tuesday, October 11

8:00 am-10:00 am
Special Interest Session

10:00 am-6:00 pm
Exhibition Floor Open

4:30 pm-6:00 pm
Networking Reception
Ernest N. Morial Convention Center Exhibit Halls

9:00 am-5:00 pm
Special Short Course
Power Systems Basics for Non-Engineering Professionals

9:00 am-12:00 pm
Super Session 2
Wind Energy

1:00 pm-4:00 pm
Super Session 3
Reactive Power

9:30 am-5:00 pm
Info Session

10:00 am-12:00 pm
Special Interest Session

8:00 am-10:00 am
Educational Track

10:15 am-12:15 pm
Educational Track Continues

1:15 pm-3:15 pm
Educational Track

3:30 pm-5:30 pm
Educational Track Continues

8:00 am-12:30 pm
Technical Panel Sessions

1:00 pm-5:00 pm
Special Interest Session

1:30 pm-3:30 pm
Technical Panel Sessions Continue

Technical Tours
8:00 am-12:00 pm
Stennis Space Center

8:30 am-11:00 am
Entergy Thermal Center

9:00 am-12:00 pm
New Orleans Transmission and Distribution Operations Center

9:15 am-11:15 am
Audubon Aquarium of the Americas

1:00 pm-4:30 pm
Michoud Assembly Facility

1:30 pm-4:30 pm
New Orleans Transmission and Distribution Operations Center

1:45 pm-5:15 pm
Static VAR Compensator at Entergy's 230-kV Switchyard

2:15 pm-4:15 pm
Audubon Aquarium of the Americas

Companion Tours
10:00 am-3:00 pm
Garden District Walking Tour and Cooking Demonstration at Culinaria (Lunch served)

10:30 am-11:30 am
Fashion Show in Companion Hospitality Room

Wednesday, October 12

10:00 am-3:00 pm
Exhibition Floor Open

9:00 am-12:00 pm
Super Session IV
Cyber Security

9:30 am-2:00 pm
Info Session

11:30 am-1:00 pm
Collegiate Luncheon

1:00 pm-3:00 pm
Info Sessions Continue

8:00 am-11:00 am
Educational Track Continues

8:00 am-12:30 pm
Technical Panel Sessions

1:30 pm-3:30 pm
Technical Panel Sessions

11:30 am-1:00 pm
Collegiate Luncheon

2:00 pm-5:00 pm
Closing Ceremony and Reception

Technical Tours
8:00 am-12:00 pm
Stennis Space Center

8:30 am-11:00 am
Entergy Thermal Center

9:00 am-12:00 pm
New Orleans Transmission and Distribution Operations Center

9:15 am-11:15 am
Audubon Aquarium of the Americas

1:15 pm-3:15 pm
Audubon Aquarium of the Americas

Companion Tours
9:00 am-1:00 pm
Louisiana Swamp and Bayou Tour (Lunch served)

9:30 am-10:30 am
Fashion Show in Companion Hospitality Room

Thursday, October 13

8:00 am-2:00 pm
Laser Interferometer Gravitational-Wave Observatory

Special Event
Friday, October 14
5:00 am-6:00 pm
Louisiana Marsh Fishing Excursion

Special Meeting
Wednesday-Friday
October 12-14
Insulated Conductor Committee Meeting
Hilton Riverside Hotel

T&D Committee Meeting
Thursday-Friday
October 13-14
9:00 am-5:00 pm
Hilton Riverside Hotel

Special Meeting
October 5-7
CIGRE/IEEE PES
Congestion Management In a Market Environment
Hilton Riverside Hotel

Conference Highlights

Sunday, October 9
6:00 pm-9:00 pm
Conference Reception
New Orleans Aquarium

Monday, October 10
8:00-10:00 am
Opening Session
Ernest N. Morial Convention Center
Auditorium, 2nd Floor

The opening session of this year's conference and exposition will focus on the major issues confronting the worldwide power-delivery industry today and on the future. Throughout the opening session, expert speakers will offer their perspectives regarding power delivery in the world and its contribution to economic growth worldwide. The keynote address will be presented by a thought leader who will provide opinions and comments you won't want to miss.

Poster Sessions
Monday-Wednesday, October 10-12
(Ongoing)

Participate in the poster session schedule throughout the conference. Sessions topics will include: design, engineering, operations, maintenance and construction of overhead and underground systems, substations and information technology.

Super Sessions
Ernest N. Morial Convention Center
Meeting Room 262, 2nd Floor

Monday, October 10
2:00 pm-4:00 pm

Tuesday, October 11
9:00 am-12:00 pm

Tuesday, October 11
1:00 pm-4:00 pm

Wednesday, October 12
9:00 am-12:00 pm

Scheduled sessions are ***Transmission Investment, Wind Power, Cyber Security and Reactive Power.***

Technical Panel Sessions
(Ongoing)

Tuesday, October 11
8:00 am-12:30 pm and
1:30 pm-3:30 pm

Wednesday, October 12
8:00 am-12:30 pm and
1:30 pm-3:30 pm

Educational Sessions
Ernest N. Morial Convention Center
Meeting Rooms, 2nd Floor

Monday, October 10
1:00 pm-3:00 pm and
3:15 pm-5:15 pm

Tuesday, October 11
8:00 am-10:00 am and
10:15 am-12:15 pm,
1:15 pm-3:15 pm and
3:30 pm-5:30 pm

Wednesday, October 12
8:00 am-11:00 am and
1:30 pm-6:00 pm

Networking Reception
Tuesday, October 11
4:30 pm-6:00 pm
Ernest N. Morial Convention Center
Exhibit Halls

All attendees are invited to this reception where you can renew old acquaintances and establish new ones, and exchange ideas and thoughts about the common problems you now face as a power-delivery professional. Join your colleagues from around the world in an atmosphere of congeniality and purposeful discussion.

IEEE Exhibitors

Company	Booth
360 Training/L&K International Division	3922
3IC	4021
3M Electrical Products	1022
4DataLink	3654
ABB Inc.	1623
ACA Conductor Accessories	2220
Accord Industries Concrete Products	617
Action Manufacturing	960
ADS Composites, Pultrall Div.	2060
Advanced Control Systems	3218
Advanced Power Technologies	3017
Advanced Rubber Products (TMP)	861
Advanced Test Equipment	552
Advantica	4014
AECI Specialty Transformer	2919
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American Polywater Corporation	2426
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Amran Instrument Transformers	1948
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Anderson (Hubbell Power Systems)	1941
Arbiter Systems, Inc.	2124
Arch Wood Protection, Inc.	3849
AREVA T&D	1123
Argillon GmbH	3741
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Arteche /Kuhlman Electric	641
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Atkinson Industries	1241
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Beta Engineering	3231
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CCI	4020
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Central Moloney, Inc.	2631
Centriforce Products	3114
CGIT Westboro, Inc.	1241
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Chance (Hubbell Power Systems)	1941
Christie Digital Systems	3223
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CMC/ESP Utility Products	1155

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Condux International, Inc.	3818
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Cooper Power Systems	3327
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Creative Distribution Automation Co., Ltd.,	2556
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DAQ Electronics Inc.	3549
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Delta Star, Inc.	1049
DeMark	3620
Dexsil Corporation	958
Diagnostic Devices Inc.	317
DigSILENT GmbH	1650
DILO Company, Inc.	2958
Dis-Tran Packaged Substations	1141
Dis-Tran Steel Fabrication LLC	1141
Dis-Tran Steel Pole	1141
Dis-Tran Wood Products	1141
DiversiTech	2219
DMC Designed Metal Connections	2558
Doble Engineering Company	1551
Dongmin Data Systems	4126
Dossert Corporation	416
Dow Chemical Company, The	815
Draka Cableteq USA	860
Dranetz-BMI-Electrotek Concepts	719
DryKeep USA	3016
DSG -Canusa	2854
DTE Energy Technologies	1118
Dulhunty Power	1258
DuPont Company	3555
Dynapower Corporation	2020
Eaton Electrical	1641
ECI Composites Inc.	1951
ECP Tech Services, Inc.	1944
EDM International, Inc.	2751
EFACEC Energia, S.A.	322
Eger Products, Inc.	2718
EHV Power Corporation	452
Ehwa Technologies	4116
Electric Energy T&D Magazine	1758
Electric Motion Company	3121
Electricity Today	816
Electro Industries/Gauge Tech	2317
Electrocon International, Inc.	1620
Electromark Company	3120
ELECTROSWITCH Corporation	2321
EleQuant, Inc.	3256
Elliott Industries, Inc.	531
Elpro International Ltd.	1922
Elspec North America	3416
EMB GmbH	1356
Emco Ltd.	3924
EMEK Elektrik End.A.S.	4047
Empower Electric Software	959
Encomm Co., Ltd.	3420
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EnerNex Corporation	314
Enerscan Engineering Inc.	2058
Enervac Corporation	3258
ENOSERV	3853
ENPAY A.S.	1655
Entec Electric	4122
Entergy Operations Services, Inc.	1455
Environmental Protection Services Inc.	615
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Erickson Air-Crane Inc.	360
ERICO, Inc.	1114

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FieldMetrics, Inc.	1260
Filnor Inc.	2421
FISO Technologies	461
FKI Switchgear	2923
Flakt Coiltech	1257
Foresight Products LLC	3851
Fortune Electric Company, Ltd.	2515
FRAMIT	2223
FreeWave Technologies	660
Fuzhou Cee Installations Co., Ltd.	2658
FWT, Inc.	2356
G&W Electric Company	2541
Gala Thermo Shrink Pvt. Ltd.	4022
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Georg Manufacturing Systems Inc.	2159
Geotek, Inc	3115
Global Power Supply	409
GLP Hi-Tech Power Products	1060
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GridSense, Inc.	649
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Gulfgate Equipment	1517
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H-J International	2431
Haefely	3160
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Hammond Power Solutions Inc.	608
Han Chang Trans	4114
Hanbal Co.	4124
Hanbit EDS	4027
Harger Lightning & Grounding	620
Hastings Hot Line Tools	855
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HDW Electronics, Inc.	707
Heary Bros. Lightning Protection Company	2258
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Hercules Industries	3957
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Korea Electric Power Corporation	4119
Korea Electrotechnology Research Institute (KERI)	1055
Korean Pavilion	4015
Kortick Manufacturing	3156
Krenz and Company Inc.	822
Kuhlman Electric Corporation	641
Kysor Panel Systems	3520
LaMarche Manufacturing Company	3015
Laminated Wood Systems, Inc.	1954
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LAPP Insulator Company LLC	3341
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Megger	2331
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New River Electrical Corporation	554
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Noram SMC. Inc	1353
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North American Wood Pole Coalition	1514
NovaTech, LLC	3515
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OSIsoft	4018
Osmose, Inc.	1827
Osmose Utility Services, Inc.	1149
Ox Creek Energy Association Inc.	3917
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Pacific Synergy International, Inc.	961
Pacs Industries, Inc.	1749
Park Electric Company	1154
Partner Technology Inc (PTI)	3831
Passoni & Villa SpA	3449
Pauwels International N V	3631
PCORE Electric Company	949
Peak Power Engineering	3157
PenCell Plastics, Inc.	1841
Pennington Crossarm Company	1914
PennSummit Tubular	2559
Pennsylvania Transformer Technology, Inc.	3349
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THE STATE OF THE UTILITY VEGETATION MANAGEMENT (UVM) INDUSTRY

Are we ready to comply with new regulatory requirements and expectations?

By Stephen R. Cieslewicz

On August 14th 2003, the United States and Canada experienced the single largest tree-related blackout in our collective history. Front page media coverage, billions of dollars in lost productivity, accidents, fatalities, and fifty-plus million people left in the dark for extended periods of time. In addition to the subsequent utility industry self scrutiny of this event, this incident captured the focused attention of almost every appointed or elected official who had any type of direct and/or indirect authority over utility company maintenance and operations. Simply put, everyone, from the President of the United States and the Prime Minister of Canada, down through all Federal and State/Provincial energy regulatory bodies, wanted to take tangible steps to prevent this from happening again in the future.

One of several locations where on August 14th 2003 a tree related outages contributed to the Northeast Blackout.

While two years may seem like a lot of time since the event, the Utility Vegetation Management (UVM) industry has only recently begun to see the full impact of the post-blackout efforts and inquiries. While it is true that many initiatives occurred shortly after the blackout (new utility reporting requirements to oversight agencies, and more focused attention on UVM programs and in preventing transmission tree related outages) it has only been recently that the industry has begun to see new mandatory UVM requirements being promulgated by various regulatory bodies.

Unlike other utility company functions and activities, the UVM industry has not, for the most part, had to deal with a large amount of regulatory requirements and oversight. Based on our past assessments of applicable UVM laws and regulations, the majority of utilities have simply had to comply with the current NESC Rule 218 requirements. For those not familiar with Rule 218, it generally requires that "trees that interfere with ungrounded supply conductors should be trimmed or removed". The Rule also makes brief references to consideration of sag and sway, addressing crossing lines, and a reference to construction alternatives. While a few individuals may argue otherwise, the Rule is generally interpreted to require utilities to perform a "reasonable" amount of UVM work. It does not specify cycles, clearances, program requirements, performance objectives, or any other type of requirement that would result in meeting specific UVM objectives. In short, it is highly subjective and limited both in its enforceability and efficacy.

While we would argue that utilities have historically done a much better job than the NESC Rule 218 actually required, we fully expect that the bar is about to be raised much higher. Utilities are in fact going to be required to adhere to new and stricter UVM requirements than they have seen in the past, along with seeing a greater level of regulatory scrutiny. And to be certain, these new requirements and oversight will call for utilities to devote more attention and resources to the important task of keeping vegetation from conflicting with energized lines.

What can we expect?

The latest and likely most influential new UVM requirements are those presently being considered for adoption by the North American Electric Reliability Council (NERC). These new requirements will impact, to varying degrees, each and every transmission UVM operation working under the aegis of NERC. In brief, the new NERC UVM requirements include:

1. New UVM reporting requirements for all tree/vegetation related outages
2. New standard program requirements for all Transmission UVM programs
   a. Development of formal annual UVM plans
   b. Program and employee qualifications and requirements
   c. Self certification and audits of compliance
3. New mandatory clearance requirements to be achieved and maintained between trees/vegetation and energized transmission lines
   a. Clearances to be achieved at time of work will be determined by the utility
   b. Clearances to be maintained are mandatory

New rules and regulations will soon impact transmission UVM programs

Based on our past UVM benchmarking with over 55 utility companies in North America, the number 1 and 2 requirements should not be overly burdensome for most utilities. Yes, some utilities will need to develop more structured programs but most utilities should be able to comply given a reasonable effort and the support of utility management. The truly dramatic changes to UVM programs will result from efforts to comply with the mandatory clearance requirements found in requirement 3. A mandatory clearance requirement is exactly what the name suggests. No vegetation can grow within specific distances adjacent to energized lines. In the case of this new NERC requirement, the absolute minimum clearances (see b above) are based on flash-over distances found in the Institute of Electrical and Electronics Engineers (IEEE) Standard 516-2003 (Guide for Maintenance Methods on Energized Power Lines) and as specified in its Section 4.2.2.3, Minimum Air Insulation Distances Without Tools in the

Air Gap. The thought process behind these clearances is quite simple. If utilities keep all vegetation out of these required "minimum" clearance zones, there should be no growth related outages on any transmission circuit.

While the concept sounds relatively straight-forward, (keep the trees from growing

New NERC standards include mandatory clearances that must be maintained between transmission lines and all vegetation

into close proximity to all the lines) not very many utilities have actually had any experience in achieving these types of clearances for any period of time. For the less than 10% of utilities that have complied with mandatory clearances in the past, they will all tell you it is not an easy undertaking. Mandatory clearance requirements require new and improved scheduling requirements, significantly increased UVM budgets, shortened inspection cycles, and a great deal more effort and resources devoted to the task of keeping vegetation away from the lines.

To understand the impacts that a new UVM requirement can have, one need only look to what happened to California utilities several years ago when the Public Utility Commission adopted mandatory clearances for transmission and distribution high-voltage lines. Here are a few highlights:

- California utilities have had to triple their UVM budgets to comply with mandatory clearance requirements - this also reflects current funding levels (it was not a one time expense)
- California utilities generally utilize an annual UVM cycle on transmission and distribution lines as opposed to the industry average range of 3.5 to 4.5 years
- California utilities necessarily spend significantly more time and money on pre-inspection, post-auditing, and quality assurance programs than other utilities.

The point in the preceding is to illustrate that complying with a new mandatory clearance requirements is not as intuitive or as simple as one may think. It is also much costlier than you might ever imagine. Here is an example to think about. We know, based on our benchmarking, that utilities across North America (excluding California) have approximately 30% of their trees in contact with high-voltage distribution lines at any given moment in time. Given that statistic, how would you answer the following 2 questions?

- What percentage would you have to increase your budget in order to get 100% of your trees in compliance with a mandatory clearance requirement?
- How much of an increase would you need long-term to maintain those clearances?

As best we can tell, the actual answers are identical to what California utilities experienced. You would likely need to triple your budgets for the long-term. Their experience has shown that in order to get "the last 30%" you need to exponentially increase your patrols, your travel time, and alter your pruning and removal criteria and work to achieve a level three times greater than you are currently doing. Don't believe me? Call someone at SCE, PG&E or SDG&E.

Fortunately, it is unlikely you will have to triple your entire budget (at least in the near future). The new NERC requirements will only require that

you maintain clearances between vegetation and conductors energized at transmission voltages. And, as most utilities recognize, the majority of transmission corridors are already in much better shape (regarding clearances) than are the distribution circuits. However, these new requirements will have an impact, in one way or another, on every utility that maintains vegetation adjacent to transmission facilities.

Distribution UVM - This is not just a Transmission Issue

A While it is correct to suggest that the Northeast Blackout was principally related to transmission issues, don't assume that Distribution UVM operations will be exempt from resulting new requirements and/or increased regulatory scrutiny. Quite the opposite seems to be happening.

As we all well know, tree and power line conflicts are not limited to transmission lines. In fact, trees have always represented the single greatest threat to electric service reliability on the majority of distribution systems in North America. This fact, coupled with the notoriety of the northeast blackout has led several states to also take a hard look at distribution UVM operations within their own jurisdiction. For example, shortly after the northeast blackout the Governor of Illinois commissioned a study to look at all aspects of the outage, and how they specifically related to the State. One of the many resulting recommendations was the need to strengthen current UVM requirements on the distribution side of the house. And to be sure, Illinois was not alone. Several other states, principally along the eastern seaboard, also began to take a look at distribution UVM programs. In our routine tracking of UVM-related legal and regulatory initiatives, we have noticed a recent increase in attention being paid to tree and power line issues.

The likelihood of new distribution UVM regulations and requirements is further evidenced by the actions of groups such as the National Association of Regulatory Commissioners (NARUC). Anyone who has been monitoring the post-blackout investigations and initiatives knows full well that NARUC has been actively involved in almost every UVM related issue. This included helping develop and author FERC's UVM report to Congress on September 7th, 2004, and in adopting their own UVM-specific resolution two months afterwards.

It appears that in the process of investigating the causes and issues surrounding the Northeast Blackout, regulators have seen a connection between transmission and distribution systems. In other words, if they can come up with requirements that will reduce the likelihood of transmission outages, why can't they do the same for the distribution side of the house?

Distribution lines may soon be subject to new UVM regulations and requirements

We are convinced that it is not an issue of whether or not we will see changes to current distribution UVM requirements; it is a question of what will they look like and when will they be promulgated.

So What Should We Do About New UVM requirements?

For starters, utilities should become very familiar with the new UVM requirements that are being promulgated by NERC. This will be the dominant requirement for all transmission UVM programs moving forward. You can download a copy here: http://www.nerc.com/~filez/standards/Vegetation-Management.html

Once utilities are familiar with the new requirements they should be evaluating their UVM programs to identify exactly what needs to be adjusted in order to comply with any new requirements. For starters, this evaluation should include:

1. Quantifying your workload: Do you know with certainty, exactly how much work you need to do in order to comply with any new requirements?
2. Evaluate your current resource assumptions: Will you need to add resources in order to comply with new requirements?
3. Evaluate current scheduling assumptions: Will your current method of scheduling required work satisfy new requirements?
4. Evaluate compliance and quality assurance processes: How will you know if you are in compliance?

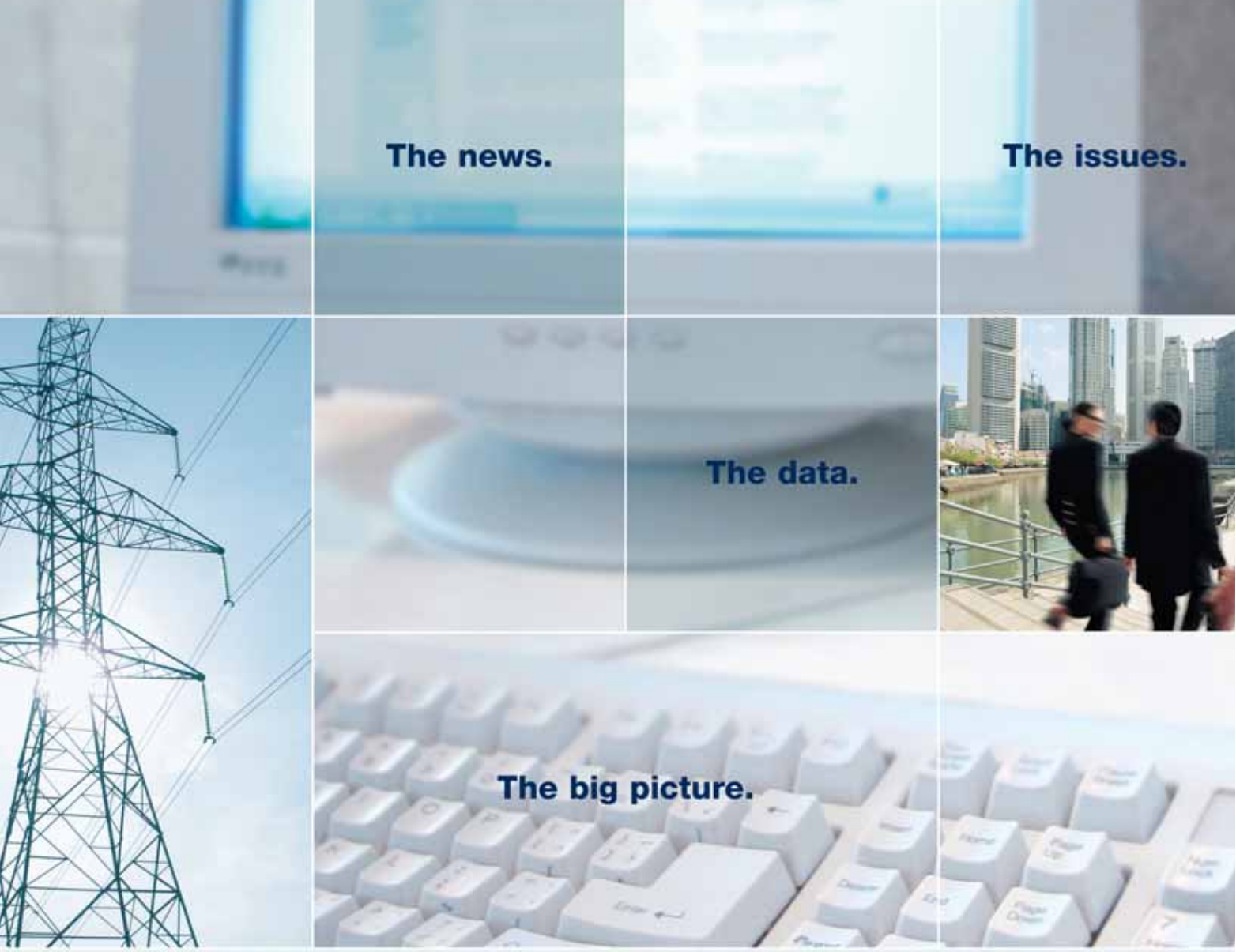
You may also consider talking to others in the industry to see how they plan on complying with the new requirements. A few phone calls may save you a great deal of frustration down the road.

In addition to preparing for the latest national transmission requirements, utilities should be paying equal attention to the possibility that new and unique regulations for distribution UVM operations will appear on a state by state basis. If and when they are identified, utilities should become actively involved in the entire process. This would include evaluating the actual need for new requirements and, if necessary, helping to craft workable provisions for the final regulations. Far too often utilities have simply waited until the new rules have been promulgated, rather than providing effective input during the entire process.

In summation, it is very probable that the UVM industry is on the verge of seeing a great deal more scrutiny and regulation than they have become accustomed to in the past. The Northeast Blackout has made this inevitable for transmission operations and also very likely on the distribution side of the business. The level of impact any new requirements will have on a UVM program is relative to each specific utility. To some utilities these new requirements will not create any dramatic changes, whereas some utilities will require significant changes and considerable investments of new resources.

It is probably best to close with a simple statement (and awful epigram) that I recently overheard being made by a state regulator. "The current utility tree clearing requirements are simply not cutting it." ■

Stephen R. Cieslewicz is currently President of CN Utility Consulting and has over 20 years of experience in the Utility Vegetation Management (UVM) industry. He was one of the Principal UVM investigators for the Federal Energy Regulatory Commission (in support of the federal investigation of the August 14th, 2003 Northeast Blackout) and has co-authored several of the resulting official reports. His firm works with utility companies, regulators, and industry service providers on all issues/projects related to UVM.
Steve@cnutility.com



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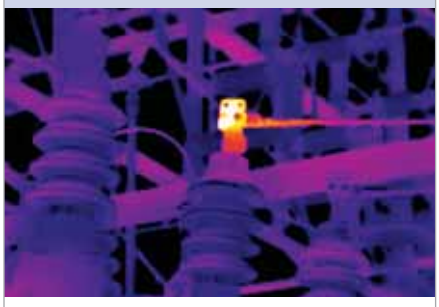
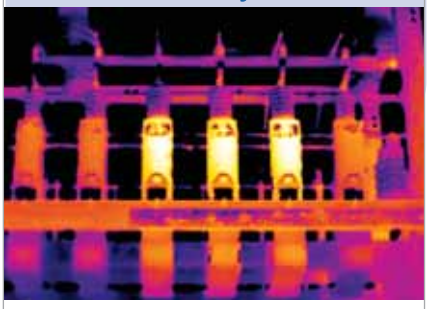


Using infrared scanning to check the incoming power at a substation revealed an overheating bushing connection. The maintenance crew discovered a fault at the transformer feed not visible to the naked eye.

With an actual power outage, production losses would have been $200,000-$300,000.

$300,000 savings

Inspect outdoor electrical systems

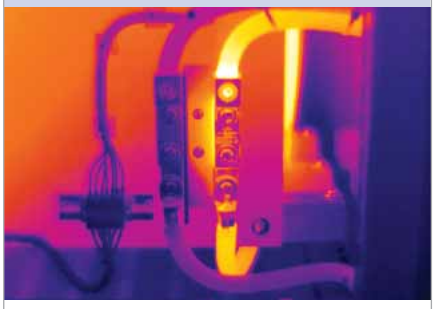


At a large public electric utility, a routine thermographic survey indicated one of the output filter capacitors of a station battery charger was considerably hotter than the others. As a result, the capacitor in question was tested and failed.

Replacement of the failing capacitor avoided an outage, which would have cost an estimated $500,000.

$500,000 savings

Evaluate new equipment installations



During an incoming inspection of a new piece of equipment, an infrared scan detected a loose connection to an important bypass switch. The faulty switch could have exposed both workers and the company to severe safety hazards and corporate liability.

Had it not been inspected with infrared, this problem would have resulted in major losses in revenue of $50,000-$100,000.

$100,000 savings

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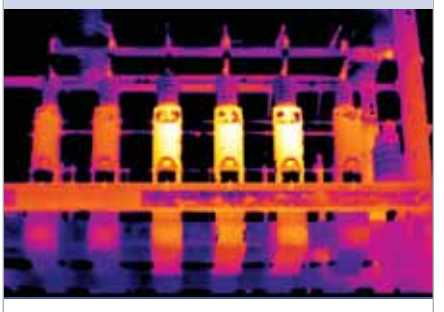

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Round Wood & Laminated Wood Poles Insure Stable Supply

By: Sid Kamprath (LWS)

Round Wood & Laminated Wood Poles Insure Stable Supply

The past several years have brought many changes to the North American Electric Utility industry. A historic rise in steel prices, skyrocketing energy costs and an increase in T&D construction, have put an significantly greater demand on the North American round wood pole supply. Round wood pole suppliers say that while there is not a shortage of supply, the increased demand has caused lead times to become greater, anywhere from 12 weeks to 12 months, depending on the pole class, length and species.

These changes in the industry have also created new opportunities for laminated wood poles to be used to supplement round wood poles on more and more projects.

Historically, engineered laminated wood poles have been used primarily in unguyed angle applications as an alternative to steel and concrete

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construction. For many years laminated wood poles have also been available in class-equivalent, tangent sizes as well. The increased prices of steel and the long lead times of some round wood poles have made laminates very cost competitive today for use in tangent applications. One Canadian round wood pole supplier, Bell Lumber & Pole Co., (Carseland, Alberta), has recently worked with Laminated Wood Systems Inc., (Seward, Nebraska) to supplement class-equivalent poles on projects they have been asked to bid. Following are three recent projects that Bell and LWS have worked together on to supply the poles needed for construction.

Case 1- Sask Power will be constructing a 138kV transmission line in Pelican Narrows, Saskatchewan near the Manitoba border (north of the 55th parallel). Due to the location of this line the lead time of the material was crucial, because there is a limited window of opportunity for construction this far north in the province. The project requires a total of 825 poles, ranging in size from 60-85 ft, class 4 to H1, Western Red Cedar. Bell had the ability to supply smaller sizes, but due to long lead times and rising prices, Bell chose to offer laminated wood poles as an alternative to cedar poles. Working with Bell, Laminated Wood Systems, Inc. (LWS), was able

to make up the balance and supply 184 laminated wood poles, ranging in class and size from 4 to 2, 75' to 85' in length. The laminated wood poles were able to be delivered within 6 weeks.

Case 2- TransAlta - The North Alberta tar sands near Ft. McMurray hold millions of barrels of crude oil. Extracting that energy resource requires the forcing of steam into the sand in order to liquefy the oil. In the past the steam was allowed to escape into the air but now is being re-claimed and is powering turbines that generate electricity. TransAlta is constructing a new 138KV line in this area requiring 65 poles ranging in size from 60' – 115'. Bell was able to supply the smaller poles within the desired lead time and supplemented the larger sizes with laminates. Working with Bell, LWS supplied 31 engineered laminated wood poles ranging in size from 100'- 115' within 6 weeks.

Case 3 - SNC Lavalin/AltaLink - Although a much smaller project than Sask Power & TransAlta, this project required two fairly long poles, one 151' and one 161'. Two existing 240KV lattice towers along a highway exit ramp needed to be replaced by mono-poles in order to reduce the right of way footprint since the line was also close to a recreational trail. The structure change out also needed to be done energized, so safety was of utmost concern.

Steel monopoles were considered initially, but long lead times, price and safety concerns ruled them out since the utility considers wood poles to be less dangerous when doing live change outs.

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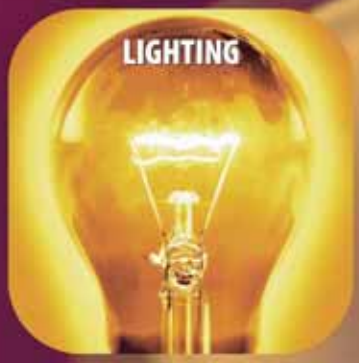

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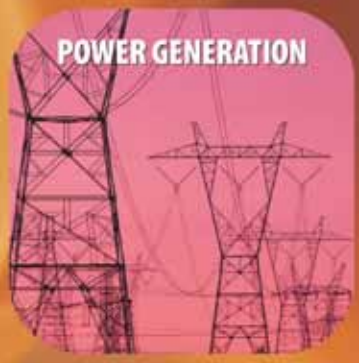
of visitors came to see companies in the power generation and T&D sectors



71%
of exhibitors stated that Middle East Electricity was better than any comparable industry event

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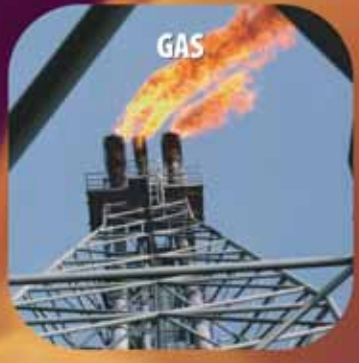

3,600
industry professionals came to meet companies specific to the gas sector

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industry professionals came to meet companies specific to new and renewable energy

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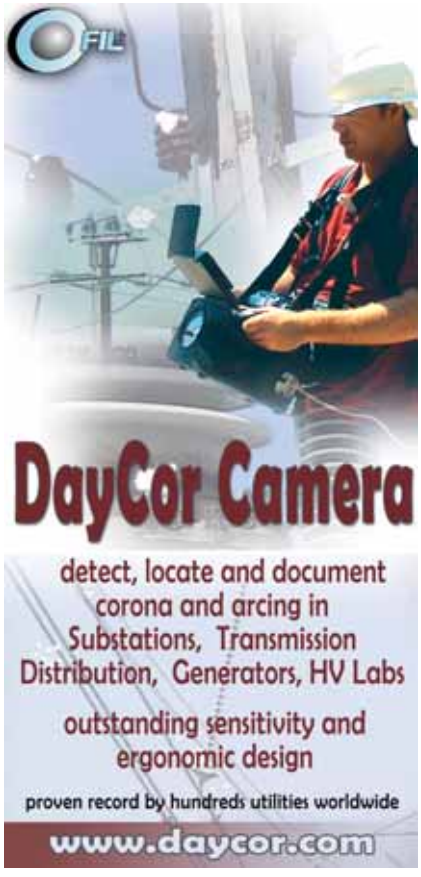

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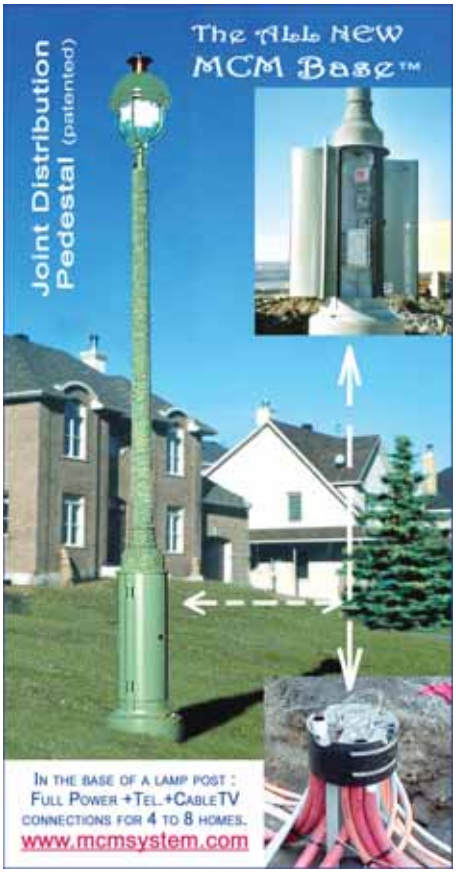

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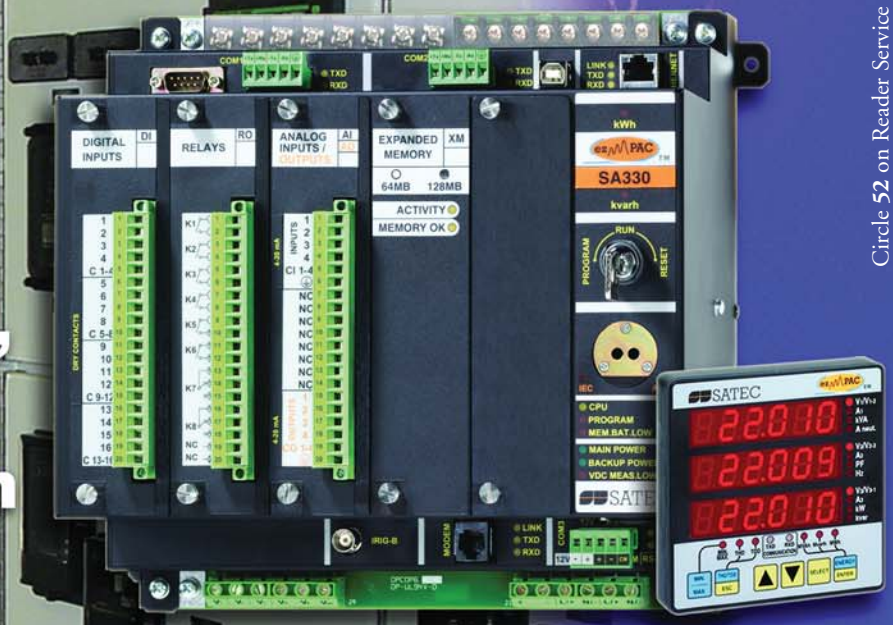

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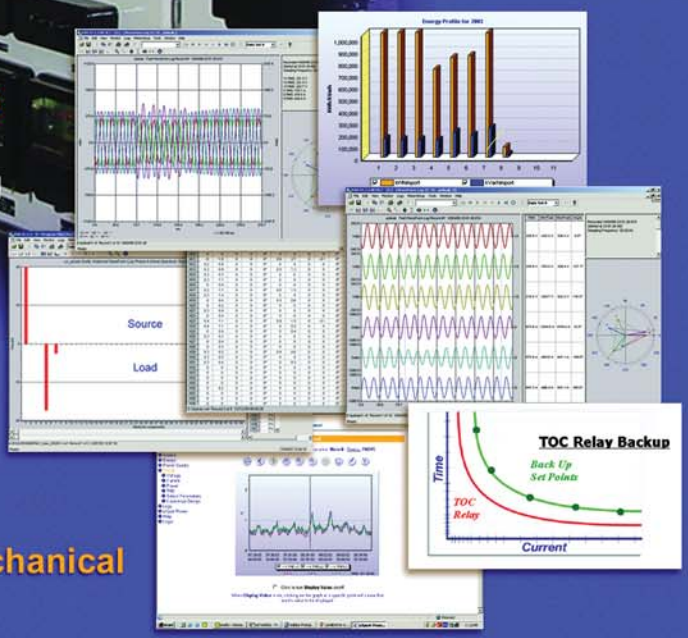

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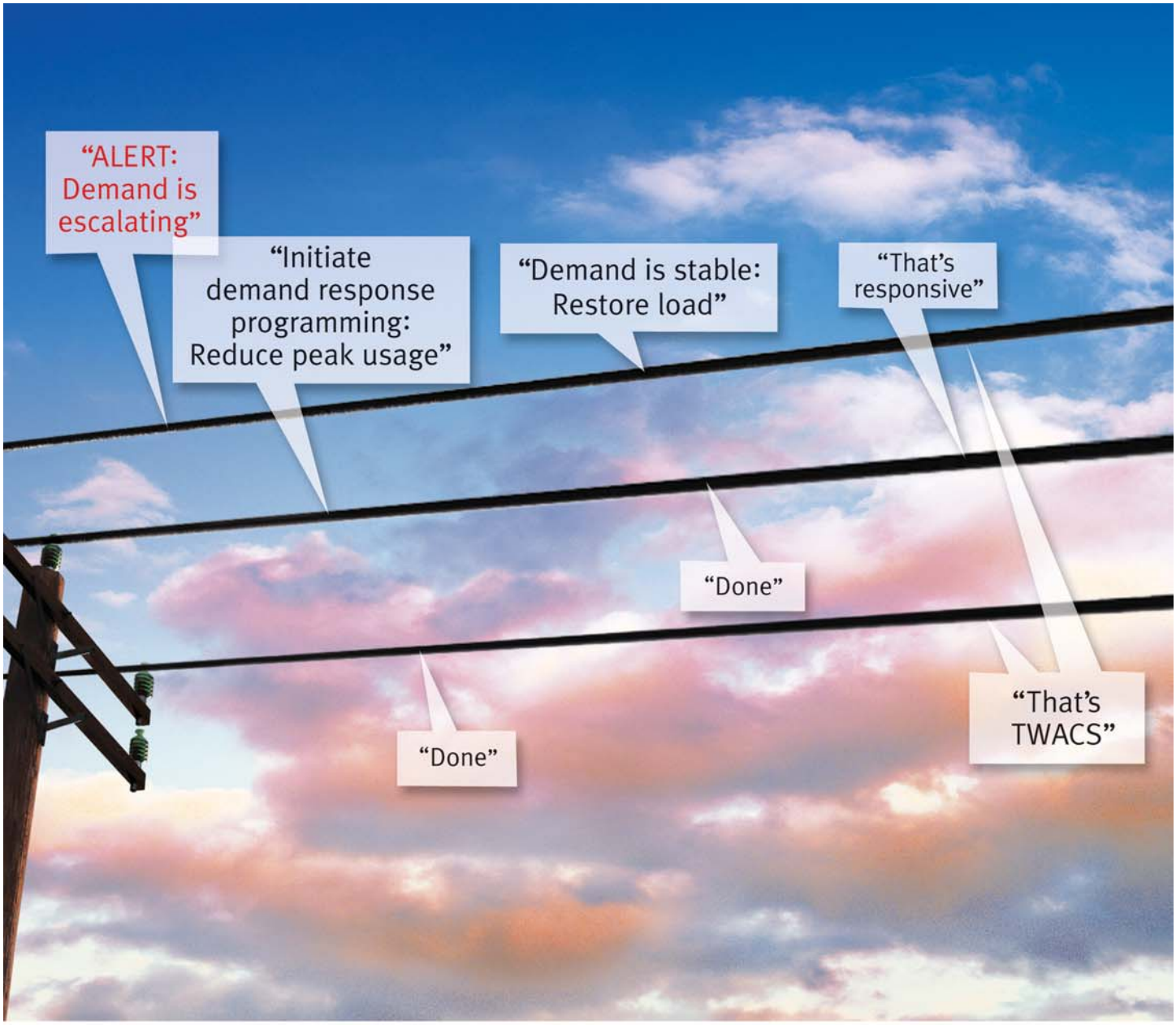

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