Electric Energy T&D MAGAZINE

In this Issue

The August Blackout: Moving Forward on Investment

Volume 7, No. 6 www.electricenergyonline.com November-December 2003 Issue

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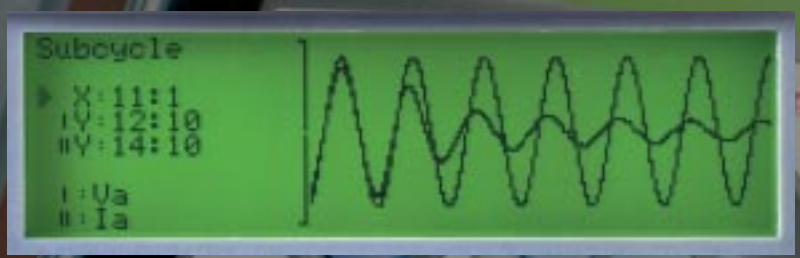

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Cover Page Photo:
Provided by Baltimore Gas & Electric (BGE) *Picture taken after Hurricane Isabel*

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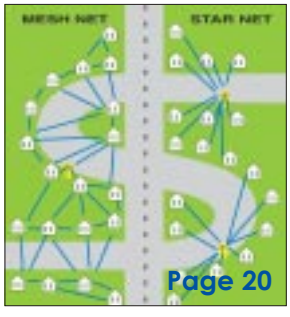

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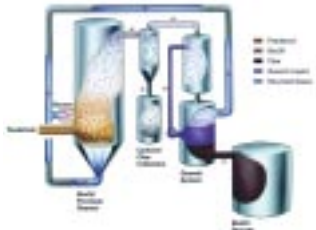
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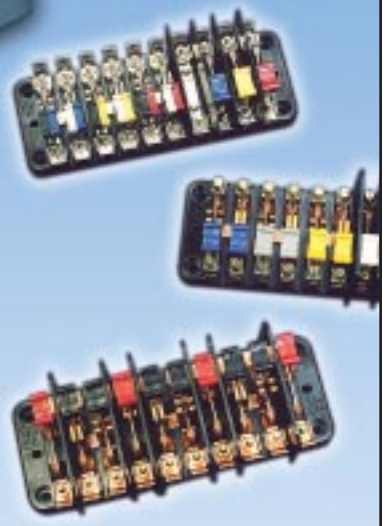

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The August Blackout: *Moving Forward on Investment*

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

The August 14 blackout in Ontario and eight Eastern U.S. states was a historic event, a disaster that hasn't happened on this scale for decades. While there was much discussion on the root cause, it is clear we experienced a major systemic breakdown in our response. Transmission lines are knocked out of service on a fairly regular basis in North America – a reality of the electricity business. But what could have been the cause of the cascading blackout that affected some 50 million people? This is the question being addressed by the bi-national task force announced by U.S. Energy Secretary Abraham and Canadian Natural Resources Minister Dhaliwal.

The good news with respect to the process embarked upon is that the expertise of the North American Electric Reliability Council (NERC) is being integrated into the fact-finding mission. NERC is poring through the records of over 10,000 discrete system events to determine what really happened. And no useful conclusions can be drawn before the facts are established and more importantly, understood.

Once we have a clear picture of what happened and why, we can set about fixing the problem. Action on many fronts is likely to be required, including both short-term and longer-term initiatives. In the short term, making sure this sort of event doesn't happen again soon is job one. Making sure it is unlikely to occur again for a long time to come – or ever – is job two and more fundamental in nature.

It is clear, however, that the system was successful in protecting equipment and making possible a rapid restart of the system. This was the first major widespread failure in the Eastern Interconnection in 38 years – not an altogether bad record. However, there is a growing consensus that the transmission system needs substantial investment, as indeed do our distribution and generation assets.

Modernization of the electricity system will not be a cheap or easy process – the total cost being open to debate. EPRI estimates it would cost $10 billion a year for 10 years to update the U.S. portion of the transmission system alone. Another consulting firm, R.J. Rudden, predicts the cost would be between $30 and $50 billion. By their analysis, this manageable cost would add between $50 to $125 to the average residential customer's bill over five years, or less than one percent a year. Given that some estimates of the annual cost of outages in the U.S. total $100 billion, this looks like a worthwhile investment.

The challenge is how to ensure those investments are indeed made. CEA has been advising decision-makers in Ottawa and Washington on what steps could be taken to facilitate these needed investments. There is a growing concern that the absence of a coherent and shared energy policy perspective has led to a sense of complacency about the electricity sector's ability to continue to deliver on its historic mission: providing North American customers with a vital service and key economic advantage. Recent events have underscored the message that we must re-examine the current state of the electricity system and put the conditions in place for the 21st century version of our past success.

From a Canadian perspective, looking at electricity supply and demand over the next 20 years, already tight supply/demand balances in several regions are likely to be exacerbated. Unless there is significant new investment in generation, transmission, and distribution, more comfortable margins elsewhere will also disappear. Moving forward will require a common agenda by government and industry that builds on our diverse and flexible supply mix, with no conventional or emerging technology excluded, our robust transmission and distribution systems, and demand-side management and related energy efficiency strategies.

Once the worst was over following the August blackout, CEA began engaging various players concerning the long-term needs of the industry to ensure reliability, and sharpened our messages into a five-point plan. Moving forward, governments and industry need to cooperate to develop and implement a common agenda that focuses on creating a reliable and secure supply of electricity.

1. Establishing an Investment Climate to Ensure Future Electricity Supply

There is an urgent need to ensure improved tax depreciation rates through higher and more realistic Capital Cost Allowances (CCA) rates for generation, transmission and distribution assets. As well, there needs to be adequate rates of return on capital investments for regulated assets. Both of these issues impact the ability of the industry to access capital needed for investment.

2. Moving Government and Industry towards Smart and Effective Regulation

CEA believes that moving to smart, effective and timely regulation for generation, transmission and distribution projects will help bring new projects on-line by shortening project timelines and making approval processes more transparent and predictable. How can we hope to meet the needs of electricity customers when, in some cases, project review and approval processes can take a decade or longer? It is not suggested that these reviews be eliminated. On the contrary, these processes are a vital step in understanding the potential impacts of projects, and ensuring the appropriate remedial actions are taken. The issue is with how these reviews are conducted and the timelines involved. Greater transparency, predictability and a more cooperative approach is required.

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3. Working to Ensure a Sustainable Future for the Next Generation

Environmental and climate change actions must be undertaken in conjunction with an overarching energy policy framework to ensure industry obligations are realistic, balanced and equitable. Long-term climate change policies must recognize the North American nature of the electricity sector and factor current and future technological options available during the current Kyoto commitment period (2008-2012) and beyond.

4. Fostering Innovation and Accelerating Skills Development

We need to work aggressively to encourage the adoption of energy efficiency, automated distribution technologies and alternative energy generation, and key climate change initiatives, that provide the opportunity for technological leadership. CEA has been studying all of these approaches, and while each involves challenges, we see great potential and will continue to pursue policies that will lead to greater use of energy efficiency programs, result in greater penetration of automated distribution technologies, and allow for alternative generation to make a significant contribution to our future energy needs. We also need to gain a deeper understanding of the future human resource needs of the electricity industry – at a time when the extremely specialized workforce in the industry is aging, and the skill sets are changing. And we must continue and accelerate government/industry collaboration on the development of clean coal technologies.

5. Strengthening our North American Institutional Arrangements

North America has changed a great deal in the past two decades. The NAFTA agreement recognized that we share not simply geography, but an economic space as well. In this post-NAFTA era, we have seen the benefits of this shared geographic and economic space. The same dichotomy applies to electricity.

Canadian companies are active in emerging North American regional transmission organizations (RTO) as well in the NERC. CEA has been and continues to be unequivocal in its support of the reliability language in the draft Energy Bills before the U.S. Congress. We support the creation of mandatory reliability standards by providing regulatory backstop to NERC. And in this post 9-11 world, security is of primary importance to CEA and its members. We have a coordinated approach to critical infrastructure protection and we work closely with Canadian and North American critical infrastructure agencies, and in particular with NERC

A number of observers have remarked that "when the lights went out in Ontario and New York, the light went on in Ottawa and Washington." Given the urgent need to address future electricity needs, CEA sincerely hopes that the attention currently given to long-term reliability results in the sorts of policy and regulatory changes we have been advocating. ■

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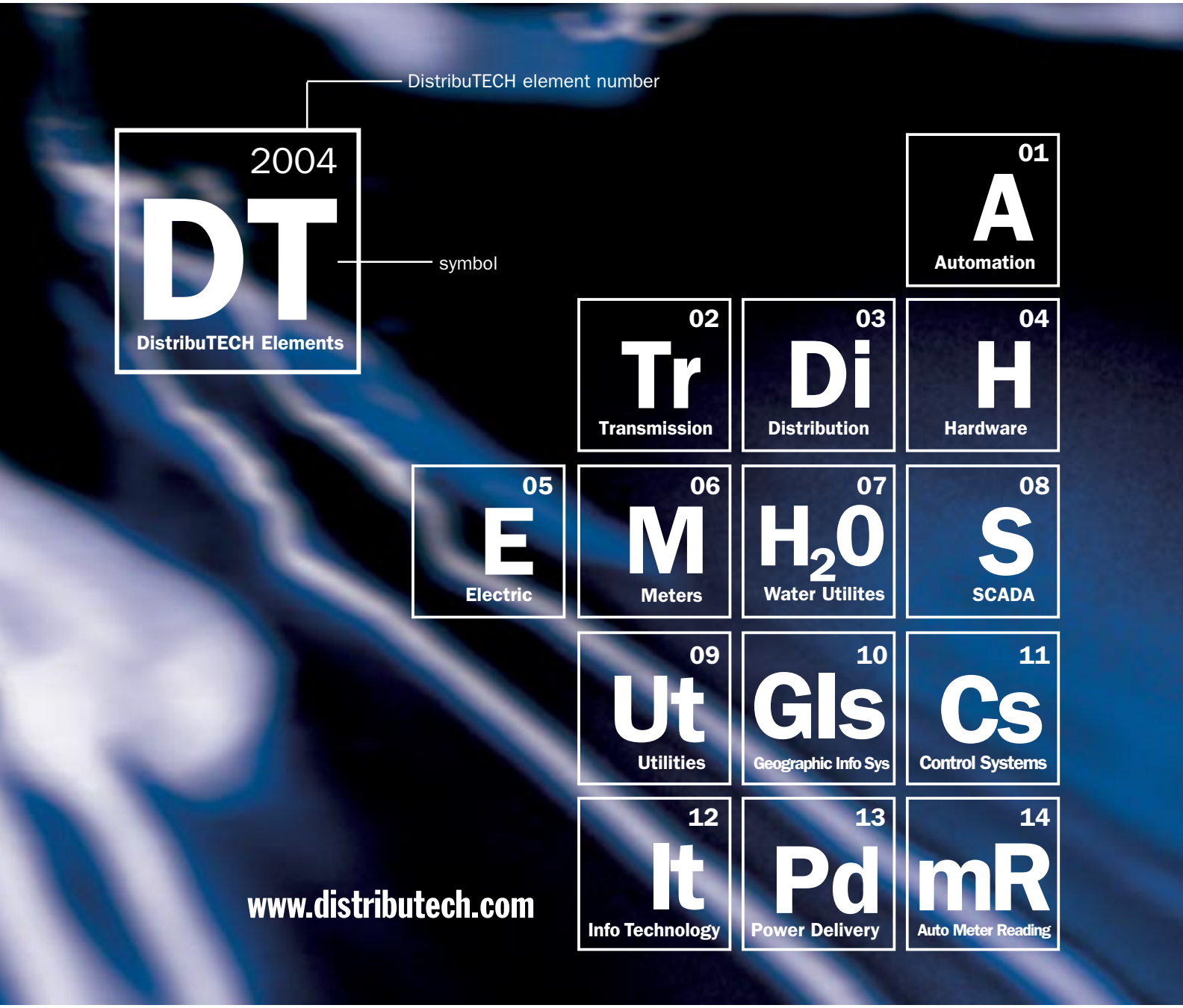

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Industry News

FCI Annouces New Burndy® Unirap™ Cable Ties

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FCI-BURNDY Products, a leading connector manufacturer and provider of OEM solutions to the industrial, energy, and automotive industries, has expanded and improved its BURNDY® UNIRAP™ line of cable ties. The new BURNDY® Cable Ties include Tefxel and Halar ties, aerial support spacer ties, identification ties, Velcro ties, mounting bases, tools and ties for military applications. This line features a new catalog numbering system, lower prices, and new packaging – all designed to simplify the selection and ordering processes.

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About FCI-BURNDY Products

FCI-BURNDY Products, located in Manchester, NH, is the second largest connector manufacturer in the world, and provides reliable connection systems and solutions to the telecommunications, data, industrial and instrumentation, energy, automotive, and military/aerospace industries. For additional information contact FCI at 47 East Industrial Park Drive, Manchester, NH, 03109, visit the website www.fciconnect.com. ●

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Joint Electric Utility - Conservation Group Effort is For the Birds

In any discussion about birds and power lines, the conversation often focuses on how deadly the electric equipment can be for the birds both from an electrocution and collision perspective. However, the power poles and lines also serve an important function for eagles, falcons, hawks, and owls, as well as other migratory birds. The equipment offers places from which the birds, especially raptors, can establish territorial boundaries, hunt, rest, feed, find shade, or sun themselves. And where birds use the power poles for nests, efforts are made to create alternate nesting platforms.

In a voluntary effort, the electric utility industry and US Fish and Wildlife Service (FWS) are working together through the Avian Power Line Interaction Committee (APLIC) to minimize the electrocution and collision risk to birds.

APLIC was formed in 1989 as a partnership involving the US Fish and Wildlife Service, Edison Electric Institute, the National Audubon Society, and 10 electric utilities to evaluate whooping crane collisions with power lines in the Rocky Mountains. Today, APLIC membership has grown to include 18 shareholder-owned utilities, FWS, Edison Electric Institute, the National Rural Electric Cooperative Association, the Electric Power Research Institute, Bonneville Power Administration and Western Area Power Administration.

APLIC sponsors short courses, funds research, offers a Web site, and produces educational materials on protecting birds and improving energy delivery. APLIC is now working with the FWS to develop voluntary guidelines for protecting birds from electrocutions and collisions with power lines. The new guidelines will give electric utilities a framework to use in developing voluntary Avian Protection Plans (APP), tailored to their specific operations.

The APP guidance document, which is being prepared by the FWS and APLIC, will reference the latest industry standards for preventing avian interactions with power lines, including recommendations from the most current editions of APLIC's "Suggested Practices for Raptor Protection on Power Lines" and "Mitigating Bird Collisions with Power Lines". The APP guidelines will be available on websites in early 2004.

This voluntary approach protects birds through industry and agency cooperation, rather than through mandatory one-size-fits-all agreements. Utility customers expect reliable energy supplies, and the public expects the FWS to protect the nation's trust wildlife resources. The collaborative work on voluntary guidelines for developing Avian Protection Plans should help reduce risks to birds, enhance energy delivery, and cut costs for electric utilities.

The APP guidelines, such as those already published by the FWS for the communication tower (2000) and wind turbine (2003) industries, outline practical and in most cases, scientifically-tested ways to protect birds. Similar recommendations are under development by FWS for the sport and commercial fishing industries to reduce bird bycatch.

PacifiCorp has had a bird management program in the northwestern U.S. for over 15 years that focuses on eagles, osprey, and other birds of prey. Company distribution line construction standards require that new or rebuilt lines in rural areas be built using raptor-friendly specifications that provide at least 60 inches of clearance between conductive and grounded parts. The program also includes reactive and proactive components. Where feasible, poles where protected birds have been killed are modified and lines in high raptor use areas are evaluated to assess risk.

If you are interested in learning more about the management approaches and techniques to minimize conflicts between birds and electrical facilities, please contact Rick Loughery at Edison Electric Institute, rloughery@eei.org. Additional information on APLIC and its course Avian Interactions with Power Line: An Overview of Laws, Mitigation Strategies, and Techniques for the Protection of Avian Species can be found at www.aplic.org. Rick can also provide information about individual power company programs to reduce risk to raptors and other protected birds.

Should you have specific questions about FWS involvement, please contact Kevin Garlick, Kevin_Garlick@fws.gov, or Al Manville ●

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Industry News

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For more information on the new PSCAD Version 4, please visit www.pscad.com or email pscadv4@pscad.com. ●
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Con Edison Named Most Reliable Utility in North America

NEW YORK, PRNewswire-FirstCall/— Consolidated Edison Company of New York, Inc. (Con Edison) has been named the most reliable electric utility in North America for the second year in a row by PA Consulting Group, an international consultant, which presented the company with its National Achievement Award for "sustained leadership and achievement in the area of electric reliability."

"Con Edison's 13,000 employees are the foundation of our electrical system's reliability," said Kevin Burke, president and chief operating officer of Con Edison. "PA Consulting's recognition of their professionalism is a tribute to our men and women who ensure New Yorkers receive the highest levels of service."

The company's reliability is approximately nine times better than the national average. Con Edison, more than 175 years old, received the ReliabilityOne award during a ceremony October 29 in Orlando, Florida.

Con Edison is a subsidiary of Consolidated Edison Inc. [NYSE: ED], one of the nation's largest investor-owned energy companies, with $9 billion in annual revenues and approximately $19 billion in assets. The utility provides electricity, gas and steam service to more than 3 million customers in New York City and Westchester County, New York. For additional financial, operations and customer service information, visit Con Edison's Web Site at www.coned.com. ●
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CONTACT: Michael Clendenin of Con Edison
Web site: http://www.coned.com

GE to Supply Ten Wind Turbines for Inner Mongolia Project

ATLANTA, GEORGIA - GE Wind Energy announced today it will supply ten of its 1.5-megawatt wind turbines for the 15-megawatt Huitengxile Wind Power Plant of Inner Mongolia, People's Republic of China.

The project will feature the largest wind turbines and the most advanced technology installed to date for a wind project in China. In addition to the wind turbines, GE will supply technical advisory support for installation and commissioning, as well as service and technical support for the project.

"We see this project as a milestone for GE as well as for China where interest in harnessing the clean energy of the wind is growing," said Steve Zwolinski, president of GE Wind Energy, a unit of GE Power Systems. "We are committed to our customers in China and to the success of this project, and look forward to future opportunities to support China's goal to bring 20 gigawatts of new renewable energy capacity on-line by the year 2020."

About GE Power Systems

GE Power Systems (www.gepower.com) is one of the world's leading suppliers of power generation technology, energy services and management systems with 2002 revenues of nearly $23 billion. Based in Atlanta, Georgia, GE Power Systems provides equipment, service and management solutions across the power generation, oil and gas, distributed power and energy rental industries. ●
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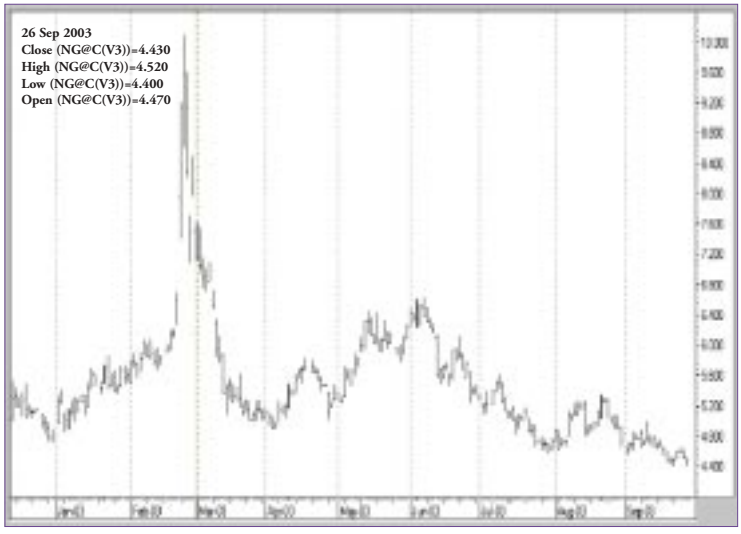
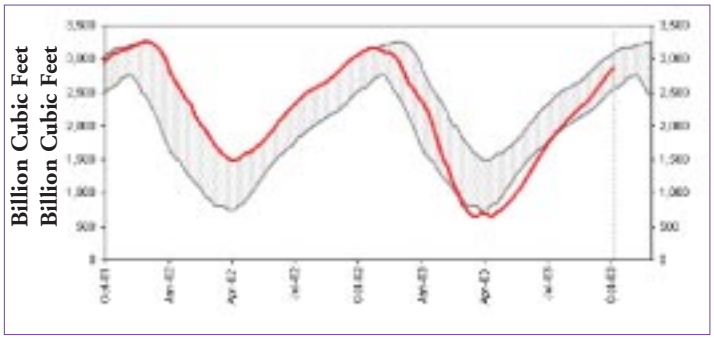
By:
Peter Bryant
President
TBC Consolidated Fuels

Energy Strategies for 2004

In order to examine the current state of energy supply in the coming year of 2004, we first need to take a look at the issues and trends of 2003 to illustrate where the industry is today. Some would say the year 2003 was one of communication mistakes and misinformation.

Throughout the volatile markets of 2003, we have heard industry analysts discuss the usual storage issues, forecasting the depletion of our natural gas supply and the limited amount of gas that would be available for storage toward the end of the year. Despite these claims, we have seen increased production in the third quarter, record injection levels into storage and an overall increase in the number of available oil wells. This has resulted in pricing levels not seen since early December 2002. Today, we have prices still trending lower, and we have adequate amounts of natural gas in storage for this fall.





During the third quarter of this year, we have stayed on track with our natural resources due to a slight drop in demand, and energy supply has not truly been an issue for 2003 – however, we are not completely out of the woods. The future of energy prices will rely upon a number of factors such as an increase in demand or a general shake-out of the financial markets. Of the many possibilities to be considered, energy prices may rely most heavily upon forecasted and actual weather conditions. As hurricane season comes to a close, the industry will brace for the threat of an early and prolonged winter, which would increase the demand for natural gas and alternate energy resources as the need to stay warm is imposed. Another factor to consider is the boom in the housing industry over the past year. Many new homeowners will be turning on their gas for the first time this year, which may also result in a significant tax on our natural gas supply. This additional demand has yet to be estimated, and with that thought, the weak economy has reduced the industrial demand for energy resources, which may help even the scales should extreme weather conditions or housing become an issue.

Potential hurdles in 2004

The energy industry will be facing a number of issues in 2004, including the threat of infrastructure security, the potential of political instability and the ability of the United States to maintain its current levels of imports and exports. With the current issues surrounding the President's initiatives with homeland security, the prices of energy commodities will reflect increased costs associated with placement of surveillance cameras and additional staff to operate a safe infrastructure. While this may create immediate job openings, the costs of additional staff, necessary equipment and insurance will be rolled into energy prices.

Politically speaking, the current situation in the Middle East could cause the price of oil to skyrocket, forcing manufacturing units or utilities to make the switch to natural gas. While our consumption of natural gas is mainly produced domestically, the sudden demand for the product due to a lack of oil or unreasonably high short-term prices could cause the price of natural gas to soar.

Next year's issue with imports and exports can also be considered a wild card. Until recently, Canada produced and exported what seemed to be an endless supply of natural gas for the United States. However, Canada has begun to produce less natural gas and at the same time, their consumption has been increasing, resulting in a net decrease in its exports to the United States thus reducing our supply. With an interruption in our current supply, we will be forced to explore the use of alternative fuels after experiencing an increase in gas prices. Currently, the United States is also a supplemental natural gas supplier to Mexico, however, due to our need to hold on to natural gas reserves, exports to Mexico have been reduced, resulting in decreased profit margins.

Implementing an energy plan in 2004

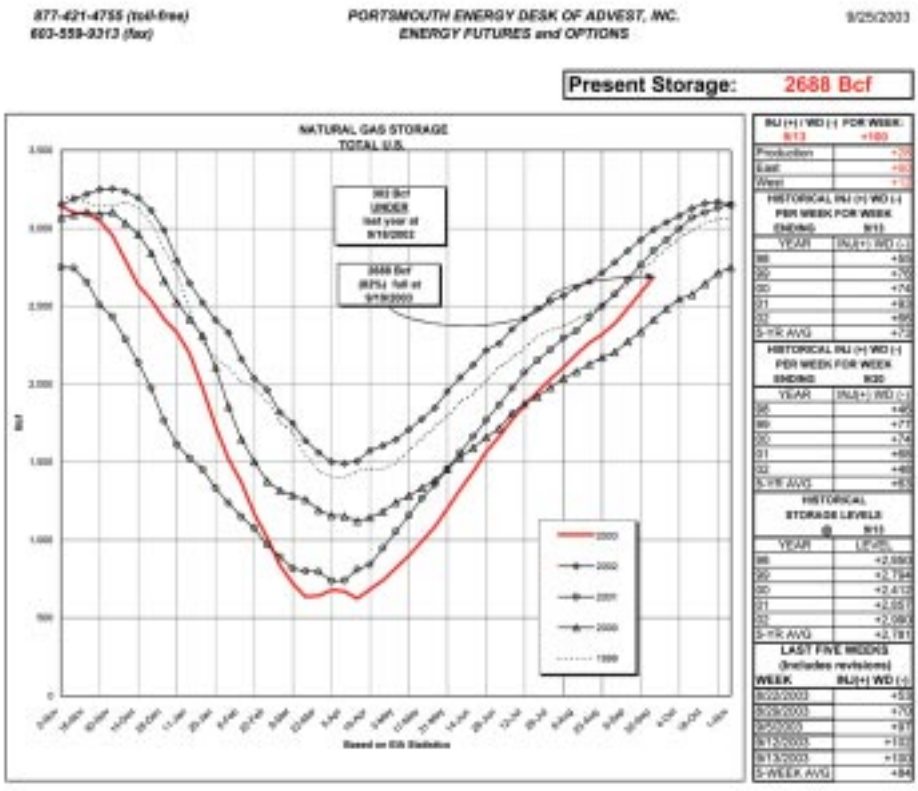
Industries should consider moving away from strategies based upon financial purchases and moving toward strategies based upon physical purchases. Establishing recall rights is a great way for buyers to establish a consistent, "over-the-counter" exchange contract with suppliers in an effort to ensure the availability of a physical energy product. This way, end users can buy energy products with a ceiling rate, that act as an established cap should energy prices increase.

Government mandated energy suppliers act as competition to small-shop suppliers because they are able to act on a cash-flow basis with the occasional rate increases to make up for profit losses. With this crux of deregulation, such major players are subsidized at some point through the unwelcome rate hikes as seen on homeowners' monthly bills. This stresses the importance for smaller suppliers to include physical transactions in next year's strategies in order to avoid having the wrong solution in the right market.

In the business sector, management teams should consider taking a more proactive stance in their energy planning procedures for 2004. In the past, managers have been projecting energy costs based upon trending markets. However, as we see a shift toward more volatile markets, it will be important for management to rely less on adding a three-percent increase to last year's numbers and calling it the new budget.

To overcome this hurdle, managers need to exercise discipline in sticking with long-term, proven strategies without trying to time the energy markets. For many, building a solid plan requires the help of consultants with trusted credentials and seasoned experience in the energy industry. In the same manner, managers should perform a thorough evaluation of company employees in decision-making roles to ensure a team of strategist thinkers versus a group of employees with a "herd mentality," to be in complete agreement with the company's long-term strategy.

Management should finally implement a long-range planning solution to evaluate its true costs, revenue projections and profitability forecasts, and then begin to focus on its energy and price requirements to meet company goals. Most importantly, management should avoid speculating their total expenditures and begin to quantify their maximum allowable energy costs. With a determination to remain loyal to a detailed long-range planning solution, any company should be ready to effectively evaluate price opportunities in the energy commodities for 2004.



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This report does not purport to be a complete analysis of the security, issuer or industry, and is not an offer or a solicitation of offers to buy or sell any commodities.

Many industrial and commercial end users are unaware that during periods of high price volatility, their local utility companies are in competition for the limited supplies of available energy. The utilities have the advantage in that they are able to bid the ultimate high price in order to secure the limited supplies. Because they are allowed a guaranteed rate of return, utilities simply pass on the high prices to the consumer in the form of rate increases. Public and private businesses do not benefit from this model.

Industries should consider decreasing their reliance on purchase strategies based strictly upon financial and commodity hedging and begin to consider strategies based upon physical purchases. Establishing recall rights is a great way for buyers to continue to take advantage of their current hedging transactions, but at the same time, ensure the availability of a physical energy product during periods of extreme volatility and high prices.

Another strategy managers should consider includes the use of alternative fuels, which are estimated to play a larger role in 2004. Alternative fuels can be cleaned up significantly and employed as a viable option to oil or gas, which can help companies save money in the long run.

In conclusion, there is no doubt that energy prices in 2004 will be volatile as we move into a period of uncertainty. The supply and demand dynamic is currently undergoing significant change; the political instability in the oil producing countries and market uncertainty is contributing to sharp price movements. The inaccurate market information and price forecasting are all contributing factors to the dramatic price and supply changes that we can look forward to during 2004. The best advice for commercial end users is to build a solid plan with the help of trusted consultants with seasoned experience in dealing with these issues. ■

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ENERGY CENTRAL

Energy Efficiency and Demand Response Programs Play Vital Roles

in Short - and Long-Term System Reliability

By:
John P. Mitola
CEO of Electric City

Electric power industry deregulation that has occurred over the past decade has wrought many changes, both positive and negative. It also has exposed some vulnerabilities within the electric power system – namely that increasing demand, coupled with a decreased focus on energy efficiency and conservation, has created added pressure to an aging infrastructure and has made it more vulnerable to failure, particularly during peak demand periods. With the advent of new technology, it is time for the electric power industry to recognize and embrace the vital role that demand side management, particularly energy efficiency and demand response programs, can and should play in enhancing system reliability.

Three major factors – customer load, utility infrastructure, and demand response – together comprise what those of us in the industry should see as the three legs that impact the reliability of the power grid here in the United States – a "Reliability Tripod," so to speak. To remain steady, each leg of the tripod must stay in proportion relative to the other two or the system becomes unbalanced and failure will occur.

With changes that have come about in the past decade, the net effect is that some aspects of each of the legs in the reliability tripod have been neglected to varying degrees and the tripod is now unsteady.

Load Growth

Load has grown significantly and the growth rate continues to accelerate. Total electricity demand grew from approximately 200 gigawatts in 1978 to 330 gigawatts in 2001. This breakneck growth pattern is continuing, with the Department of Energy projecting that electricity demand will reach 709.6 gigawatts in 2004, while the Energy Information Administration (EIA) projects that electricity use will increase an additional 22 percent by 2010, placing further demands on the transmission grid.

The transmission grid of approximately 160,000 miles of high voltage transmission lines has become a "super highway" for electric utilities to buy and sell power. Congestion from the increased flow of electricity over great distances is now a reality.

Infrastructure Investments Lagging and Difficult

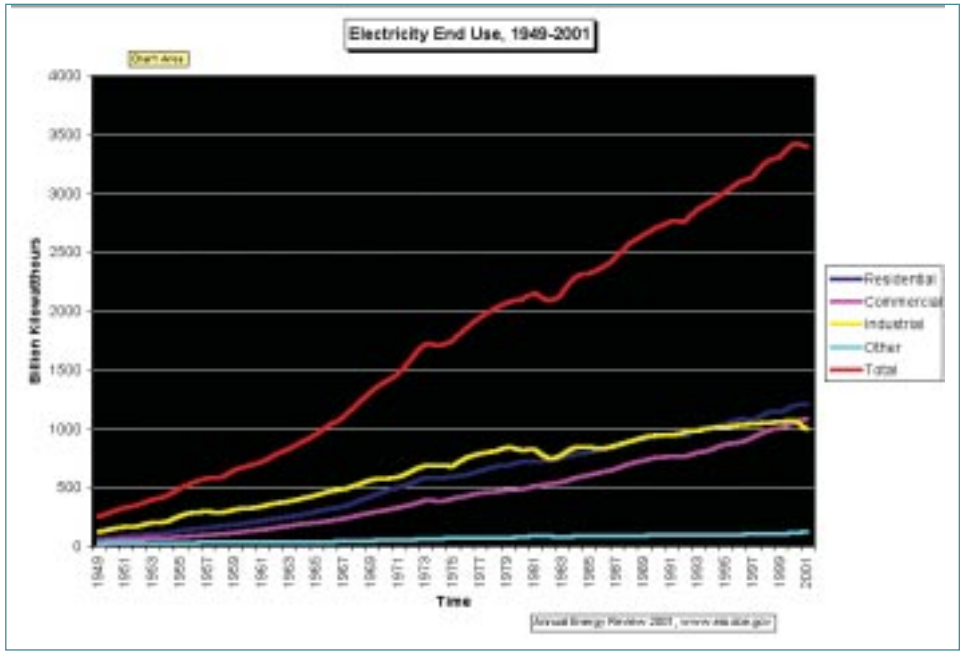
The core United States' electric generation and transmission system is 70 years old and is primarily based on technologies from the 1950's. While load growth has been increasing rapidly, investments in the infrastructure have not kept pace.

According to Edison Electric Institute data, transmission investment has been declining for the last 25 years at an average rate of $120 million a year (in constant, inflation-adjusted 1999 dollars).

"Transmission investment in 1999 was less than half of what it had been 20 years earlier," stated Eric Hirst and Brendan Kirby in the June 2001 report "Transmission Planning for a Restructuring U.S. Electricity Industry".

According to Edison Electric Institute: "Between 1979 and 1989, transmission capacity grew at a slightly faster rate than the demand for electricity during peak periods. But in the subsequent years, infrastructure needs did not keep up with that demand. To handle the requirements that the transmission system expects over the next 10 years, about 27,000 gigawatt-miles are required, however, only 6,000 gigawatt-miles are planned."

Lagging additions to the transmission infrastructure are not only due to a changing risk profile of the investment (in an era of deregulation), but these investments are also made increasingly difficult due to NIMBY (Not in My Back Yard) concerns. Numerous transmission additions have been blocked across the U.S. by NIMBY groups. As a result, utility operators are placed in an interesting corner between consumers who want service at all times and the same consumer NIMBY groups who do not want high voltage lines passing near their homes.



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Demand Side Management Programs Reduced

In the '80s, energy efficiency and demand management were key components in a utility's Integrated Resource Plan. Nearly all utilities sponsored demand side management (DSM) programs, which generally included energy efficiency, peak demand reduction/demand-response, load shaping and/or load building components. These strategies were significantly affected as the electric utility industry restructured (unbundling of generation, transmission, and distribution).

Many confuse energy efficiency and demand response programs. However, the two programs share some similarities, but are not interchangeable. Energy efficiency programs reduce energy use, both during peak and off-peak periods, typically without affecting the quality of services provided. Such programs substitute technologically more advanced equipment to produce the same (or a higher) level of end-use services (e.g., lighting, heating, cooling, drive power, or building shell) with less electricity. Demand response programs entail load management via direct control at peak periods, interruptible load tariffs, and economic response.

As the electric utility industry moved through deregulation and restructuring to competitive markets, many utility-sponsored DSM programs were dropped in the mid '90s. When utilities moved from being vertically integrated to separating generation from T&D, T&D no longer had the pressure from its sister generation companies for demand reduction. T&D's revenues are tied directly to their electricity throughput. Therefore, deregulation effectively quashed any incentive for T&Ds to sponsor DSM programs. And, since the generation companies no longer had a conduit via the T&Ds to the consumers, they no longer had the means to efficiently encourage or implement DSM programs.

Steadying the Wobbly Reliability Tripod

Since load growth cannot be easily influenced, we are essentially limited to having an impact on only two of the three factors in the Reliability Tripod: infrastructure investment and demand side management.

There are many obstacles to infrastructure investments. Chiefly, grid and capacity expansion is an extremely expensive proposition, fraught with long regulatory approval processes and public hearings that must be completed. Even if the project is able to overcome the initial NIMBY public sentiment, the ensuing engineering and construction cycle is extremely long before any positive impact to the system is realized. And, very often the industry faces a final round of NIMBY battles after the formal process has been completed and shovels are about to go into the ground. The entire situation is extremely unpredictable.

Demand Side Management — particularly new demand response technologies that are reliable, measurable, competitive, transparent to end-users and fully-dispatchable to a utility — are the quickest, most cost-effective and reliable way to relieve pressure on our aging electrical infrastructure and re-steady the reliability tripod.

"Until the grid is upgraded, energy efficiency is key," Susan Coakley, Executive Director of Northeast Energy Efficiency Partnerships, Inc. stated in a September 22, 2003 *Energy Pulse* article. "The problems with our electricity system didn't develop overnight, and they won't be solved overnight. But until they are, energy efficiency can and should play a vital role in addressing both the short- and long-term issues of system reliability."

Recognizing that no single energy source or demand side management program can meet our nation's growing energy needs, energy efficiency and demand response technologies can give the nation time to rebuild and modernize the electric transmission infrastructure.

Demand Response/Energy Efficiency Innovations

For demand response programs to be seriously considered as timely and effective tools to relieve pressure on the electrical infrastructure, they must be reliable, measurable and verifiable. Very recent, technological advancements have enabled the creation of new demand response and energy efficiency systems that meet all these criteria.

Previously, a key drawback was that demand response programs weren't able to dump large-scale, aggregated loads immediately and reliably. Curtailment programs, which relied upon customer action, were oftentimes unreliable because, when called upon for curtailment, customers had to deploy staff to manually turn off equipment and, depending upon staff availability, load shed didn't occur immediately and the amount of load shed wasn't guaranteed. Also, electric energy savings and load reductions could not actually be measured by metering and, therefore, had to be estimated. Verification was very difficult and time consuming. This history has led to deep suspicion of demand response on the part of utility and ISO operators.

Now, computer network-enabled automation and measurement allows various elements of electrical systems in facilities to be controlled and monitored remotely with the click of a mouse for measurable and verifiable steady state savings, as well as immediate, measurable and guaranteed

load shed during peak demand periods. An added bonus is that it requires minimal effort or staff involvement from the participants.

To encourage adoption, demand response systems should be able to trade head-to-head against supply and be on an equal footing against wholesale supply prices. This would have a two-fold effect.

First, it would encourage end users to participate in the reduction of peak-period demand. There has always been a disconnect between the wholesale price of electricity and the retail price. Although peak power is more expensive to generate than off-peak power, in regulated retail markets, end-users are never exposed to the cost of producing power on a real time basis. If end users were hit with the real cost of peak period energy, they would be much more open to utilizing demand response systems to reduce peak period demand.

Secondly, the advanced demand response technologies that enable guaranteed, aggregated load shed would allow participants to take aggregated load reduction and trade it into the market – if no utility-sponsored program exists. The net effect is that peak demand would be reduced and participating companies could be rewarded financially for their efforts. For open trading to occur, several barriers to entry (developed as a holdover of industry suspicion of DSM) would need to be removed at the utility, ISO and RTO levels. If the energy market was truly open to developers and traders of this "Negative Power", technology growth and customer participation would reach levels never seen before in the industry.

Encouraging Demand Side Management

Seeing Green — Many DSM programs are viewed as resources because they capture cost-effective energy savings that would not otherwise be achieved. However, there is no legislative language that recognizes demand response or energy efficiency as a renewable resource – yet.

Demand response and energy efficiency programs are truly renewable resources, and should be recognized as such by industry and government, particularly in light of the existing regulatory pressures regarding green energy. The greenest megawatt is the one that is not produced. Given their ability to reduce the demand for additional electrical generation, demand-response and energy efficiency should be on equal footing with other renewable energy generation resources, such as wind, solar, biomass, and hydro, when it comes to funding, investment tax credits and accelerated depreciation.

In its report "The Need for a Balanced National Energy Policy," the National Energy Policy Council of the Association of Energy Engineers in September 2003 recommended that regulatory agencies should require energy suppliers to promote energy efficiency improvements to their customers, as well as require utilities, Independent System Operators (ISO) and Regional Transmission Operators (RTO) to create and implement load management and demand response programs and provide incentives to customers to shed load.

Energy Efficiency Incentives — Utility regulators must provide incentives in order for distribution companies to promote energy efficiency. Since throughput (the amount of power transmitted across the grid) is directly proportional to the distribution companies' revenues, distribution companies need to have a powerful incentive to counteract reduced revenues and profits as a result of consumers using energy more efficiently. Some state commissions address this problem by using: (1) net lost revenue adjustment mechanisms that allow utilities to recover revenues lost as a result of conservation programs net of any cost savings; (2) revenue decoupling that separates utilities' profitability from the levels of actual sales; or (3) DSM performance incentives that are paid to utilities based on the savings achieved.

There is no question that reliability tripod is unsteady. While the solutions to restore stability and reliability aren't easy or quick, the questions today are:

• When will utilities, regulators and end users truly embrace advanced energy efficiency and demand response programs as a means to ease the demands on the power grid until infrastructure upgrades are implemented?

And

• When will they accept them as renewable resources that can help preserve our environment and reduce our nation's dependence upon foreign oil and its associated economic costs? ■

About the Author

John Mitola is CEO of Electric City, a leading developer, manufacturer and integrator of energy savings technologies and developer of "Negative" Power Systems. Formerly he was VP and General Manager at Exelon Thermal and prior to that Director of New Business Ventures for Commonwealth Edison. Electric City is backed by Cinergy, Morgan Stanley, CIT and several other industry-leading strategic investors.

Mitola has put Electric City at the forefront of innovative energy conservation efforts nationwide with its innovative Virtual Negawatt Power Plan, which will provide large-scale energy demand reduction for utilities and corporations. Illinois Governor Rod Blagojevich, recently appointed Mitola to the state's new Special Task Force on the Illinois Energy Infrastructure and as chair of the Illinois State Toll Highway Authority. For further information on Electric City: e-mail: sales@elccorp.com or visit the web site: www.elccorp.com

By:
Gerald Mimno
CEO
Advanced AMR Technologies, LLC

Mesh Networks:
An Optimum Solution for AMR

Recently, two of the major suppliers of automatic meter reading equipment (AMR) both demonstrated new mesh networks in St. Louis at the annual AMRA international symposium. Something must be afoot if both Elster Electricity and Landis+Gyr, two of the industry's predominant meter manufacturers, have made similar technology decisions in favor of developing mesh networks. What is this concept called "mesh" and what are its advantages in AMR?

Mesh refers to a geographic communications pattern that looks like a fishing net made from knots and links. In a typical wireless mesh network, the knots are meter sites and the links are the radio paths between the meter sites and a neighborhood concentrator. Using mesh communications technology, any knot in the communications chain can link to any other knot and it is up to the network to calculate an optimum path by hopping from meter to meter until the radio message eventually reaches a concentrator.

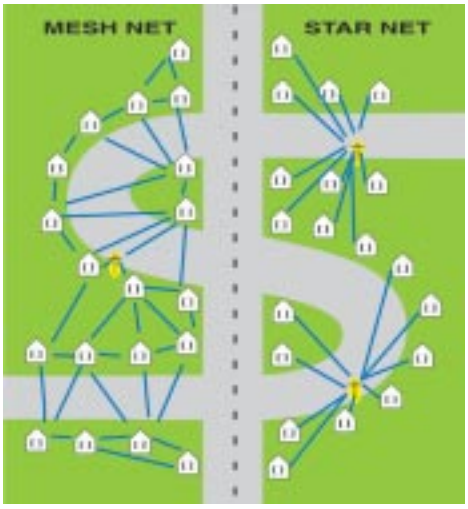
This mesh communications architecture is different from many older types of radio based meter reading technologies requiring extensive network infrastructures. "My clients are increasingly interested in mesh network communications for AMR applications", states Ed Finamore, President of ValuTech Solutions, an AMR consulting firm. "The unique message routing characteristics of mesh technology have significantly improved the economics of fixed network deployment, while at the same time supporting time-of-use metering, remote disconnect services and other advanced features."

Until now, the most common form of radio AMR has been through a single hop configuration from a meter to a mobile concentrator in a van or a handheld device. This single hop pattern is also seen in wireless fixed networks where the concentrator is mounted on a pole located in each neighborhood. The meter reading messages make a single hop from the house to the van or pole. Concentrators then typically use a phone line or cellular call to send data from the pole to headquarters. A second, or "double hop" is sometimes found in apartment house sub-metering systems where a radio repeater is used to get a message from the most remote apartments to the concentrator. These types of configurations greatly limit the network's ability to deliver data through the network in near real time.

A major problem with single hopping or double hopping is that if the radio signal is weak, another expensive concentrator or repeater becomes necessary to make the system communicate properly. In addition to being expensive and, to some extent, redundant, adding additional repeaters creates deployment issues that can significantly increase the costs of network deployment. A meter read used for billing purposes is low value data worth, say, one or two dollars a month. While AMR equipment located inside the meter may cost less than $US 50, an additional concentrator on a pole can cost $US 3,000 to $4,000 for equipment, installation, and broad band connection.

Sharon Allan, Director of Strategic Initiatives and Relations at US Elster says, "Mesh networks will allow us to reach the economic price point where fixed radio AMR becomes viable for utilities". Elster and its predecessors in the ABB metering line considered many AMR technologies. She continues, "Mesh allows us to group more nodes around a concentrator and link nodes across greater distances. Mesh also increases network reliability as each node also functions as a repeater". Since Elster already had a line of meters with a communications port for a broad band connection, they adapted this meter to become the network's neighborhood concentrator. In Elster's mesh, the entire radio infrastructure is contained inside the meters. No poles are required.

The military developed much of the foundation technology for mesh networks which have been deployed to network individual soldiers, and for use as sensors scattered on the ground. The core principle of the mesh or "peer-to-peer" network is that nodes broadcast their presence to find what

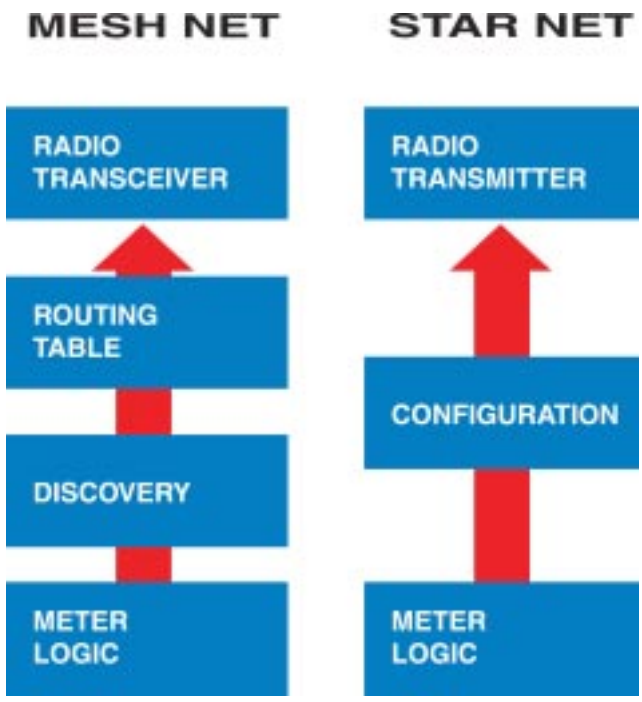


other nodes are nearby and which of these nodes they can communicate with. Each node then constructs a routing table listing the other nodes which are best situated to pass a message on, including who is next best. These routing tables are dynamically updated to account for new nodes or nodes temporarily lost behind various obstructions such as wet leaves. There are many variations of the routing algorithms in use as each technology company fielding a mesh network approaches the problem in a different way. One difference is whether a message can be addressed across the network to any other node or if messages seek only a specific route to the concentrator.

Much more overhead messaging, information processing, and trial and error communications are needed to operate a true "any peer to any peer" network. A network design seeking the nearest concentrator can in a sense be visualized as a funnel. A message entering the top of the funnel does not know the whole route to the bottom, but it does know who is lower down the funnel at each hop and it arrives soon enough at the bottom. Nodes configured in this scheme accept a message, look up their associated routing table, and then pass the message along. The store and forward routine being used can take from almost no time to half a second depending on the speed of the microprocessor in the meter.

Landis+Gyr uses data forwarding algorithms licensed from their partner, StatSignal Systems. Ember.com, an offspring of the MIT Media Lab, creates a new look-up table for every message. And there is also an open source group called the ZigBee.org Alliance developing a standard protocol dubbed IEEE 802.15.4 For the most part, radios like ZigBee operate at low power in the unlicensed bands: 915 MHz in the US, 868 MHz in Europe, and 2.4GHz globally. Lower powered, unlicensed technologies will typically range from 30 to 300 meters between nodes. However, licensed, two watt radio bands for Wireless Wide Area (WWAN) networks, used primarily in commercial and industrial metering applications, can extend their range to 15 kilometers or more per hop.

In today's residential metering solutions, unlicensed radios are the norm. As long as the transmitters meet the communications specifications to prevent interference, a utility may deploy millions of unlicensed wireless meters. While the advantage is ease of deployment, the penalty is low wattage and hence short range. The range limitations of unlicensed radio have until now limited the build-out of fixed wireless AMR. Typically there are a few meters that cannot reach the concentrator. They may be located on the wrong side of the house or are just too far away. As mentioned above, until mesh was developed, the only fixed network remedy for missed meters was to install an expensive additional concentrator. With mesh, a distant meter need only talk to a meter located closer to the center, which in turn talks to the concentrator. If a message is blocked to the East, it may find a suitable node to the South at which point it can then again hop East. Different manufacturers have adopted different norms for the number of hops and number of



addresses served by each concentrator. Since each hop introduces a statistical chance of failure, use of too many hops is not a good idea. System reliability appears to be highest with three or four hops. More hops may begin to introduce error.

Many advanced metering applications lie on our horizon. Recent blackouts in Europe and North America are a reminder that wholesale deregulation and economic growth have put the electric grid under great stress. Time-of-use metering, real-time pricing, demand response, and other efficiency measures may provide a better return on investment and reliability than simply building more transmission lines or generation. However, each of these actions requires more meter data to be delivered closer to real-time. The inevitable future of the meter is to assume a greater role as an energy manager as well as a cash register. This cannot be done with drive-by AMR and will ultimately tip the economic scale to real-time AMR provided over fixed networks. While some of these networks may use power line carrier technology, wireless mesh networks appear inherently simpler than PLCs and should see an increasing level of deployment. The AMR market research firms are telling us that AMR has entered the mass market stage and will begin to rapidly penetrate the market from twenty percent of meters to over 70%. Mesh networks are one of many AMR technologies that appear to have turned a corner. One California group is shopping hard for AMR systems, but is only looking among mesh network technologies. ■

About the Author

Gerald Mimno is CEO of Advanced AMR Technologies, LLC where he writes extensively on harvesting value from meter data. He invites comments at gmimno@AdvancedAMR.com

Captions

(Green Illustration)
"A mesh net needs fewer expensive concentrators than a star net"
(Blue Illustration)
"The microprocessor in a star net is programmed with a fixed configuration telling the radio transmitter who to talk to. The micro in a mesh net continuously discovers who is nearby and sets up a dynamic routing table to optimize a route to the concentrator".

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In association with Global Media Partner Commodities Now

www.keywomeninenergy.com

KEY WOMEN IN ENERGY™

- Global Honours

Nomination form, 2003 Global Awards

To acknowledge the development of the role of women in business, RaderEnergy, in association with *Commodities Now* magazine, would like to honour women in the energy industry who you feel have made an exceptional contribution to their marketplace or company. Nominations can be for women working in ANY sector of the energy industry globally, in ANY job, with honours being given for the display of particular characteristics or skills in their work. Winners and honourees are selected **on the strength of their nomination**. Please note, **it is vital that your nomination convey to a panel of judges the virtues of your nominee. Insufficient information will affect the chances of your nominee reaching the top 50.** Remember to include relevant information for the category in which you are nominating. To nominate a candidate, please complete all five steps of the following application and submit it as indicated **NO LATER THAN DECEMBER 15th 2003. Nominations received after that date will be rolled to the 2004 honours programme.** PLEASE NOTE, THIS SAME FORM CAN BE COMPLETED & SUBMITTED ELECTRONICALLY AT WWW.KEYWOMENINENERGY.COM

STEP 1: **PLEASE TICK THE CATEGORY FOR WHICH YOU WOULD LIKE YOUR CANDIDATE TO BE NOMINATED:**

(Please provide a separate form/details for each nomination and/or category)

- ❑ Leadership
- ❑ Innovation & Creativity
- ❑ Visionary
- ❑ Wisdom
- ❑ Potential*
- ❑ Pathfinders & Trailblazers

Date submitted: .....

Please tick all that apply:

- ❑ Key Women in Energy – Global Honours
- ❑ Key Women in Energy – Americas Honours
- ❑ Key Information Technology Players in Energy

N.B. **ALL** telephone codes must be included

STEP 2: **NOMINEE DETAILS:** (Please include as much information as possible)

NAME: ..... JOB TITLE: .....

COMPANY: .....

ADDRESS: .....

EMAIL: ..... TEL: + ...

COUNTRY OF WORK: ..... COUNTRY OF BIRTH: .....

WEBSITE: .....

MEDIA/PR CONTACT: .....

MEDIA/PR EMAIL: ..... MEDIA/PR TEL: +.....

STEP 3: **NOMINATOR'S DETAILS:**

NAME: ..... COMPANY: .....

ADDRESS: .....

EMAIL: ..... TEL: + ...

STEP 4: **NOMINATION:** (Please attach a separate piece of paper if necessary. Detailed information is critical for selection).

In no more than 500 words, tell us why you believe your nominee deserves the award for which they have been selected.

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STEP 5 **SUBMIT THE APPLICATION – EITHER:**

1)	**ELECTRONICALLY:**	**COMPLETE & SUBMIT THE FORM AT WWW.KEYWOMENINENERGY.COM OR WWW.COMMODITIES-NOW.COM**		
2)	MAIL:	MAIL TO Linda K. Rader, RaderEnergy, PO Box 27391, Houston, TX 77227-7391, USA		
3)	FAX:	+1 713 622 8490		
QUERIES:	Linda K. Rader:	+1 713 960 0001	raderenergy@att.net	**or** keywomeninenergy@att.net

Nomination forms may be handed back to Linda Rader or Commodities Now staff at any shows they attend

* The Potential category is limited to new-hires to energy since 1/1/2001.

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Top Ten Internet Scada Mistakes

Veterans Describe Common Mistakes That Sink Internet SCADA Projects

By:
Bob Forbes
Vice President
M2M Data Corporation

Introduction

In our business, we constantly come across companies that have taken a run at leveraging the Internet for their SCADA (Supervisory Control And Data Acquisition) systems, either by Internet-enabling existing SCADA systems or building new applications from scratch. Internet SCADA champions have sold their managers on the cost benefits of using the public Internet instead of expensive, dedicated lines. They have also won support by explaining how the use of open Internet standards makes it easier to integrate SCADA with other corporate systems and avoids technology obsolescence by allowing the use of technology from multiple vendors.

However, all too often, such implementation efforts fail, embarrassing both the engineers who proposed them and the senior managers who backed them.

Most industry experts agree that IP networks and the public Internet will soon play a role in virtually all SCADA systems. The economics are overwhelming, considering that virtually every organization already has a link to the Web and an IP-based internal network it can leverage at relatively low-cost for its SCADA applications. But many companies are still fearful of Internet SCADA, having heard countless stories of projects that failed to meet the required high levels of reliability, performance and security.

Over the past year we've canvassed our customers, partners and our own staff about their worst moments with Internet SCADA to document all of the hurdles to success. Time and time again we find the same short list of common mistakes that are serious enough to destroy the corporate sponsorship, return on investment or technical feasibility of an Internet SCADA solution. Avoid these, and you've vastly improved your chances of making Internet SCADA pay off for your employer and its customers.

Figure 1: Trending of real-time transformer conditions via a standard Web browser.

One: Not Setting Appropriate Expectations

A common cause of Internet SCADA project failure is promising a system based on traditional SCADA technical parameters, that may be more than you can deliver or more than the end-user needs. It is important to understand how the timing and availability characteristics of the Internet differ from traditional SCADA systems, and to communicate those differences and their ramifications to all project stakeholders.

"Leaving people to assume the Internet SCADA system will perform in the same way as a traditional system, whether the application warrants it or not, may be setting yourself up for failure," says one industry veteran. While it is true the Internet cannot guarantee the sub-second response times of traditional SCADA networks, a properly engineered system that relies on the Internet can provide more than adequate response times for most SCADA applications. And several current generation Internet SCADA systems are capable of consistently achieving 99 percent or higher levels of availability.

Two: Building the Internet SCADA System Around Polling

Traditionally, SCADA systems have operated within a "master/slave" architecture, the "master" being a central computer programmed to gather data and transmit instructions to "slaves". These "slaves" are remote terminal units (RTUs) programmed to provide local data gathering and control under the supervision of the "master". This approach minimized bandwidth usage and ensured predictable operation over a shared communication medium such as leased telephone lines.

However, Internet protocols, services and techniques make this architecture ineffective and obsolete. Because Web servers are designed to accept and process requests from many Web clients simultaneously, Internet SCADA is best built on a "push" architecture where each remote field device is programmed to intelligently transmit its data to the master system. The transmission can take place at set intervals (such as every five seconds) or when certain conditions occur, such as a device reaching a certain temperature or the voltage in an electric line reaching a critical point.

Figure 2: Typical PLC panel assembly with a "push" Internet gateway device.

Internet SCADA Security Checklist

From *Implementing a Local Security Program to Protect National Infrastructure System Companies and Facilities* by the **SANS Institute,** a cooperative research and education organization.

The paper discusses trends such as the migration of SCADA systems to the Internet, and includes a checklist for security. Highlights from the list:

1) Do a vulnerability assessment of your current computer, communications, and control network.

2) Check Security sites for various security related bulletins and to keep up to date on hacking trends and treats.

3) Harden your operating system. Make sure you have an OS that is "security Friendly". The object is to build a secure configuration for your Network OS.

4) Implement a multi-layered defense of Firewall, Intrusion Detection, and/or Virus Scanning software and systems.

5) Use encryption and Virtual Private Networks (VPNs)

6) Implement incident handling plans and procedures.

7) Implement a system of program/data backup and recovery.

Link to full article:
http://www.sans.org/rr/paper.php?id=822

Failing to adopt a "push" architecture has doomed many projects. For example, over the course of three years, a top natural gas field services provider tried polling-based Internet SCADA systems from five separate vendors to monitor compressors along its pipelines, using satellite IP communications links. "Every time there was a communications glitch, the entire poll started over," remembers the senior field engineer, which rendered each system "totally unreliable" and "sent the satellite service fees through the roof".

Three: Rolling Over the End Users

The move to Internet SCADA is a big change, especially for field managers who may have done their jobs in the same way for decades. Those who are used to hands-on troubleshooting at a remote site might feel less valuable when a dispatcher can give them detailed repair information before they even get into their truck. They may remember earlier, failed attempts at Internet SCADA and not realize that new software, hardware and methodologies make Internet SCADA much more feasible than before.

At one oil and gas company, the automation manager championed an Internet SCADA project from headquarters and began with a pilot project to prove the ROI of the system and attract the necessary support for a full deployment. The project died, however, when users who hadn't been consulted or educated about the new system refused to use it, while managers of existing SCADA implementations battled the new system fearing it might cost them their jobs.

In an effort to plow through the project, you may be tempted to simply avoid the messy work of listening to users' fears and addressing their concerns. Don't. Without the support of your end users, you can lose the corporate support that is so critical for the project's success. If you are working with an Internet SCADA vendor that has worked with many users in your industry, consider tapping their experiences and insight in the process.

Four: Not Bothering With SCADA "Surety"

SCADA "surety" means the combination of security and continuity, both of which are major issues for a company monitoring a critical asset such as a transmission line over the Web. The public Internet exposes SCADA systems to a host of security and reliability threats that can be expensive to deal with, if not handled correctly.

Internet-based applications are prime targets for viruses, worms and denial of service attacks. Furthermore, hackers can exploit any vulnerable data streams they can "sniff" online, and SCADA systems are particularly attractive prey. If a determined attacker manages to break into a SCADA data stream, they could change the data, trigger false alarms, suppress actual alarms or send false controls to the remote devices. Each of these security breaches can be potentially devastating to your SCADA system and the operations it serves.

Your Internet SCADA effort could backfire if you don't have the infrastructure to continuously monitor the system, lock down every node, encrypt the information, and back-up the data that has been gathered. If you have any doubts that your own data center can provide these capabilities, consider a reliable, proven outsourcer with experience hosting Internet SCADA systems.

Five: Assuming that Any SCADA Solution Can Do the Job

Most SCADA applications are good at generic data acquisition and control functions. However, different industries require that information be assembled, filtered and displayed in very specific ways. For example, the type and format of information used for alarming, trending and reporting about a gas plant may be very different than for a transformer in an electric substation.

The work required to customize and configure a generic SCADA application for a specific industry can destroy all the benefits promised by Internet SCADA. For example, one rural electric cooperative took months of extra time, and the help of expensive specialized staff, to configure and customize an Internet SCADA system for low voltage distribution automation. In addition to exceeding their schedule and budget, the coop was then tied to a custom, proprietary application. Savvy project managers avoid such problems by choosing an Internet SCADA solution that includes modules already customized for their vertical market.

Six: Buying Into Proprietary Technology

The Internet SCADA-wares of many vendors are simply tools that provide a limited Web interface into existing proprietary applications. For example, one major utility decided on an Internet SCADA system to monitor aging transformers to maximize their throughput and reliability. Rather than utilize an open, extensible framework for Internet SCADA, they used Web "snap-ons" to legacy SCADA applications and remote monitoring units. As a result, they were unable to later extend or integrate what were, in effect, standalone Web applications.

You're better off choosing a vendor who treats Internet SCADA as a central, open, accessible monitoring framework for the enterprise. Products and services built on such a philosophy give you full access to the real benefit of open interoperability across IP-based networks, so you can change your monitoring, alarming, analysis and control functions as your business changes.

Seven: Overbuilding the User Interface and Overwhelming the User

Internet SCADA designers, excited by the bells and whistles of Web development tools and a fresh canvas on which to paint their new application, consistently overbuild the screens that the user will interact with. The resulting screens - mixtures of web graphics, asset illustrations, schematics, traditional SCADA graphics, and raw data - often obscure the critical information the end-user needs.

Further, on the theory that more data means better analysis, some Internet SCADA designers collect and model far too much data. Again, in many cases the result is too much data, overloading both people and systems.

"A fully populated RTU may have only 10% of its register values that are critical to the operation of the site" says one T&D SCADA veteran. "When the users have to dig through the screens to find those values, it makes it tough to get them onboard with the application, and ultimately means we're spending more time training and supporting them."

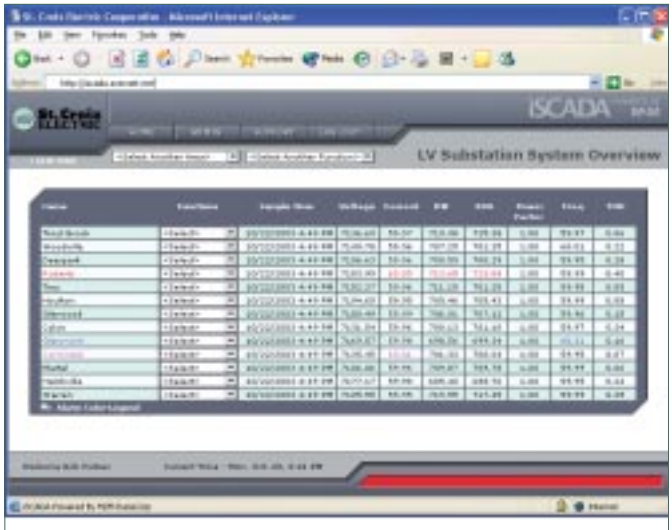


Figure 3: Aggregated view of key conditions for 13 low voltage distribution substations. Alarm bar on bottom of webpage prominently displays condition, and colored text within data provide alarm specifics.

Rather than overwhelm the operator with every piece of available data and clever graphics, get his buy-in by keeping the user interface simple, displaying important data upfront, and using colors sparingly and only to highlight critical alarm conditions. This type of design is more data-driven than traditional SCADA systems and "thinner" on the client (much like e-Commerce applications), and has the added benefits of being less costly to develop, easier to maintain, and more open and flexible.

Eight: Choosing a Vendor Based Only On Price

Buying only on price is almost never a good idea, and is particularly dangerous in a relatively new market such as Internet SCADA. Low bidders may be small companies who are giving business away to establish them in the market and may not have enough money to stay in business until the end of your project, or to help with ongoing support and upgrade issues. Such small companies may also be outsourcing development work overseas without the ability to manage the associated language, culture or quality of workforce issues. Oftentimes high bidders may be young companies charging the highest prices they think they can get, or that need to charge high prices or accelerate payment terms to make their next payroll.

Experienced buyers who have completed many automation projects and evaluated hundreds of proposals recommend discarding the highest-priced and lowest-priced bids, instead aiming for a partnership with a vendor who can deliver the optimum price-performance.

Nine: Not Planning For Support After the Project

Buying service and support for Internet SCADA systems after the system is complete can be very expensive, because you are already committed to the vendor's products. The vendor has little incentive to bargain, since their next sale to you is probably years away. And once you have begun purchasing Internet SCADA as a service from an outsourcer, it's far more difficult to negotiate SLAs (Service Level Agreements.)

The time to think about such needs is before the project begins. Before signing a contract for Internet SCADA hardware or software, be sure to negotiate a warranty. When purchasing it as a service, negotiate an SLA with uptime guarantees that match the reliability needs of your application.

Ten: Treating Internet SCADA as a Technology Rather Than a Business Issue

SCADA is a business-critical technology because it can reduce expensive diagnostic and repair visits to remote sites, enhance the reliability and efficiency of the systems being monitored, and increase the mean-time-between-failure for critical equipment.

Using the Internet as a platform for SCADA delivers these benefits more quickly, while reducing capital expenses and risk. It also provides dynamic data access to applications, giving designers the flexibility to provide operators with only the information they need.

Many or all of these benefits can be lost, though, if an Internet SCADA project is allowed to evolve into a purely technical endeavor, in which an IT or engineering group is left to focus only on nuts and bolts, such as the inner workings of Internet protocols and technology implementation issues. The most successful Internet SCADA initiatives base their architecture, design and purchasing decisions on the business drivers that make Internet SCADA so compelling.

The Internet SCADA market has matured to the point where deployed systems can become strategic business assets, and many of the common technical and design risks can be recognized and avoided. By keeping a constant eye on the business drivers, and being armed with the knowledge of the most common Internet SCADA pitfalls, you'll be well positioned to pull off a successful project and quickly begin reaping the benefits of this evolving SCADA standard. ■

About the Author

Bob Forbes is vice president for M2M Data Corporation in Denver, Colorado. His responsibilities include research, strategic planning and the introduction of new technologies to the market. Forbes and his colleagues at M2M have pioneered of many of the security, sensor and application delivery methodologies in use on Internet SCADA systems today. The electric power, oil and gas, defense, homeland security, and national research and development sectors use M2M's Internet and satellite-based SCADA products and services. Prior to M2M, Forbes was founder and executive vice president of strategic initiatives for Authentor Systems, an Internet security company. Before that, Forbes held senior executive positions with several private energy and information technology firms. Mr. Forbes has a Bachelor of Science degree in Finance and International Business from the University of Colorado.

By:
David Mulit
General Manager of the
Americas, SPL WorldGroup

Utilities Face the Customer Revolution

Information exchange among businesses and consumers will change relationships between customers and their utilities

"Utilities are facing a crisis of rebirth." That's futurist Alvin Toffler speaking in an interview he gave last spring.

Toffler was talking about the revolutionary change he sees taking place between energy producers and sellers on the one hand and customers on the other.

In the 20th Century, he points out, the producer/consumer relationship was based on producers' power to develop and offer new products. Consumer power was largely confined to accepting products or rejecting them. Producers' mindset revolved around, "if we build it, they will come." When they sought customer feedback, it was primarily to discover factors that would make customers more likely to accept, less likely to reject the product.

In the 21st Century, Toffler foresees a transition to a different type of relationship between energy producer and customer. He envisions the customer as an active participant in the development of the products that appear in the marketplace. He sees marketplace relationships becoming more complex and interdependent. He envisions a relationship in which both parties are sellers and both are buyers.

Far-fetched? Probably not.

C&Is in the Forefront

Look at commercial and industrial customers (C&Is). Yesterday, only the largest used their size and economic influence in the community to essentially write their own tickets when it came to utility services.

In the Nineties, smaller C&Is anticipated gaining some of these benefits for themselves through deregulation. But the failure of early programs—some to achieve affordable energy, others to achieve competition at all—has led to indefinite delays in states' and provinces' taking the next deregulatory steps. At the same time, these smaller C&Is are suffering from economic slow-downs stock-price declines that have them increasingly focused on cost cutting.

The 2003 Chartwell Report on Key Accounts Service reports that only about half of all utilities offer time-of-use billing to commercial and industrial customers. *(Graph used with the permission of Chartwell, Inc., <www.chartwellinc.com>.)*

As a result, an increasing number of smaller C&Is are exchanging information and using it to work with utilities to develop new service models. Consolidated bills that permit franchisers to cut down on paperwork. Convergent bills that mesh multiple services. Bills in multiple versions sent to multiple site managers and compared at headquarters to see who's minimizing energy costs—and who isn't.

Smaller C&Is are also seeing advantages in tailored contracts that gear utility rates to their usage patterns and economic conditions. Increasingly, they're proposing specific ways they and their utilities can produce under a regulated scenario the options once thought achievable only through deregulation: Access to the wholesale generation market. Device management. Supply prices and delivery mechanisms that supplement rather than dominate their use of on-site generation.

That's not yesterday's utility market. Today, C&Is expect to work with their utility. They expect utilities to help them achieve energy supplies and prices that support corporate competitiveness in their own tough domestic and global markets.

What About Consumers?

On first glance, residential consumers seem unlikely to adopt the C&Is' stance—at least in the immediate future. The popular resistance to North American deregulation has fueled a belief that few consumers want power and that most will reject it when it is thrust upon them.

But wait. The "power" placed in consumer hands during the initial stages of North American deregulation was defined by regulators and large C&Is. In many states, consumers had change thrust upon them. Their "power" seemed limited to spending five or ten hours trying to understand competitive intricacies. Their reward was saving $20 or $30 a year on their electric bills.

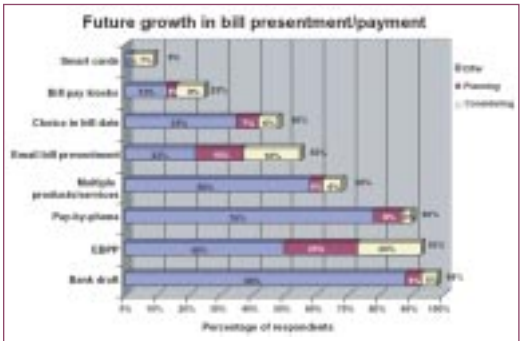
Some consumers were further short-changed. When meaningful competition evaporated in states like Pennsylvania and New Jersey, consumers found their accounts back with the original utility. In Georgia, consumers' time investments skyrocketed as they were forced to track down missing and inaccurate bills. And that's not even mentioning California.

In short, many consumers have failed to receive what they believe to be an appropriate return on their time investment in competitive markets. As a consequence, their interest in exercising power in the immediate future is probably low.

New Awareness Through Information Exchange

But it may not remain low.

There is a flip side to the consumer experience with most state and provincial electricity-choice programs. It has enlarged the agendas of utility consumer groups once focused solely on rates. Broader consumer-advocacy groups have entered the fray. They are exchanging information across state, provincial, and national boundaries.



A number of utilities offer multiple billing-related services, according to Chartwell's Guide to Bill Presentment and Payment 2003.
(Graph used with the permission of Chartwell, Inc., <www.chartwellinc.com>.)

Over the next few years, consumers are likely to become aware that, with or without deregulation, a growing number of utilities offer:

- Billing flexibility. Some utilities permit consumers to choose the date on which their billing cycle closes. That's an option particularly popular with senior citizens, who can match billing dates to receipt of pension checks. Other utilities provide duplicate bills. That provides another senior-citizen benefit: the out-of-state children of elderly parents can more easily assist will bill payment.
- Convergent billing. This permits households to pay for multiple services with one check.
- Bill payment options. On-line, credit card, automatic debit are popular Kiosk use is on the rise.
- Loyalty programs that offer premiums (like frequent-flyer miles) and rebates on utility bills.
- "Green electricity" programs. Some permit consumers to purchase varying amounts of electricity from renewables and to change that amount frequently.
- Surge protection insurance.
- Guarantees against the consequences of interruptions in electricity or gas service.

Judging from the experience in other deregulating industries, information exchange can lead to new consumer demands. Utilities that fail to offer new services may soon confront consumers asking, "Why not?" Furthermore, utilities that fail to offer these services could find that customers perceive them as poorly managed or not progressive.

Speed of Evolution

Clearly, the customer revolution is coming. The question is: how quickly?

C&Is are already on the move. And many utilities are responding. The 2003 Chartwell Report on Key Accounts Service sees most energy providers—especially electric utilities—with some sort of program to handle their largest customers. In fact, about half of all utilities report a dedicated key accounts program.

But is a "we care" attitude really enough? Many utilities appear to think so. When Chartwell asked about specific services, programs appeared less than responsive. A remarkable 47 percent of those surveyed said they had no plans to offer C&Is time-of-use billing. Fifty-three percent were not considering choices in billing date. Thirty-one percent failed to see electronic data interchange (EDI) on their horizons.

Service expansion for consumers is also uneven. A second Chartwell report, the Guide to Bill Presentment and Payment 2003, shows considerable movement on some fronts. More than three-quarters of all utilities, for instance, accept credit-card payments and bank debits. On the other hand, only half offer electronic bill presentment and payment (EBPP). And only 35 percent permit consumers to choose billing dates.

What about the future? Currently, Chartwell reports, 22 percent of utilities offer email bill presentment. Another 15 percent are planning to add it, and an additional 18 percent are considering the move. That's a rapid growth rate. But it still leaves 45 percent of utilities in which email billing is not even on the radar screen.

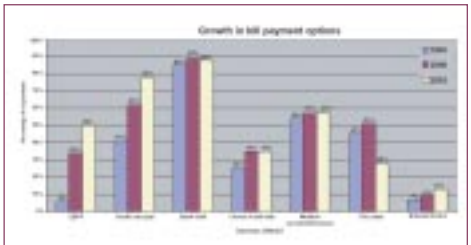
Is utility service evolution fast enough? Or will the customer revolutionaries be at the gate before planning begins?

IT Implications

The uneven pace of response to the customer revolution results in part from the inflexibility of the customer information systems (CIS) still in place at most utilities. Designed for the single-service, commodity emphasis of the Eighties (or the Seventies, or even the Sixties!), these legacy CIS systems cannot accommodate new service offerings without significant change.

Utilities are hamstrung if they approach CIS replacement from the point of view of a single new service. Cost-benefit justification for system replacement does not emerge. Given that even the best established EPBB programs, for instance, report only about 4-5 percent customer usage, only the foolhardy would suggest that a utility spend $2 million to offer Internet bill payment to its 70,000 customers.

The analysis is different, however, when a utility places system-replacement costs against the dozens of potential new services available through the same system change.



More services are on the way. But many utilities are not yet considering billing options that have become routine in other markets.
(Graph from Chartwell's Guide to Bill Presentment and Payment 2003; used with permission.)

Change becomes even more compelling when additional new-system advantages are included: faster rate changes; environmentally sensitive options for customers like "green electricity"; reduced training time; less vulnerability to the retirement of those few programmers who understand the intricacies of the current system. And change becomes an imperative as utilities begin to consider the home-sized fuel cell. Once customers become generators, their demands to participate in the overall design and direction of electricity infrastructure are likely to swell rapidly.

Customers Are Marching

There's little doubt that utility customers of all sizes are starting to want more—and will increasingly vocalize their desires in the future. A new report from the Consumer Energy Council of America demands residential choices like advanced metering, alternative pricing methodologies, and products that help consumers make environmentally sound choices. Phrases like "virtual choice" and "virtual competition"—an approach to energy distribution that demands utilities offer consumers options—are becoming commonplace among policymakers.

But the customer revolution does not have to be threatening. Revolutionaries man the barricades only when demands are met with resistance. Why not join the revolution instead? By making plans and infrastructure changes now, utilities will be able to welcome a generation of high-demand consumers and turn the customer revolution into a springboard for improved customer service and satisfaction. ■

About the Author

David Mulit is general manager for the Americas at customer-information-solution vendor SPL WorldGroup. He previously worked for a large gas and electric utility for sixteen years. You can see more of the interview with Alvin Toffler on the future of utilities at http://www.splwg.com/main/news/articles/April2003_SPLprofile.pdf

OSIsoft RtPM

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 real-time performance management (RtPM) software from OSIsoft, 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.

For more information contact

OSIsoft
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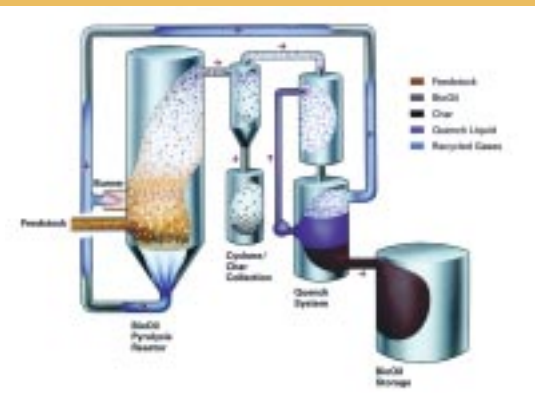
OSIsoft™ Performance-driven Intelligence

Fast-Pyrolysis: How, Why and Where it Works

BioTherm™ is DynaMotive's patented fast pyrolysis process that takes organic residues, such as forest and agricultural wastes, and quickly – in less than two seconds – converts them into BioOil, char and non-condensable gases. (See accompanying progress diagram).



Think of preparing a meal with a high temperature pressure cooker. First, one might break-up the ingredients to remove excess moisture and ensure all ingredients get cooked. For BioTherm™, this includes drying the feedstock to less than 10 percent moisture content and grinding the feed into small particles. This minimizes water content in the resulting BioOil, and ensures rapid reaction during the ensuing pyrolysis process.

The dried biomass is then fed into a completely sealed system (a bubbling fluid-bed reactor) that operates at normal atmospheric pressure, but at a temperature of about 500 degrees Celsius. Absent oxygen, the high temperatures cause a physical reaction, which changes the dried biomass residues into a vapor or gas. In order to capture the gas and convert it to a useable form, the system rapidly drops in temperature and quenches the heated biomass. This temperature drop also prevents the cracking of the newly produced BioOil.

BioOil Presents

Free-Flowing Alternative to Traditional Biomass Energy Generation

By: Sue McChesney

If you've been following the development of renewable energy for any length of time, you've seen the push and pull between the true believers and the begrudging compliers. But if the momentum around a new technology called fast pyrolysis continues, there may soon be a meeting of the minds.

Put simply, fast pyrolysis is a process for converting biomass collected from agricultural and forest residues into an organic liquid fuel, called BioOil, that's easily transported, stored and handled. The beauty is that, while the BioOil itself can be used to generate carbon-neutral, cost-effective process heat and electricity, the means for producing it can also dispose of organic waste and even create new jobs and industries.

"For the first time, BioOil makes biomass fully transportable," said Patricia Seifert, a research analyst from Frost & Sullivan, a leading global consulting firm. "Plus, there are sub-products from BioOil that go beyond just producing electricity."

Just what is BioOil? And, if it does offer obvious economic, environmental and energy benefits, why isn't every electric company getting into the act? The fact is that they may soon be doing so. Consider just two recent developments:

In September 2003, the U.S. Department of Energy (DOE) announced it had teamed with the U.S. Department of Agriculture to award $23 million in biomass research funding to 19 projects across the U.S. In announcing the funding, U.S. Agriculture Secretary Ann M. Veneman said, "The conversion of biomass into bio-based products, fuel and energy offers significant benefits to the nation through healthier rural economies, improved environmental quality and improved energy dependence."

A month earlier, the Government of Canada announced details of its $1 billion investment toward implementation of the Climate Change Program for Canada. Among its highlights: A commitment of $30 million to support the development and demonstration of bio-based energy systems and technologies.

These national initiatives are just a fraction of what's being done to boost biomass from an also-ran to a front-runner in the North American energy market. States, provinces and even municipalities are looking to partner with energy companies, forestry and agriculture interests, local manufacturers, and other key customers on biomass projects that can supply energy needs, jump-start their economies, and actively address public concerns on climate change and pollution.

Why Biomass? Why Now? What's New?

One could say that society has been refining biopower since man first rubbed two sticks together. By 1850, fuelwood represented about 91 percent of the total energy supply of the United States. But today's biopower is far afield from the dirty, smoke-spewing, relatively low-efficiency combustion stacks of just a few years ago. With the recent advent of pyrolysis, gasification, plasma gasification and anaerobic digestion technologies, biopower is now being hailed as a clean, commercially viable solution to many of North America's energy, economic and environmental challenges. One reason: It's a CO2 neutral, cyclical process. When biomass is converted into thermal energy, the carbon dioxide that's released is roughly equivalent to the carbon dioxide that went into growing the biomass.

Even before the major national grants awarded to biomass projects in the U.S. and Canada, industry analysts were predicting an industry boost. For example, in a June 2003 report, Frost & Sullivan reported that financial incentives from government sources were likely to propel the North American BioMass and Waste-to-Energy Markets from market generated revenues worth $350 million in 2003 to revenues worth as much as $1 billion in 2012.

"New technologies are likely to call the shots as they generate clean gas that can be used with highly efficient production systems such as gas turbines, fuel cells and micro-turbines," said Seifert. "Along with this, the generation of many by-products such as bio-fertilizers, bio-oil, new

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A key advantage of this process is that the solid residues or char left behind are used for other clean chemical applications, while the non-condensable gases are fed back into the system to create additional process heat. Everything else is converted to BioOil.

The process is particularly appealing to energy companies and their private sector customers (as well as government partners) in areas with large forestry or agricultural potential. For example, in mid-2002, New Hampshire began a BioOil feasibility study in which DynaMotive participated, funded by grants from the U.S. Department of Energy and the U.S. Department of Agriculture. The state is now looking at using BioOil to help revitalize its wood products' industry, fuel combustion turbines, and provide feedstocks for "green" chemical industries.

"We're currently looking at co-locating a BioOil facility near an existing biomass power plant," said James Taylor, director of Grants and Program Development for the New Hampshire Office of Energy and Planning. He explained that the state would both purchase power from the biomass facility and use its wood chipper equipment.

"There are some tremendous synergies," said Taylor. "We'd use the biomass power to start the BioOil process, and then the BioOil process would, in essence, self-generate. We'd then extract the desirable green chemicals and use the remaining residue as a fuel that goes back into the biomass plant."

According to virtually everyone involved, there are natural synergies – both in the process to produce BioOil and in the community and customer relationships formed when implementing a BioOil project. Better still, the process makes economic and environmental sense, even to non-technical audiences. Participants in the energy industry can score "quick hits" with customers and community leaders by clearly demonstrating their commitment to clean energy, lower costs and improved efficiencies. At the same time, they're meeting their own short- and long-term business needs.

tile and road materials are expected to produce additional revenues."

Likewise, some far-sighted energy companies, like Ontario Power Generation (OPG), owned by the Ontario Government, were quick to give new biomass technologies a serious look.

"Utilities are looking for ways to manage emissions, supply green power requirements, and meet potential renewable energy portfolio standards. At the same time, the technology is starting to become available to allow biomass to be used more easily," said James Perry, senior Business Development engineer at OPG.

That's one reason that OPG decided this year to invest in a fast pyrolysis technology that allows raw biomass, which typically has a very low energy content, to be converted into a fuel that can be transported away from the biomass source. The other benefit, said Perry, is that it's easier to use converted BioOil in existing generating facilities than it would be to use raw biomass.

He explained, "You can use BioOil in coal, oil or natural gas-fired boilers with far fewer modifications than would be needed for raw wood or agricultural waste. Assuming that it is proven on a large commercial scale, BioOil should allow utilities to access biomass more easily than ever."

The Proof is in the Power

For many energy companies, interest in developing biomass has been steadily growing in recent years, especially in reaction to the Kyoto Protocol, the proposed U.S. energy policy, and renewable portfolios in dozens of U.S. states. The key is determining the best way to move forward.

For OPG, a major break came when they were introduced to another Canadian company, DynaMotive Energy Systems Corporation. DynaMotive, the world leader in fast pyrolysis technology, is in the business of developing and commercializing environmentally friendly energy systems based on fuels produced from biomass. When DynaMotive invited OPG to become the first market-leading generation company to participate in developing a large-scale commercial BioOil plant, OPG seized on the opportunity.

The project involves building a 100 tonne per day BioOil plant at the site of Erie Flooring and Wood Products, in West Lorne, Ontario, using DynaMotive's patented fast pyrolysis process, called BioThermTM. The project is actually the expansion and commercialization of DynaMotive's 10 tonne per day pilot project in which the company successfully used the BioThermTM process to produce BioOil.

"It's instrumental to have a leading generation company, like OPG, recognize the commercial potential of this technology and how important it is to the collective future for renewable energy and our environment," said Andrew Kingston, President & CEO of DynaMotive.

Erie Flooring and Wood Products will supply wood residue for the project, which will use fast pyrolysis to convert the residue to BioOil. That process should generate enough electricity and process heat to not only power Erie's operations, but to also export excess power to the Ontario grid. Magellan Aerospace Corporation, Orenda division will provide the project's 2.5-megawatt OGT2500 gas turbine that will combust the

bio-oil and generate electricity. Ramsey Machine Works, Ltd., meanwhile, will work with DynaMotive and UMA Engineering to fabricate the pyrolysis plant, capable of processing 100-tonnes of biomass feedstock per day.

Perry noted that OPG already gets a very small portion of green power from biomass, but the BioThermTM BioOil project marks its first direct investment in the renewable technology. Currently, the biopower included in OPG's green power offering, marketed under OPG—EvergreenTM Energy, comes from power purchase agreements.

"We're carefully and conservatively looking at this new BioOil plant as an additional option," said Perry. "At this point, the goal is to prove the pyrolysis technology in a commercial environment."

All of the project participants are looking well beyond the current project. For example, Ramsey Machine Works, Ltd. and UMA Engineering are collaboratively developing an adaptive process that will allow companies interested in similar projects to build on the existing 100-tonne per day module plant, using up to three additional 100-tonne modules for a total 400-tonne per day plant.

"We expect the project to meet the energy demands of Erie Flooring and Wood Products, plus it has capability to begin contributing about 1.5 megawatts of power to OPG's green energy portfolio in 2004," said Kingston. "We're confident that after seeing a commercial project of this scale, more energy companies will begin investing in BioOil facilities."

A Technology for Our Times

"This is an incredibly flexible, clean and cost effective technology for electric energy companies and their customers," said Kingston. "Some companies may choose to build BioOil plants because of the need for distributed generation, some may need the renewable energy to meet state portfolio standards, some may want to sell emission credits to other companies burning dirtier fuel, and still others may use the BioOil to replace fossil fuels in their own plants. With our model, they can build and market to suit their needs."

He continued, "Traditional hydrocarbon oil would need to sell for less than $15 per barrel to be competitive with BioOil. Oil prices that low are just not realistic in today's day and age, so BioOil really does have a ready advantage."

Another factor in the equation is transporting fuel sources to where energy is produced. When produced from locally harvested biomass in markets that can use the BioOil right away, BioOil easily competes with the full life cycle costs of hydrocarbon oil. Add to that ancillary benefits – like the sale of value-added char or trading pollution credits – and the process really begins to pay off for electric companies and their customers.

Thus far, DynaMotive has successfully produced BioOil with about 70 different feedstocks, making it practical to produce virtually anywhere and as easily transportable as diesel oil. Although the finished product has higher specific gravity than diesel oil, it has lower viscosity and flows more freely.

Mark Wilhelm, president of GreenBuilt Consulting and a long-time electric energy marketing and research leader, described BioOil as "environmentally sound, convenient, practical, innovative, efficient and economical." On top of all that, he said it supports the role of electric companies as community leaders, especially when it comes to environmental, economic, and quality of life initiatives and indicators.

"BioOil is a technology with legs," said Wilhelm. "It addresses many of the current issues that directly affect electric energy companies, and it provides opportunities to partner with key accounts, government agencies, environmental organizations, economic development, and even agricultural and forestry interests. There's also a potential for BioOil to someday be used in several utility-specific applications, such as environmentally-friendly treatment of wooden poles." ■

The process also appears to be gaining favor as a way for thinning forests, especially in light of recent fires in the Western United States and resultant public and media attention given to forest management.

DynaMotive's Chief Forester Dr. Luc C. Duchesne, who is on loan from the Canadian Forestry Service's Great Lakes Forestry Center (GLFC) in Sault Ste Marie, Ont., is currently working to help develop additional commercial BioOil opportunities.

He added, "We have the technology to export that energy, and that's especially important now because we are reaching what's called Hubbert's Peak. That means that, more and more, energy is becoming a critical issue. In fact, it's the most critical issue controlling economic growth."

According to University of Saskatchewan Chemical Engineering Professor A.K. Delai, another Canadian researcher working extensively with BioOil and DynaMotive, biomass already supplies about 15 percent of the world's energy, and has long been identified as the world's largest sustainable source of renewable energy. On average, he says, one-third of the total energy supply of Third World countries comes from biomass, whereas the contribution in industrialized nations is about 3 percent.

Resources needed to produce BioOil are globally abundant, easily accessible, renewable, and greenhouse gas neutral. Plus, by converting biomass to BioOil, companies overcome what have traditionally been drawbacks to using biomass. Its compatible with fuel infrastructure, can be used with easily modified gas turbines and reciprocating engines, and increases energy density by seven-to-one over traditional biomass. ●

By:
Travis White
Vice President of Marketing
Datria

Raise Your Voice and Lower Your Costs:

Adding Voice to Your Mobile Strategy

The Ins and Outs of Mobile Communications

Many power utilities are laying plans for how to improve communications with their mobile workforces, especially with their field service crews. By improving the flow of information to and from mobile employees, companies can achieve three different objectives:

1) **Cost Reduction –** A good mobility strategy helps ensure that the right truck with the right parts and the right technician skills gets to the right place at the right time. This often results in fewer truck rolls, less overtime pay, and greater efficiency.
2) **Improved Productivity –** One utility with a comprehensive mobility strategy reports that, because it shares more timely information and uses resources more effectively, it now completes an additional 1 1/2 jobs per technician per day. The company also reports that supervisor productivity has improved: while supervisors used to manage eight technicians each, they now manage 11.
3) **Improved Customer Satisfaction –** Better information means better predictability, which means that you can inform your customers more precisely about what's going to happen and when.

This is all well and good, but choosing and implementing a mobile solution takes planning and preparation. A confusing array of technologies, devices, standards, and protocols can complicate the process. If you choose wrong, you could wind up in a technical blind alley with few options. Here are some of the questions you'll need to wrestle with:

- **Which device?** Should you use a PDA with a phone built in or a phone with a PDA on the side? What's the future of WAP? When will 3G take off? Should you use a Windows® device or a Java device? Does everyone need a laptop?
- **Voice or data?** Which one do you need most? If you want both, how do users know when to use their voice and when to use the keyboard? How long does training take?
- **Which standard?** Do you use standards like VoiceXML, which is ratified by the World Wide Web Consortium (W3C) or SALT, which is proposed by Microsoft®?
- **Which protocol?** CDMA? GSM? 2.5G? 3G? 802.11b? 802.11g?
- **Which users?** Do all your users need the same device? Will you give the device to your contractors or only your employees?
- **What cost?** What's the total cost of owning these devices? How does a user communicate if the device is lost? What data are lost when the device is lost? How do you add new business functions to the device?

Remember the Apple® Newton? It was supposed to be the next big thing. Without very careful planning and a little luck, you could wind up with an equally obsolete device at the heart of your mobility solution.

Voice – The Latest Word in Mobility

After going through a litany of questions and technologies, you'll probably find that simpler is better. Voice-enabled applications offer a proven alternative to the confusing array of mobile technologies. With a voice application, a mobile employee uses a telephone to speak and listen to your enterprise applications. The voice application "listens" to the employee, converts their voice to data, and updates the enterprise system. The application then "reads" the data in the enterprise system and "speaks" it to the employee. The process is very similar to calling a dispatcher except that the mobile employee speaks directly to the computer. No dispatcher is required to mediate between the employee and the system.

Voice-enabled applications draw on recent advances in speech technologies to deliver very high recognition rates. If you've called an airline to inquire about a flight time, you've probably already used one of these systems. While

initially deployed to customer-facing applications, these same technologies are now becoming popular in employee-facing applications such as field service management.

Voice applications typically include architectural features that can provide compelling business and economic benefits. These include:

- Employees can use the system anytime, anywhere, from any phone line. You get better information more quickly.
- Training and deployment times are radically reduced since voice is universal and the infrastructure is already in place.
- You don't need to buy new enterprise software. The voice application simply speech-enables your existing software.
- The device is a simple telephone. If it's lost, no data are lost and a substitute is easily found. Plus, it's equally available to employees and contractors.
- It's a "thin" client solution. The application runs on a server in a central facility. If you need to update the business logic, you can do it in one place. Every subsequent caller immediately receives the new functionality. Partially because of this, thin client solutions are much less costly than fat client solutions.
- In addition to "speaking" information from the enterprise system, many voice applications can also push the information via text messaging or e-mail. Mobile users can see the information on their phones or pagers.
- The system will never become obsolete – unless we somehow lose the ability to speak.

Where Does Voice Fit?

For these and other reasons, many electrical utilities are starting to deploy voice applications as a key component of their overall mobile strategy. The question is, where does voice fit best? For electrical utilities, there are two answers: 1) Business Process Improvement; and 2) Outage Management. Let's take a look at both.

Business Process Improvement

Voice applications are very successful in business processes that:

1) Require frequent contact between mobile workers and a central facility;
2) Update or retrieve multiple data elements that change frequently;
3) Involve business-oriented information, such as scheduling, billing, payroll, expenses, vehicle maintenance, parts replenishment, or customer data ;
4) Require real-time information to improve operational efficiency (e.g., workforce scheduling), customer satisfaction (e.g., what's the status of my repair?) or revenue enhancement (e.g. cross-selling or up selling).

Many business-oriented voice applications involve fairly routine data that must be refreshed several times per shift. For instance, companies can use voice technologies to shift from static to dynamic scheduling. In static scheduling, field crews pick up all their work tickets at the beginning of the shift. With dynamic scheduling, each crew is assigned one job at a time, and when they finish, they call for the next job. A voice-enabled application captures the information about each job, looks up the next one, and speaks the assignment to the crew. A utility company in the southern United States shifted to dynamic scheduling and fairly quickly reduced overtime costs by 22% because it could balance workloads more effectively. It also improved customer satisfaction because it could respond more quickly and schedule work more predictably.

Business process improvement often involves customers as well as your own technicians. When your technicians visit a site where a customer is present, they often need additional information in a hurry. For instance, your technicians may be on site to repair item X. While there, the customer asks if they could also "take a look at" item Y. Suddenly, your technicians need to know things like: Do we have time to do the additional work? Is Item Y under warranty? If not, what's the cost? Do we have the right parts? The simplest, fastest way to get this information is through a voice-enabled application that can quickly query various enterprise systems and speak the results over the phone – and possibly sell additional products and services to boot.

Outage Management

Voice applications are also a perfect fit for outage management. In fact, the bigger the outage, the greater the voice advantage. Most electrical utilities maintain reciprocal agreements with sister companies to lend workers to each other in emergencies. The problem is that the different workers from different companies are trained to use different workforce scheduling systems. Thus, when workers arrive at an emergency location, there's no common way to assign them tasks and keep track of what's been completed and what remains to be done. The result is often poor coordination and a longer recovery cycle than would otherwise be needed.

Voice applications can help you coordinate your emergency resources more effectively. The reason is simple: voice is universal – everyone already knows how to use a voice-enabled system. One major power utility has established a simple protocol when organizing hastily assembled emergency workforces. The company simply asks on-loan employees to bring a cell phone with them and then uses "tailgate training" to teach the workforce how to use the voice-enabled system. The process takes about half an hour.

Voice-enabled systems have proven themselves invaluable in outage management situations. Affected utilities can organize emergency workers more quickly and coordinate their efforts more effectively. They can also keep track of what work has been completed and what remains to be done. This information can be crucial to improving customer and media communications.

Voice – The Future Is Now

Voice applications have three fundamental advantages: they're natural, they're universal, and they're time-tested. They're also available today. Voice companies have packaged standard field service processes as "shrink-wrapped" applications. Leading electrical utilities are already seeing the benefits of using our oldest communication method to solve our newest productivity, cost control, and customer service problems. ■

About the Author

Travis White is the Vice President of Marketing at Datria. Based in Englewood, Colorado, Datria is the world's leading supplier of voice-enabled applications for field service automation. Contact the author at: travis.white@datria.com or through the Datria website at www.datria.com.

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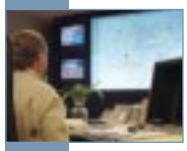

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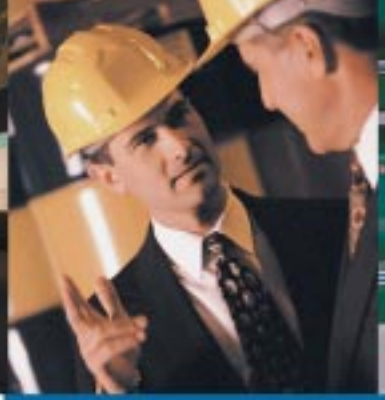
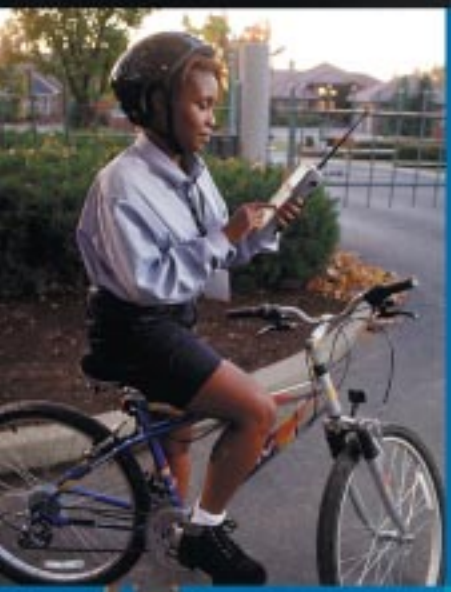
30	Satec	www.oksatec.com	Outside Back Cover
31	Spintelligent (PTY) Ltd.	www.spintelligent.com	33
33	TechAdvantage	www.techadvantage.org	17
34	The Von Corporation	www.voncorp.com	10
35	Unique Concept Ltd.	www.uclsafetysystems.com	12
37	WIRE Services/Manitoba Hydro	www.wireservices.ca	18



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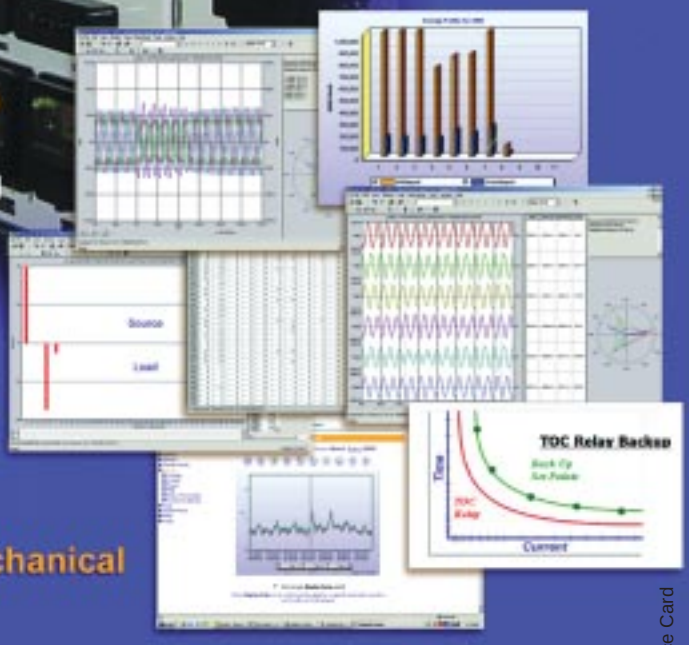

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  - Fault Analysis and Recording - Sequence of Events
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