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**INDUSTRY 4.0 AND WOMEN IN ENERGY**

Elisabeth Monaghan, Editor in Chief

According to research conducted by global nonprofit Catalyst, women make up 15 percent of senior management positions within the utility industry. While the gender gap in the energy sector still must be addressed, it appears that more women are assuming leadership roles in energy.

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Green Mountain Power

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**LAUNCHING A DRONE INSPECTION PROGRAM**

Alex Babakov, Aeriosense Technologies

Drones are emerging as the next evolution in technological advancements in asset management. Whether you have a drone inspection program already, are considering implementing one, or if drones have not yet made their way up on your list of priorities, there is no denying this is a trend you need to keep on your radar.

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**ENERGY 4.0, REVOLUTION OR FAD?**

Edgar Sotter, Systems with Intelligence

Some have started calling a recent energy trend "Energy 4.0" to highlight the magnitude of the transformation they expect it will bring to the electric industry. However, given the implicit risk involved in the adoption of new technologies, and the criticality of the operations in the electric industry, it would be reasonable to doubt the massive adoption of these technologies to the point of calling it a revolution.

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**IEEE EXPLORES DIVERSITY IN A GLOBAL WORKFORCE**

Kathy Herring Hayashi, IEEE WEI ILC

Today, many major initiatives work towards continuing to encourage women to stay and flourish in technology fields. One event that gathers thousands of industry leaders to address women's leadership within the energy sector is the Women in Engineering International Leadership Conference (IEEE WIE ILC). The 2019 IEEE WIE ILC was held this year, May 22-24 in Austin, TX.

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**A MATTER OF SCALE**

Erik Brandstaedter, G&amp;W Electric

One investor-owned utility in Illinois called upon a long-standing industry partner, based in Bolingbrook, IL, to help provide a scalable approach to distribution automation so the utility could provide reliable power to its 1.2 million customers.

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**SURVIVING HURRICANE IRMA**

Hormoz Kazemzadeh, OSI Scott Bishop, Lakeland Electric

In 2017, Hurricane Irma — a Category 5 Atlantic hurricane with winds as high as 160 mph — reached the state. The impact was staggering. When it struck, it downed or interrupted a majority of the powerlines in Lakeland's network with fallen trees and airborne debris. At the height of the storm, 90,000 customers lost power — close to 75 percent of Lakeland's customer base.

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## GUEST EDITORIAL

**THE DIGITAL UTILITY SOUNDS COOL, BUT IT'S A LOT OF WORK, TOO**

Mike Smith, SAS

Here, we will look at the utility industry's digital journey in three phases: the smart infrastructure build-out, data-driven use cases and industry transformation. In this context, we'll look at how utilities have had to re-invent themselves from risk-averse, electro-mechanical entities, to leaders at the forefront of the digital revolution, and what many call "Industry 4.0."





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GUEST EDITORIAL

#### DISRUPTION OF ADMS IMPLEMENTATION DEMANDS FOCUSED TRAINING

Rich Cummings, The Mosaic Company

What started as a series of initial innovations like smart meters and smart switches rapidly progressed to the introduction of significantly more sophisticated and complex distribution solutions. Electric distribution operations control centers evolved from wall maps and printed trouble tickets to outage management systems (OMS). Moreover, control centers are quickly embracing and investing in advanced distribution management systems (ADMS).

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POWERFUL FORCES

#### KUMI PREMATHILAKE, SVP OF ADVANCED METERING INFRASTRUCTURE, ACLARA

Elisabeth Monaghan, Editor in Chief

Meet Kumi Premathilake, our Powherful Force for Q3, 2019. With a background in chemical engineering and a senior executive role with Aclara, Premathilake understands the science and technology behind both water and electric utilities. She also is a gifted communicator – especially when addressing the needs of or encouraging the input from her colleagues, industry partners and utility customers.

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## PG&E MAKING SUBSTANTIAL PROGRESS ON WILDFIRE SAFETY EFFORTS TO PROTECT CUSTOMERS, COMMUNITIES

July 2019

Pacific Gas and Electric Company (PG&E) continues to make substantial progress toward its Community Wildfire Safety Program (CWSP) goals, intended to mitigate the risk of wildfires and protect customers and communities.

"We've accomplished a lot, but there is more work to do. Our system is better today (7/15) than it was yesterday, and it will be better tomorrow than it is today. We are committed to further reduce wildfire risks and help keep our customers and the communities we serve safe," said Sumeet Singh, PG&E vice president of the Community Wildfire Safety Program.

Here are updates on the various facets of the CWSP, through June 22, 2019:

- **Wildfire Safety Inspection Program (WSIP):** Visual inspections of 96 percent and aerial inspections of 92 percent of approximately 50,000 transmission structures in high fire-risk areas. Inspections of all 222 substations in high fire-risk areas. Inspections of more than 99 percent of nearly 700,000 distribution poles in, or adjacent to, high fire-risk areas.
- **Wildfire Safety Operations Center (WSOC):** The 24/7 command center for PG&E's wildfire monitoring and response opened in 2018. The WSOC, based in PG&E's San Francisco headquarters, has received technological and facility upgrades in 2019.
- **Weather stations.** These provide hyper-local information and increase situational awareness. Approximately 430 have been installed since 2018, including 231 so far this year. PG&E will have 600 in place by the end of 2019 and 1,300 by 2022.
- **High-definition wildfire cameras:** An effective tool for early spotting of wildfires, 31 cameras have been installed so far with a goal of 100 in place by the end of 2019 and 600 by 2022.
- **Enhanced vegetation management:** Work to keep trees and power lines separate continues. The 2019 forecast is to prune or remove approximately 375,000 trees along approximately 2,500 miles of distribution lines. More than 50 percent of the line miles have been inspected so far with 20 percent cleared.
- **Reclosers:** These devices shorten a power outage by sending a live pulse when an issue is detected. On days of higher wildfire risk, this functionality is turned off for safety. In 2019, we added remote-functioning capability to all operational line reclosers in High-Fire Threat District (HFTD) Tiers 2 and 3 (737 devices with remote capabilities.) This work was completed by June 1 and will further increase our ability to isolate and minimize the scope of PSPS events by sectionalizing portions of circuits within HFTD Tiers 2 and 3. We will do additional sectionalizing over the next five-plus years.
- **Helicopters.** In June, PG&E finalized the agreement with CAL FIRE to make four PG&E-owned heavy-duty helicopters available at CAL FIRE's discretion to support fire response and suppression activities as needed. [These helicopters are used for normal PG&E maintenance & operations activities when not required by CAL FIRE.]
- **Public Safety Power Shutoff (PSPS):** The first PSPS event of 2019 took place in June. Customer and stakeholder communications, including open houses and workshops, continue. Customers should make sure their contact information is updated at [www.pge.com/mywildfirealerts](http://www.pge.com/mywildfirealerts)
- **System hardening and resiliency:** So far in 2019, PG&E has completed installing stronger and more resilient poles and covered power lines on 44 circuit miles with a goal of completing 150 circuit miles in 2019 and 7,100 miles in high fire-threat areas in the next 10 years.

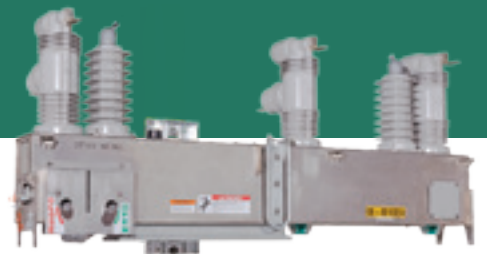
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- Pilot resilience zones. By the end of the 2019, our goal is to have at least one resilience zone operationalized. Construction is ongoing on the first pilot in Angwin in Napa County. The resilience zone is designed to be quickly isolated from the broader electric grid when a PSPS is initiated and to receive power from temporary mobile generation connected to a new pre-installed interconnection hub. Additional grid hardening was recently added to the scope of the pilot project to maximize risk reduction, which extended the operational target beyond June 1 to the end of 2019.

Additionally, PG&E has begun daily aerial fire detection patrols across thousands of miles of its service area. This is the sixth year for these patrols which assist the U.S. Forest Service, CAL FIRE and local fire agencies with early fire detection and response. Early detection of smoke or fire allows fire agencies to quickly respond to accurate locations. The patrols began on June 1 and will run until October 31, depending upon conditions. Seven planes will fly daily routes from late afternoon until dusk, the time of day when wildfires are most likely to start.

For more detailed information on the various pillars of the Community Wildfire Safety Program, visit our website, [www.pge.com/wildfiresafety](http://www.pge.com/wildfiresafety)

## BPA POWERS UP FUTURE ENERGY INDUSTRY WORKERS

July 2019

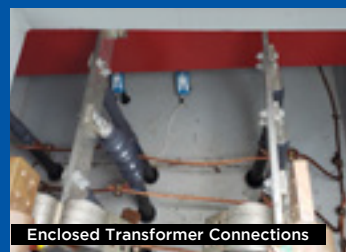
The energy sector faces shortages of skilled laborers, such as electricians, welders and lineworkers - skills that are essential to maintaining power in the region.

***“The industry as a whole needs more talent in every group, in every facet: lineworkers, electricians, substation operators, the advanced crafts,” said PJ LeCompte, apprenticeship program manager at the Bonneville Power Administration.***

In an effort to boost awareness and interest in careers in the crafts and trades, more than 50 BPA volunteers stepped away from their daily duties May 17-18 to support the 2019 Oregon Tradeswomen's Career Fair, an event that focuses on a part of the population that is underrepresented in the trades.

Nearly 2,500 students, women and families attended this year's career fair at the National Electrical Contractors Association and International Brotherhood of Electrical Workers training center.

***“This career fair is an outstanding venue to create awareness and interest in crafts and trades where qualified workers are in high demand,” said Robin Furrer, BPA's vice president for Transmission Field Services. “The beauty of this event is you look around and you see all these faces of eager young women that really want to have a career that takes them outside, that uses their physical skills in addition to their brains and make a really good living.”***



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# FINGRID INCREASES REAL-TIME MARKET INFORMATION ABOUT BALANCING POWER

July 2019

Fingrid is extending the test for real-time publication of balancing power pricing data. The aim is both to increase the transparency of the electricity market and to create a level playing field for all operators on the market. Fingrid targets to enable the participation of flexible electricity consumption, production and storage in the electricity trade increasingly close to real time.

The testing period for the real-time publication of balancing power pricing data in scarcity situations was launched in late 2016 and it was extended in December 2017. The practice of the extended testing period has been that pricing data is to be published in situations where Finland is decoupled into a separate regulation area

and remaining voluntary up-regulation bids amount to 150 megawatts or down-regulation bids to 100 megawatts. The change made today (7/15) eliminates the megawatt limits, and the price of the last activated balancing power bid will always be published in situations where Finland is decoupled into a separate regulation area.

Pricing data will be published in connection with the state of the power system picture. Pricing data will also be available in Fingrid's open data service. Finland is the only Nordic country to publish balancing power pricing data in real time. The testing period will be continued until further notice.

# NATIONAL GRID COMPLETES ACQUISITION OF LEADING RENEWABLE ENERGY DEVELOPER

July 2019

Today (7/15), National Grid (LSE: NG; NYSE: NGG), through its competitive non-regulated unit National Grid Ventures (NGV), completed its \$100 million acquisition of Geronimo Energy - a leading wind and solar developer in North America. The deal, which was announced on March 7th, 2019, has now satisfied all regulatory requirements and closing conditions.

National Grid has also entered into a joint venture agreement with Washington State Investment Board (WSIB'). National Grid contributed approximately \$125 million for a 51% controlling share in the joint venture which acquired 379 megawatts of solar and wind generation projects from Geronimo Renewable Infrastructure Partners.

"Today's (7/15) announcement underscores National Grid's commitment to the decarbonization of our energy system. We believe in the long-term growth potential of renewable generation, driven by consumer demand and technological advances," said Badar Khan, president of National Grid Ventures.

Founded in 2004, Geronimo Energy has developed over 2,200 megawatts of wind and solar energy projects that are operational or currently under construction.

The company also has a strong development pipeline of projects in various stages of development throughout the United States. Geronimo Energy has a strong track record of being farmer-friendly, community-driven and customer focused, which aligns with National Grid's core values. Geronimo Energy will continue to be headquartered in Minneapolis, with satellite development offices and operational project facilities located throughout the country.

"We're very pleased to have officially joined the National Grid family today," said Blake Nixon, chief executive officer for Geronimo Energy. "With our joint expertise, we have an exciting opportunity to grow our project portfolio, expand upon our commitments to project host communities and landowners, and offer our customers increasingly high quality, competitive renewable generation."



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# SAINT JOHN ENERGY TO INCREASE EFFICIENCY OF POWER DISTRIBUTION

July 2019

Building a resilient and efficient power distribution grid helps minimize environmental impacts and costs, providing long-term rate stability for consumers. With support from the Government of Canada, the regional economy and the competitiveness of local industries will benefit from Saint John Energy's scalable improvements to the power grid.

Saint John Energy will deploy multiple grid-connected resources to manage the supply and delivery of energy during peak demand periods. It will also use artificial intelligence to predict energy loads, so that grid-connected energy resources can reduce operational costs and improve system efficiencies.

The Government of Canada, through the Atlantic Canada Opportunities Agency (ACOA), is providing a non-repayable contribution of \$950,000 for this project. Wayne Long,

Member of Parliament for Saint John-Rothesay, on behalf of the Honourable Navdeep Bains, Minister of Innovation, Science and Economic Development and Minister responsible for ACOA, made the announcement on July 11. Natural Resources Canada also contributed \$4.1 million to the project.

Economic growth and the creation of good jobs for Atlantic Canadians require innovation and diversification. Support for this project is one way the Government of Canada is growing the innovation economy by working to advance projects that increase efficiency while minimizing the environmental costs of power-grid operations. Projects like this also contribute to the Atlantic Growth Strategy outcome of long-term economic prosperity in the region.

*“Our government is investing in strategic projects to empower communities across the country so Canadians in every region can compete and succeed in the global economy. Today's investment in Saint John Energy is building on our competitive advantages by increasing the efficiency of power distribution, minimizing the economic and environmental costs of its operations, and providing long-term rate stability for its customers to boost economic growth and create good, middle-class jobs for Canadians.”*

- The Honourable Navdeep Bains, Minister of Innovation, Science and Economic Development and Minister responsible for ACOA

*“From manufacturing to exports to technology, Saint John is a hub for many diverse industries. I am pleased that our government is supporting the competitiveness of our business community through this project that will increase the efficiency of our power grid and provide stable rates for consumers. These improvements will enable Saint John Energy to continue to be a leader in the innovation of power grids and power delivery as Canada transitions to a low-carbon economy.”*

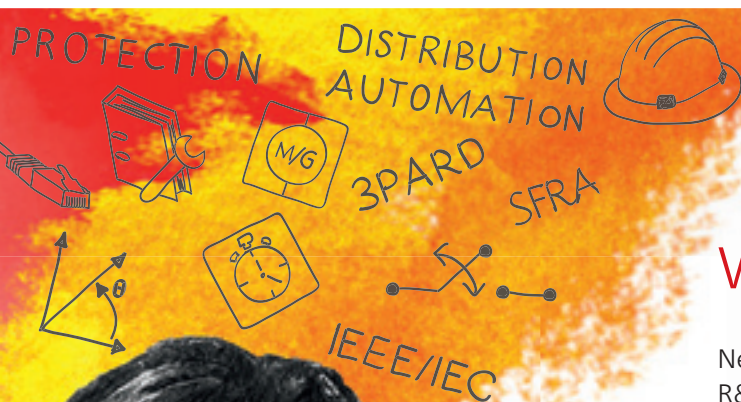
- Wayne Long, Member of Parliament for Saint John-Rothesay

***“Saint John Energy is committed to providing consumer choice with smart home energy services while maintaining low electricity rates. Funding will support smart energy initiatives that will reduce our impact on the environment as well as improve our cost structure. We are focused on making Saint John one of the greenest and most affordable energy cities in Canada.”***

- Ryan Mitchell, VP, Saint John Energy

#### Quick facts

- The Government of Canada invested \$950,000 in this project through ACOA's Regional Economic Growth through Innovation (REGI) program. Natural Resources Canada also contributed \$4,127,000 toward this \$ 11.7 million project.
- The Regional Innovation Ecosystems stream of the REGI program supports the creation and growth of inclusive regional ecosystems that support business needs and fosters an entrepreneurial environment conducive to innovation, growth and competitiveness.
- The REGI program continues to build on the objectives of Government of Canada's Innovation and Skills Plan.
- Saint John Energy, owned by the City of Saint John, has been providing electricity to the city since 1922.



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Jackie Peer  
Head of Strategic  
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# INDUSTRY 4.0 AND WOMEN IN ENERGY



**ELISABETH MONAGHAN**  
Editor in Chief

After a prolonged winter and a spring that was much too short, summer finally arrived. On the first day of summer, I attended an outdoor event taking place just east of Denver, Colorado. It was a good thing I had the foresight to wear my winter coat, but it was so chilly, I wished I also had thought to bring gloves and a hat. The foothills received a dusting of snow, and I was beginning to wonder if we would see sunshine any time soon. One week later, temperatures shot up past 90 degrees Fahrenheit. It is not uncommon for temperatures in the Front Range of the Colorado Rockies to shift quickly from cold-to-hot or vice-versa, but over the past few years, the fluctuations seem more frequent and more extreme. I tell myself these strange weather patterns force me to be more flexible.

While we adjust to the current weather patterns, the EET&D team is mapping out the editorial calendar for 2020. As we do every year, we will carry over certain topics that coincide with events or times of year (e.g., storm prevention and restoration for the third and fourth quarter issues, or upcoming technology trends for the first quarter issue), some of the best ideas for what topics we will cover come from our readers and industry partners. For example, we did not include Industry 4.0 in our 2019 editorial calendar, yet two of the articles in this issue touch upon the topic.

In his article titled “Energy 4.0, Revolution or Fad?” Edgar Sotter, who is the director of product strategies and client solutions for Systems with Intelligence, focuses on 4.0. Sotter presents arguments to support the adoption of Industry 4.0, but rather than gloss over the advantages, he points out the risks involved with this new technology – especially for the electric energy market.

Mike Smith, with SAS, gives Industry 4.0 honorable mention in his article, “The Digital Utility Sounds Cool, but It’s a Lot of Work, Too.” Digital technology has taken over how we live and how we access and share information. It also is changing the future for utilities. It may not be a simple undertaking, and not all utilities are eager to embrace the digital age, but those utilities that accept they no longer can afford to avoid digitization stand a better chance of surviving Industry 4.0 and whatever unknowns it has in store.

Another unplanned topic that shows up in more than one article in this issue is the role of female executives in the energy sector. According to research conducted by global nonprofit Catalyst, women make up 15 percent of senior management positions within the utility industry. While the gender gap in the energy sector still must be addressed, it appears that more women are assuming leadership roles in energy. Perhaps that is why three of the articles in this issue showcase women in power, starting with Virginia-based utility Green Mountain Power (GMP), and its CEO Mary Powell.

Since last year, when we first wrote about Virginia-based GMP, Powell and her team have continued their legacy as a small utility that is big on innovation. This issue's *Grid Transformation Forum* column tells the story of GMP's Resilient Home pilot through the experience of Erik Yunghans, a GMP customer participating in the program. As you read it, you, like the members of Yunghans' family who do not live in Virginia, may want to encourage your local utilities to explore something similar. You'll also see why we're so enthusiastic about the potential Resilient Home offers for utilities of all sizes. By the way, If you work for or know of a utility that is developing any new programs or products we should know about, email me. We would love to share your innovation with our readers.

Also in this issue, is a recap from IEEE Senior Member Kathy Herring Hayashi, chair of the sixth annual IEEE Women in Engineering International Conference. Held in Austin from May 22 -24, the 2019 event gathered more than 1,000 STEM leaders from around the world, who work to inspire, engage and advance women in technology. In her article, Herring Hayashi writes about some of the more poignant comments made during IEEE WIE. She also included information for anyone interested in learning about or who would be interested in speaking at next year's IEEE WIE conference.

Rounding out the topic of women holding leadership positions in the energy sector, we profile Kumi Premathilake, senior vice president of advanced metering infrastructure in this issue's *Powherful Forces* column. During the interview, I asked Premathilake to talk about her experience as a female executive in an industry made up mostly of men. Premathilake responded, "Sometimes we get so busy, we don't have time to think about things like what kind of an impact we have, but when I speak to others in the industry, it gives me an opportunity for introspection. I've been fortunate to be in a position of leadership, and discussions like the one we have had today, make me think how I can do a better job of paying it forward to the next generation." She cites an encounter she had with a younger female associate. The young woman told her she had seen Premathilake's name while walking past her office and decided to look her up. Recounting this story, the younger colleague also explained how excited she was to discover Premathilake was an executive within the company. "She did not know me, and yet, because I was a woman in a leadership role, I still had an impact on her. To me, it is a great honor to have that kind of influence, and I see it as a privilege not to be squandered."

*If you have an idea about emerging or innovative technology, or would like to suggest a topic to cover, please email me at [Elisabeth@ElectricEnergyOnline.com](mailto:Elisabeth@ElectricEnergyOnline.com).*

*Elisabeth*

# RESILIENT HOME: INNOVATING, CUTTING CARBON AND INCREASING RELIABILITY

BY KRISTIN KELLY, GMP AND ELISABETH MONAGHAN

When the app on Erik Yunghans' phone showed power going from his home in Moretown, Vermont onto the grid, he smiled. His Tesla Powerwall had just been installed days before as part of Green Mountain Power's Resilient Home program, and the energy flow showed it was working like a charm.

"It was awesome! I took a screenshot and showed family out of state," he said. "They're now writing to their utility (in New Jersey), asking 'why can't you be like GMP?'"

The Vermont power company's Resilient Home program offers customers in this rural, wooded state great reliability during storms – the Powerwall batteries start seamlessly and can power the whole home for up to 24 hours. Erik Yunghans' app showed his batteries sending energy to the grid because GMP also networks the stored energy in customers' homes to reduce demand during peaks, which cuts costs for all customers. Beyond the customer benefit and grid value to all customers, GMP's program announcement made a splash this spring, because it is a breakthrough in the utility world – GMP is using batteries as the meter for the home to track power usage.

"Our vision is a battery in every home. Our groundbreaking approach is making meters obsolete," Mary Powell, GMP's president and CEO, said with a smile. She's not surprised customers love it. "The battery replaces the meter with accurate energy measurement and fantastic resiliency. Think about what that means for storm restoration, for making both the home and the grid more resilient, and cleaner. Your lights stay on. You're comfortable while we work to get the poles and wires repaired. And, that stored energy you're using is clean – our supply is 90 percent carbon-free and 60 percent renewable."

Innovating, thinking ahead and looking around the corner to benefit customers is something Powell has become known for in the utility world. On a national scale, GMP is a relatively small utility – it has 265,000 customers serving 75 percent of Vermont, but the company has a track record of big, bold decisions. GMP was the first utility to partner with Tesla on home battery storage with Powerwalls, the first utility to earn B Corp certification with its rigorous social and environmental accountability standards, and it is one of the first utilities to commit to being 100 percent carbon-free by 2025 and 100 percent renewable by 2030. →





Louisa Wilson and Erik Yunghans with their children Evelyn and Anders at home in Moretown, Vt.

That accelerated push to reach 100 percent renewable made national headlines, and Powell says doing it in a cost-effective way for customers is both critical and achievable. “We must do this,” says Powell. “Making sure we’re providing great, affordable service for all of the customers we serve is at the heart of every decision we make. And being 100 percent renewable is no different. The science is clear – we are running out of time to make a difference to stop irreversible climate change. We can do this.”

When Powell says, “We can do this,” she’s speaking from experience. You don’t turn a small, traditional power company into an innovative dynamo without knowing how to get things done. Powell’s been CEO at GMP since 2008, but she started there a decade before that – leading human resources and workplace development after years in banking and finance in both Vermont and New York City. At GMP, she launched a transformation of company culture, to break down rigid corporate barriers to problem-solving. “Culture eats strategy for breakfast, lunch and dinner. The best laid plans will get bogged down and destroyed if your company culture isn’t set up to foster the kind of work you’re trying to do,” Powell says.

What that internal transformation looks like at GMP includes open offices and less bureaucracy. Powell decided the marble-clad, imposing company headquarters made no sense. She moved everyone out of their individual spaces to a revamped, open, light-filled office above the Transmission & Distribution garage nearby, where the line crews work. Open spaces foster communication – Powell’s desk is right next to the line workers. She also peeled away layers of stale process to make the company more nimble, with the motto being “fast, fun and effective.” Employees are empowered to make well-reasoned decisions to solve problems for customers. “We’re here to serve customers. That’s why we do what we do. That has to come first,” she says. The transformation seems to be working. Not only does GMP consistently land among top utilities for its size on JD Power’s customer service rankings; its innovative work also earned GMP a spot among Fast Company’s Most Innovative Companies in the World three years in a row (2017, 2018, 2019).

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“  
The program launched in 2017 and has also  
proved that storage can be key to controlling  
costs for all customers.  
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The Resilient Home pilot program, using the battery as the meter, fits into GMP’s customer-centric approach. The model benefits not only participating customers like Erik Yunghans but also all other GMP customers because of the projected \$1.5 million saved through peak shaving. Customers pay \$30 per month for two Powerwall batteries, and GMP can share their stored energy to drive down peaks. The pilot program has room for 500 customers – 250 leasing their batteries from GMP this way, and 250 buying their batteries from private companies around the state. GMP provides a discount for those customers to help reduce the cost while growing the third-party marketplace.



GMP President and CEO Mary Powell with her team accepting the Deane C. Davis Vermont Business of the Year Award from the Vermont Chamber of Commerce and Vermont Business Magazine, May, 2019.

“The minute I saw the email from GMP about Resilient Home, I emailed right back and picked up the phone to sign up,” Yunghans said. “I’d tried to get into GMP’s original Powerwall program, but it was full. I wasn’t going to miss out on this one!” Others had the same idea. GMP had incredible customer interest – more than 1,000 customers reached out in the first 24 hours after the announcement.

The original Powerwall program Yunghans is talking about was pivotal for GMP – 2,000 batteries are now in customers’ homes, and word is out that battery storage can conveniently power you through outages. The program launched in 2017 and has also proved that storage can be key to controlling costs for all customers. GMP calls on that stored energy network several times a year to go after peaks. Josh Castonguay, GMP’s Chief Innovation Officer, says overall the pilot will save customers about \$2 million. →





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He explains how gratifying it was to see years of hard work paid off when GMP used the network of Powerwalls for the first time last summer.

“Our system worked seamlessly to drive down demand at the key moment it needed to, which translates into savings for customers. This is what our new energy future looks like, delivering on innovations while finding ways to cut costs and carbon emissions,” Castonguay said. That experience is fueling the new step of also using the battery as the meter in the new Resilient Home pilot program.

Yunghans made it into the program as he was one of the first to call in this spring. His home is in a rural area, and the Powerwalls give him great, low carbon power backup instead of a traditional generator. The battery-as-meter aspect of this program appeals to his clean energy/innovative technology ethos – the family heats and cools their home with heat pumps networked with GMP for peak control, and he also drives an electric vehicle. “This is a great step toward a cleaner grid and energy future, and we’re thrilled!”

That’s music to Powell’s ears. She describes the batteries in the Resilient Home program as breathing in and out. “This is the future of the energy system happening now, right here in Vermont. The power is low carbon, flowing

back and forth. It means more independence for customers while driving down costs for them and making an impact on climate change. It’s a win-win-win!”

GMP wouldn’t be in this pioneering spot without years of work toward this vision of a cleaner, more distributed grid. It was during GMP’s first Powerwall program that the energy data coming from the batteries created an ‘Aha’ moment. “We realized that there could be a way to maximize this technology for customers and make the energy system even more efficient by using it as the meter. You don’t need that chunk of metal on the side of your house anymore.” GMP then took that idea, and developed a way to make the meter concept work. In testing before the pilot launched, the innovation team found that the data from the Powerwall was just as accurate as what was coming from smart meters. The company applied for a patent before announcing the pilot this spring.

“Does this mean meters are going away? We hope so,” Powell said. “We’re learning from this pilot the way we’ve learned from the others we’ve done. We push forward, learn, and innovate for customers. We build on our experience and keep customers as our North Star. In this time of climate crisis and disruption in the energy business, it is serving our customers well.”



Line worker Matt Butler at GMP's solar-storage facility in Pantton, VT.

#### ABOUT MARY POWELL

**Mary Powell** is nationally recognized as an energy visionary, positioning Green Mountain Power as a leading energy transformation company. She has served as president and Chief Executive Officer for GMP since 2008. Powell has initiated and implemented a strategic and comprehensive restructuring of the company that dramatically transformed GMP, and she has been the backbone of a cultural transformation and service quality improvement. Under Powell's leadership, GMP became the first utility in the world to become a member of B Corp, showing a commitment to use energy as a force for good.



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# LAUNCHING A DRONE INSPECTION PROGRAM





### **ALEX BABAKOV**

Findings by Navigant Research suggest that, globally, electric utilities are expected to spend over \$13 billion a year on drones and robotics by 2026; that's a dramatic rise from about \$2 billion currently. This trend can also be seen in Google searches for "drone inspection," which has increased 20 fold in terms of web search volume in a span of eight years, from 2011-2019. Within the same timeframe, the search volume for "drone pilots" increased by a whopping 557 percent. Drones are emerging as the next evolution in technological advancements in asset management. Whether you have a drone inspection program already, are considering implementing one, or if drones have not yet made their way up your list of priorities, there is no denying this is a trend you need to keep on your radar.

#### **Where we are now – where we're headed**

Utilities have been slowly making headway into leveraging drones to help with inspections, though it has not been a transition that can be implemented on a whim. Technology has been improving steadily in terms of drone capabilities and reliability. Although regulations have not been fully fleshed out and still pose some challenges when operating in controlled airspace (e.g., flying near airdromes) and for flights beyond a few thousand feet (Beyond Visual Line of Sight, BVLOS), investing in drone inspection is proving successful for more electric utilities every year.

Electric grids are complex systems with 200,000 miles of high-voltage transmission lines and 5.5 million miles of distribution lines in the United States. These lines all need regular inspection. For utilities wanting to make a first foray into establishing a drone inspection program, consideration needs to be given to these assets, dispersed over vast areas and with different access, safety and environmental challenges. However, even with these challenges, drone programs are demonstrating increasingly the benefits of drone inspection in allowing faster access, reduced safety risks and better inspection vantage points – leading to considerable return on investment. →





There are significant reductions in safety risk through drone inspection of overhead facilities. Drones keep inspectors/operators safely on the ground. The flights are held at a safe distance from energized conductors and supporting structures. Using drones, it is easier to analyze the influence of system conditions and make necessary improvements to increase asset reliability; drones may examine the condition of supporting structures, detect defective elements and reveal a range of deficiencies. Thermographic power line inspection can easily determine problems and defects otherwise hidden. The ability to reach hard-to-access structures is also a huge benefit of drone inspection.

Many utilities have been taking a crawl, walk, run approach and are experimenting by performing a few ad-hoc inspections with basic, off-the-shelf equipment. This is not exactly the case for trail blazers such as Xcel Energy, who in April 2018, became the first American utility to gain approval for BVLOS flights. The company estimates that flying drones beyond line of sight will eventually cost between \$200 and \$300 per mile, compared to helicopter flights that cost an average of \$1,200 to \$1,600 per mile. While cost-savings is a significant consideration, utilities need to have a realistic idea of the many factors

involved in implementing drones before deciding on how much to invest in their program.

For utilities on the verge of deciding whether or not to launch their inspection program, and thinking about how to do it best, what are the next necessary steps?

### **Creating your road map: Understanding existing programs to effectively integrate drones**

Boiling it down to the basics, utilities can consider running an internal drone program, bringing in external contractors, or adopting a hybrid approach. Regardless of the option, the first step is to consider the company's roadmap going forward and to determine the vision and future goals of the inspection program. For many utilities starting a drone inspection program, it also requires a close look at the existing inspection methods and processes. Whether the current inspection processes rely on helicopter or foot patrol, the goal is to determine how a new drone inspection method can be integrated to supplement the current process. A useful decision tool is a cost model, which can help determine the current optimal approach, as well as a plan for the future, by examining the gaps and benefits of various inspection options and considering factors specific to your utility.





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This analysis will provide insights into how efficiencies and synergies can be achieved and could point to a phase-out of certain types of inspections.

Staffing and expertise are also critical to examine as utilities create their roadmap. Utilities will need to have some internal expertise in drone technology. This means deciding whether the company will build an internal department, or if it makes more sense to contract out all or parts of the process.

To kick-start a program, utilities should be aware that while the latest technology might produce greater efficiency, there is also a significant technology cost ramp-up if you decide to pursue the latest updates. It is important to find a middle ground, where you achieve an optimal level between personnel and technology costs.

As government and industry standards tighten, it is important to be aware of any knowledge gaps that might equate to hours of training needed. For many utilities that might currently lack the internal staff to launch a drone inspection program, having an RFP for contractors that can fill the expertise gap while building an internal department may be of great value.

When considering an internal or external approach, utilities will also need to decide whether they want to own their technology or not, and the cost of technology maintenance each decision entails. If the company is not ready to integrate drone technology in-house, it is important to consider how the contractor can best work with existing technology infrastructure and systems.

Consider the following different approaches of three North American utilities: One large utility company in the United States implemented a hybrid model: they decided to train a couple of pilots in-house to conduct ad-hoc inspections several dozen times a year. During the first year, the company worked with a contractor in addition to in-house pilots, and they are now set to scale up their routine inspections of their power grid. For this company, safety was a key draw to implementing drone inspection, with the goal to see a reduction in accidents.

A smaller utility in Canada, serving about 1.2 million customers, decided to use contractors to inspect a section of their power lines to start, with the possibility of having people trained internally on an ad-hoc basis in the future. This company received new data insights from a vantage point they couldn't have accessed with their conventional methods of in-house inspection. →

Another big player in the United States, serving 2.4 million electric customers, leveraged internal resources, and chose to perform routine drone inspections that accounted for 15 percent of their systems. Today they are thinking ahead to scaling this to 100 percent, with the creation of a drone department complete with pilot and managers. This company was able to see a 40 percent reduction in inspection costs.

## How to begin

You have finished your prework and organizational alignment. Now what? If the answer is that you are not fully committed to building an internal inspection program, chances are you will be looking at external contractors, or at least a hybrid model. When bringing in external resources as part of your program, it is crucial to engage with contractors that have experience in and understand electric utility business. There have been many instances of poor project results because of that missing subject matter knowledge.

As in other aspects of business, the partnership between the utility and the contractor takes time to hit its full stride; there is learning for both. Be ready for some imperfect results in the beginning and plan your rollout accordingly. The utility must also realize that they will give up some control of the process to allow the contractor to leverage their expertise. The key is to set requirements and metrics diligently, so as to allow the contractor to provide you with excellent results over time.

The scope of the services should be clear on deliverables. Will the contractor only capture the inspection photos and data? Will this data be analyzed internally? Are there enough internal resources for that task or will this also need to be contracted out? If the deliverable involves inspection results, discuss upfront if your contractor has the ability to conduct the required analysis. How will the data make its way from the field to the office? Integration is worth considering as the program grows.

If the initial scope of the program includes only ad-hoc inspections (e.g., there is only a need for specific inspection once in a while, up to several times a year) and not necessarily routine inspections, working with internal staff is a good option. If there are fewer inspections per year, a small internal team may suffice. The downside to hiring external contractors in this situation is the effort required to get the right contractor in place, a process that involves properly scoping out the work, deliverables and all the due diligence.

Any type of drone inspection program, internal or external, requires proper documentation and data collection. A benefit of using drones is that they can greatly simplify reporting by integrating with your back-end databases and workflows, given an appropriate solution is chosen. It is important to consider how your solution will interface with the existing information technology structures to seamlessly handle condition assessment results and data.

## Further considerations

Launching a drone inspection program to best fit inspection intervals, human resources allocation and technology capital is the first step. Once this process is started, consider some of the other important aspects of the program:

- *Automation:* In order to increase efficiency and to maintain the consistency and quality of the inspection process, automation is key. Consider how to scale the inspection program and conduct routine drone inspections in the future.
- *Fleet management:* Keeping track of pilots, drone platforms and all related operational activities can quickly become a challenge for larger operations. Putting tools in place to help manage a drone fleet is invaluable in coordinating the emergency response efforts of the drone team.
- *Data management:* For many, it is a big hurdle at the forefront of creating a drone inspection program. A strategy should be in place to leverage the collected data and create a dataset for machine learning-enabled, automatic identification of defects. Consideration should be given to all the internal stakeholders who would benefit from access to the data collected during inspections. You want to avoid siloed data; having a centralized information portal is key. '

Preparing for BVLOS operations is another consideration. Although there is no regulation around the use of this technology yet, some utilities are starting to run research studies and pilots to test out inspections performed at a greater distance. Laying the groundwork for BVLOS operations means utilities will be ready when regulations are implemented.

## Parting thoughts

Although each utility has its own unique situation and will need to develop a custom approach to inspections and asset management, learning from peers and industry partners can be incredibly valuable. Consider what path other organizations have taken that might be similar in terms of geography, size or philosophy to see what is applicable to your organization. One of the ways to engage with peers and industry is through organizations like CEATI or EPRI. Looking at what others are doing, even after developing your roadmap and vision, can be illuminating, offering perspectives you might not have considered.

### ABOUT THE AUTHOR:

**Alex Babakov** received his bachelor's in engineering physics from University of British Columbia and is a registered professional engineer in the Province of British Columbia. In the past 15 years, Babakov has been involved in the electrical utilities industry, working in the area of asset management, testing and condition assessment of transmission and distribution utility equipment. He has previously held positions at Powertech Labs, a subsidiary of BC Hydro, leading research and development of condition assessment techniques and tools for transmission and distribution equipment. Currently at Aeriosense Technologies, Babakov leads the integration of automated drone inspections into day to day infrastructure management. Babakov has authored and contributed to reports and articles for CEATI, CIGRE, and industry trade publications.



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# ENERGY 4.0, REVOLUTION OR FAD?

EDGAR SOTTER

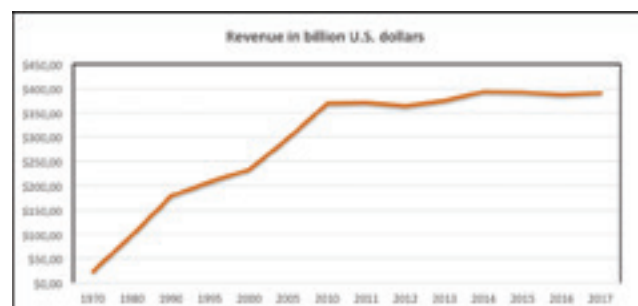
Some utilities have started to implement in their operations the same emerging technologies that are driving the fourth industrial revolution in the manufacturing sector. The Industrial Internet of Things, (IIoT), machine learning and cloud computing are among the new technologies that are already being used by a few electric companies around the globe for asset monitoring <sup>[1]</sup>, smart metering <sup>[2][3]</sup>, predictive maintenance <sup>[4]</sup> and the operations of distributed energy resources. (DER) <sup>[5]</sup>. Some industry experts have started calling this trend Energy 4.0 to highlight the magnitude of the transformation they expect it will bring to the electric industry. However, given the implicit risk involved in the adoption of new technologies, and the criticality of the operations in the electric industry as well as the reliability standards in this sector, which are among the highest in any industry, it would be reasonable to doubt the massive adoption of these technologies to the point of calling it a revolution. On the other hand, the electric energy market in developed countries is on the verge of experiencing dramatic changes that will affect the capacity of utilities to be self-sustainable. The emerging technologies that are making possible Industry 4.0 in the manufacturing market can be a life saver for electric companies, helping them adapt to what may be soon the new normal in the electric energy market.

## Maximizing profits while the market slows down

The continuous demand for electricity that fueled the growth of the electric industry during the 20<sup>th</sup> century seems to be coming to an end. Despite the increase in population and the fact that we are living in a time when

most activities depend 100 percent on electricity, its demand in developed countries is plateauing <sup>[6]</sup>, mostly due to more energy efficient appliances and buildings, as well as the off-shoring of power-intensive industries <sup>[7]</sup>. Electric companies have felt the impact of this decline in their revenues, which have not increased for the past 10 years, as shown in **Figure 1** <sup>[8]</sup>.

Businesses that are high electricity consumers are also leveraging Industry 4.0 technologies to minimize their energy costs. Energy management systems based on Artificial Intelligence (AI), analyze the electricity market, the global electricity consumption and the business' energy needs to automatically decide when it is a good time to buy electricity from the distribution company, and when it is better to get it from an alternative source of energy, like storage devices or solar panels. →



**Figure 1.** Revenue of the electric power industry in the United States from 1970 to 2017 (in billion U.S. dollars) <sup>[8]</sup>





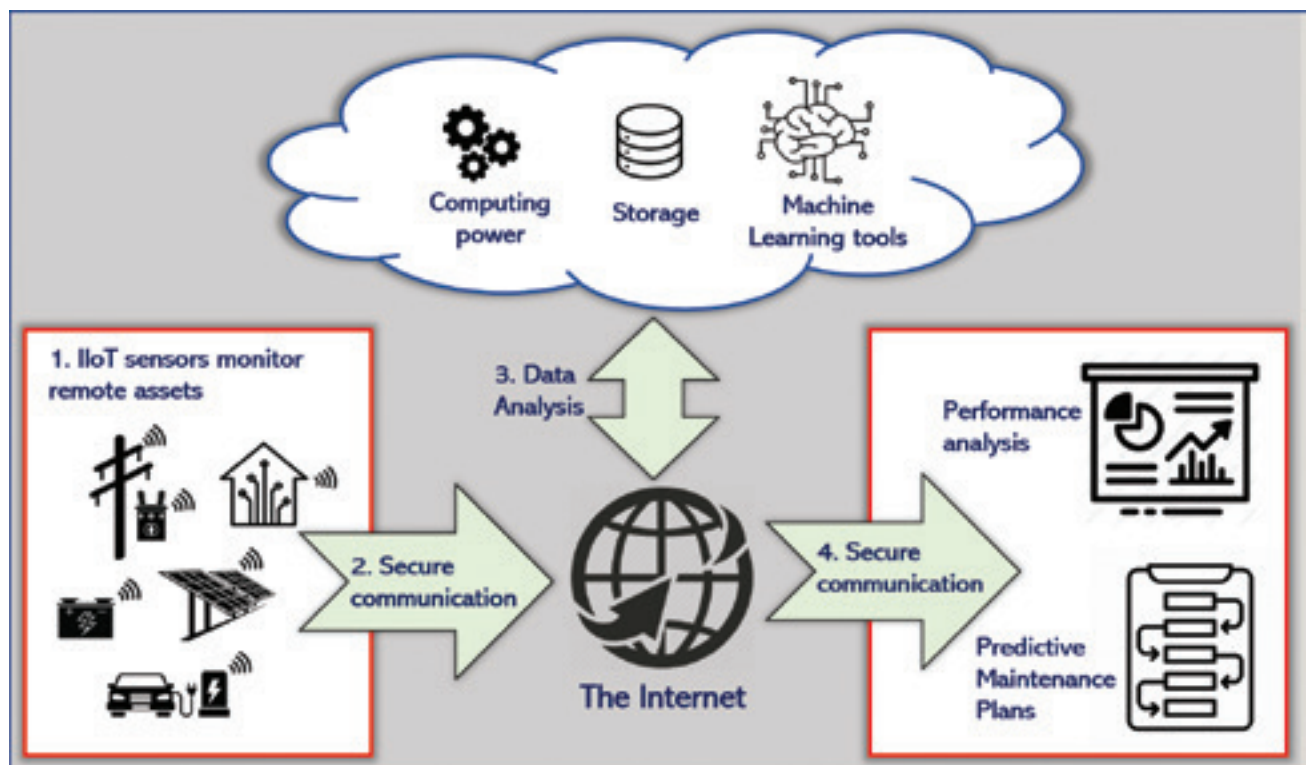
In jurisdictions where the annual cost of electricity for businesses is based on their contribution to the major global peaks of consumption during the year, AI systems can provide up to 30 percent reduction in energy costs<sup>[9]</sup>. As the use of these solutions becomes more popular, the global consumption of electricity among businesses during a year will eventually flatten out, reducing, even more, the revenue of utilities and leaving them with underutilized assets.

With a decrease in consumption, and because it is not easy to increase electricity rates in regulated markets, electric companies are left with only one option in the short and medium term to maintain their current profits: reduce their operations and capital expenses. This reduction will be difficult to achieve in the coming years, given the reliability demands from customers and regulatory bodies, and the fact that many assets in the grid are reaching their end of life and will soon need to be replaced. Many utilities have implemented preventive maintenance plans, based on manufacturer recommendations of each piece of equipment, equal to maximizing the lifetime of their assets, reducing their capital expenses and the losses from asset downtime. However, the labour costs involved in these plans can easily offset the savings in capital. It is here where the emerging technologies of Industry 4.0 can provide a solution.

Electric companies can use IIoT sensors to gather behavioural information about their assets. The information can then be analyzed together with the data from the rest of the power network using machine learning algorithms and big data techniques, to predict issues and help operations managers decide when to maintain or replace an asset. Predicting when equipment will need maintenance not only maximizes its lifetime but also reduces the number of truck rolls, personnel deployed in the field and material stock. All of these translate into savings for the utility (**Figure 2**).

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AI systems can provide up to 30 percent reduction  
in energy costs  
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It is important to note that the use of sensing devices to monitor assets is not a novelty for electric companies. They have been using sensors in their operations for decades already. These sensors are used to monitor load, voltage, phase, temperature and oil viscosity among other parameters, and provide SCADA operators an early



**Figure 2.** Using Industry 4.0 technologies to enable predictive maintenance in the electric industry



warning of the malfunction of specific equipment. There are, however, two main differences between the existing sensing and actuating devices in the power grid, and IIoT devices proposed in Industry 4.0.

First, the smaller size, as well as lower the power requirements and price of IIoT devices, compared to incumbent technologies, makes them much easier to deploy in larger quantities in any equipment or at any point in the network. Given that most legacy equipment does not have embedded sensing devices, IIoT sensors are the best solution to acquire the data needed for predictive maintenance plans for older assets, as well as areas in the network that were not previously monitored.

The second difference is the use of the Internet for communication instead of private networks to bring the data from the sensors. This characteristic is crucial to deploy these devices in a fast and cost-effective way all across the power grid. It is estimated that to manage the number of sensors and amount of data needed for an application like this one, the investment required to upgrade an existing communication network will be at least 60 percent its initial cost<sup>[10]</sup>. By relying on Internet Service Providers, (ISP) to manage the communications, utilities are diverging the enormous cost involved in building up, upgrading and maintaining a private communication network, to a third-party company whose core competency is communications, and therefore can provide a better service at a lower price.

Emerging technologies like IIoT and machine learning are thus the best options electric companies have when they migrate to predictive maintenance plans. No legacy technology can match what these technologies can offer today at the same cost, reliability and time of implementation.

### The democratization of energy

The electric energy market, which has been an oligopoly for the past hundred years, might soon resemble a perfect competition with multiple buyers and sellers, exponentially increasing the complexity of operating and maintaining the grid to levels beyond the capabilities of the current monitoring and control systems. This shift in the market means that utilities will have to look for faster and more efficient ways to operate their power networks.

Physical constraints for electricity transmission, as well as the high amount of capital required for infrastructure and operations, limited the number of sellers in the market since the beginning of the electric industry. However, technological developments in recent years have resulted in cost reductions and increased efficiency in the technologies involved in the use of Distributed

Energy Resources, (DER), favouring the adoption not only in utility and industrial sites but also in commercial and residential buildings. Many of these buildings and houses can now generate and store electricity and can decide when to consume the electricity they generate and when to consume electricity from the power grid. Sometimes, they will generate more electricity than they can consume, which means they have the potential to become sellers of electricity. Although the current regulatory environment in most countries will not allow individuals to become sellers of electricity at their will, at least not using the power grid, the political support for an open market of electricity is gaining momentum as it is seen as the only way to achieve the commitments made regarding climate change<sup>[11]</sup>.

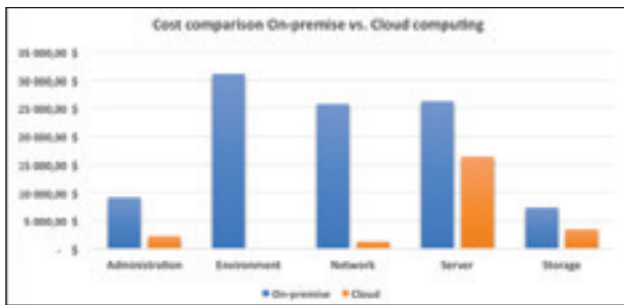
The democratization of energy will create enormous challenges for electrical companies because the distribution grid was never conceived or designed to convey power in two directions; however, it is required for the incorporation of DER into the grid. Therefore, overvoltage problems and power quality issues will be introduced to the grid when the use of DER starts scaling. The growing popularity of electric vehicles (EVs) adds another level of complexity to the topology of a future electric grid with multiple sellers of electricity. EVs can use their batteries to buy or sell electricity from the grid or a building, depending on their energy needs and the electricity rates, and behave as a mobile DER, transforming the topology of the grid from a static to a dynamic one<sup>[12]</sup>. Electric companies will have to monitor and control voltage and power flow at each potential point of connection with DER's to eliminate their impact to the reliability of the grid, creating a wave of petabytes of data that must be stored and processed.

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“The democratization of energy will create enormous challenges for electrical companies because the distribution grid was never conceived or designed to convey power in two directions; however, it is required for the incorporation of DER into the grid.

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Utilities will have to rely on better technological tools than the ones currently in use, to adapt their operations to the new power grid. →



**Figure 3.** Cost comparison exercise between on-premise and cloud computing. The cost of accessory hardware and space required for on-premise service (environment) as well as the network makes this option the most expensive <sup>[13]</sup>

The capital and maintenance cost involved in deploying sensors all over the grid and building a communication infrastructure to support them can be extremely high, so it is a dead-end road for many companies. As previously mentioned, IIoT technology would be the perfect solution to monitor the entire grid at almost an atomic level while minimizing costs and deployment time. IIoT sensors and actuators, designed to consume little power and to use the Internet for communication, can be deployed very fast, most of the time without causing any disruption to the grid, and without having to build a communication infrastructure to support them.

Electric companies will also have to deal with the constant petabytes of data generated from these devices, a task that will require a computational power that most of these companies can't support. Some of the operations needed for data analysis use peaks of computational power, meaning a utility will have to own expensive hardware that will probably be underutilized most of the time. The best solution would be to share this resource with other companies in the same situation, something difficult to do with in-house servers and computers, but easily done with cloud computing. After accounting for hardware, software and maintenance, the cost of sharing a computing resource on the cloud can be around 20 percent of the cost of owning it on-premise, as shown in **Figure 3** <sup>[13]</sup>. Reputable providers of cloud computing services, like Google, Microsoft or Amazon, have secure facilities with many reliable and powerful computers that can be used on demand by people, businesses and institutions to process high amounts of data at a fast speed. The distributed locations of these facilities and the use of the Internet to receive and transmit data ensures the availability of the service. The high-tech cybersecurity tools and strict physical security policies guarantee the integrity and anonymity of the data. Cloud computing also allows for easy and cost-effective scalability and technology upgrades, making it the best option to deal with the processing requirements of managing the new grid, from a technical and economic view.





## What's next?

The previous paragraphs provided arguments to support the adoption of Industry 4.0 technologies by the electric industry. There is enough evidence to believe that Energy 4.0 is happening. It is not just about the implementation of novel, nice-to-have technologies, but it is a response to real changes in the electricity market, to which electric companies will have to adapt if they want to remain self-sustainable. It is now clear why some electric companies around the world have already started to try these technologies in their operations, despite the risks involved.

The applications of Industry 4.0 technologies shown previously (i.e., IIoT and cloud computing) are just two examples of how these new technologies can become extremely valuable for electric companies in the coming years. However, there are still some very important issues regarding the implementation of these technologies that must be addressed before they can be adopted massively within this industry. Issues like cybersecurity, service availability, reliability and data ownership, are among the common concerns raised by operations and information technology stakeholders in utilities. In Part II of this series, we will cover these concerns and explain how some utilities are already using these technologies and still meeting regulatory requirements, like NERC-CIP, as well as eliminating any risk to their operations.

## References

- <sup>[1]</sup> M. Rebolini, A. Valant and F. Pepe, "Terna's approach for on-line monitoring system Intelligent management of Assets in a large scale infrastructures," in AEIT International Annual Conference (AEIT), Cagliari, ITALY, 2017.
- <sup>[2]</sup> P. Gordon, "Swedish telco to connect 900,000 IoT-enabled smart meters," 25 04 2019. [Online]. Available: <https://www.smart-energy.com/industry-sectors/smart-meters/swedish-telco-to-connect-900000-iot-enabled-smart-meters/>.
- <sup>[3]</sup> T&DWorld, "Ameren Missouri to Deploy 1.4 Million Advanced Meters," 30 04 2019. [Online]. Available: <https://www.iotworldtoday.com/2019/04/30/ameren-missouri-to-deploy-1-4-million-advanced-meters/>.
- <sup>[4]</sup> ECG, Inc., "TEPCO to Implement ECG's Predict-It™ Analytics Solution," 24 04 2019. [Online]. Available: <https://www.prnewswire.com/news-releases/tepco-to-implement-ecgs-predict-it-analytics-solution-300836700.html>.
- <sup>[5]</sup> P. Darrell, "Innovative Microgrid Will Power Finnish Distribution Center," 01 01 2019. [Online]. Available: <https://www.powermag.com/innovative-microgrid-will-power-finnish-distribution-center/>.
- <sup>[6]</sup> J. Fox, "Americans Keep Using Less Electricity," 01 03 2018. [Online]. Available: <https://www.bloomberg.com/opinion/articles/2018-03-01/americans-electricity-use-just-keeps-falling>.
- <sup>[7]</sup> W. Richter and W. Street, "Demand for electricity is dropping – and that could shake the power industry to its core," 4 December 2017. [Online]. Available: <https://www.businessinsider.com/electricity-demand-dropping-power-industry-negative-impact-2017-12>.
- <sup>[8]</sup> U.S. Energy Information Administration, "Electric Power Annual," EIA, 2018.
- <sup>[9]</sup> Stem Inc., "Reduce Global Adjustment charges with the world leader in energy storage," Stem Inc., 2019. [Online]. Available: <https://www.stem.com/canada/>.
- <sup>[10]</sup> F. Grijpink, A. Ménard, H. Sigurdsson and N. Vucevic, "The road to 5G: The inevitable growth of infrastructure cost," 02 2018. [Online]. Available: <https://www.mckinsey.com/industries/telecommunications/our-insights/the-road-to-5g-the-inevitable-growth-of-infrastructure-cost>. [Accessed 21 05 2019].
- <sup>[11]</sup> C. Hubbuch, "As utilities embrace clean energy, some lobby for a more democratic solution," 20 05 2019. [Online]. Available: [https://madison.com/wsj/news/local/environment/as-utilities-embrace-clean-energy-some-lobby-for-a-more/article\\_e8aaeed5-eb89-5896-b272-1aa988be4abe.html](https://madison.com/wsj/news/local/environment/as-utilities-embrace-clean-energy-some-lobby-for-a-more/article_e8aaeed5-eb89-5896-b272-1aa988be4abe.html).
- <sup>[12]</sup> P. Dzikiy, "Honda, GM blockchain project to examine how EV owners could earn revenue from smart grids," 20 05 2019. [Online]. Available: <https://electrek.co/2019/05/20/honda-gm-blockchain-smart-grids/>.
- <sup>[13]</sup> R. Vidhyalakshmi and V. Kumar, "Determinants of cloud computing adoption by SMEs," *International Journal of Business Information Systems*, vol. 22, no. 3, pp. 375-395, 2016.

### ABOUT THE AUTHOR:

**Edgar Sotter** has doctorate in electronic engineering from Universidad Rovira I Virgili (Spain), an MBA from University of Toronto (Canada) and a Bachelor of Science in electrical engineering from Universidad del Norte (Colombia). Sotter's fields of expertise are in sensors, monitoring systems and computer networks. Sotter has experience working at Siemens/RuggedCom, and he is currently the director of product strategies & client solutions at Systems With Intelligence.



# IEEE EXPLORES DIVERSITY IN A GLOBAL WORKFORCE

KATHY HERRING HAYASHI

Increasing the representation of women in the global technology workforce, and in particular, in engineering, is critically important. From the initial engineering design to overall usability and, ultimately, to the impact of technology on society, it is important to have diversity involvement. In addition to other success metrics, this diversity ensures complete functionality as well as removing unintended consequences of bias.

More than 4500 women responded to a recent IEEE survey on women's experiences in technology. The detailed findings outlined some of the discouraging experiences and perceptions within the industry. For some, they were assigned lower-level tasks, and comments were addressed to males in the room when the questions should have been addressed directly to the female respondents. Further, the second page of the survey results listed a summary of concrete suggestions from the respondents on how the issues that women face

might be addressed. These included raising awareness of the status quo of women in the workplace and highlighting top performers to raise their visibility within their organization.

Today, many major initiatives work towards continuing to encourage women to stay and flourish in technology fields. The Women in Engineering International Leadership Conference (IEEE WIE ILC) is an annual event that focuses on providing leading-edge professional development for mid-level and senior women. One initiative, which was launched more than five years ago at the IEEE WIE ILC, provides professional women in technology, whether in industry, academia, or government, the opportunity to create communities that fuel innovation, facilitate knowledge-sharing and provide support through highly interactive sessions designed to foster discussion and collaboration. →











**Women engineers, in particular, may be looking to advance to the next step in their careers, and part of that involves obtaining the executive training needed for career advancement.**



At the 2019 IEEE WIE ILC, held in Austin on May 23 and 24, attendees were able to participate in leadership workshops and to receive training on emerging technologies. The conference provided sessions on cutting-edge technologies, including artificial intelligence (AI), machine learning (ML), digital transformation and security topics. Other sessions included leadership presentations on executive coaching, professional development and networking opportunities.

Some specific highlights to the WIE ILC 2019 conference showed advanced trends and topics in AI. As part of the disruptive technology track, Kay Aikin, co-founder, and CEO of Introspective Systems, provided an interactive conversation on autonomous artificial intelligence in re-imagining the electrical grid. In the past, Aikin worked on four Department of Energy (DOE) projects around researching and developing electrical grid architectures and AI-powered “transactive energy” controls. She is now leading an applied science company specializing in complex systems applications. In her talk, Aikin discussed high-level requirements for future grids that are affordable, high quality and sustainable. She also outlined the complexity of the problem and solutions and management through autonomous, distributed AI systems.

Keynote, Candace Worley, VP and chief technical strategist of McAfee, discussed the overall field of artificial intelligence and the human factors we must consider. The benefits of AI are a given, but some bias must be considered, including measurement, sample, algorithmic and prejudice. Privacy breaches and automated systems that have legal and financial consequences against certain groups are among risks. There are grey areas where convenience and privacy boundaries are not clear. Worley emphasized the importance of incorporating privacy and security protections into all AI and ML projects. She also encouraged attendees to hold both themselves and their colleagues accountable to this principle, while also remaining transparent about the benefits and risks of AI.

Also at WIE ILC, a panel of leaders in the energy sector presented insights and thoughts on innovation and cultural

change fueling and sustaining the energy revolution. Led by Veronica Bermudez, Ph. D, who is the energy center director for the Qatar Environment and Energy Research Institute (QEERI), the panel included representatives from renewable energy sectors, cleantech companies and electric grids. Emerging technical development focuses on many areas of energy management, storage, conversion and efficiency, which can be enhanced by identifying and developing new technical strategies. In this highly-competitive market, bringing in innovative solutions, including AI and ML, will provide opportunities for breakthrough technologies, which can lead to major innovations to sustainable energy environments.

In addition to strong, technical skills, professional development is also key to leadership and advancement. Kathy Gruver, Ph.D., CHt, provided a talk titled “Professional Development on Communication.” To ensure effective communication takes place, Gruver advised attendees to watch for verbal versus non-verbal cues. She suggested that attendees should consider how others might react before approaching a conversation with them. Then, before engaging in dialogue, make sure the timing works for everyone involved. While speaking, seek clarification and repeat the other person’s words back to them. Keep in mind that stress can affect another’s perception, causing them to filter their responses, which would increase the inability to communicate clearly. When someone does not respond, Gruver reminded her listeners to remember that “silence is golden” and to understand it is okay to be quiet and wait. Leaders who are effective communicators frequently make slight tweaks as they speak, which makes for more effective communication and improves the overall potential for impact.

Catherine Jereza, ambassador to the U.S. Clean Energy Education and Empowerment (C3E) Initiative, led a panel discussion titled “Empowering Women to Power up to the Executive Ranks.” Initiatives, such as C3E recognize outstanding women leaders and accomplishments in clean energy. Ambassadors from this group discussed their work to close the gap and increase the participation, leadership and success of women in clean energy fields including symposiums, awards and community.

Overall, diversity in technology, like training data in AI, design and implementation of technical components, and discussion during technical development, is important. Although female engineers have made great strides in the past few decades, the number of women in high-level positions is still low compared to male engineers. Jereza suggests retention rates for women in engineering increases when they join professional networking groups or attend conferences, which specifically target diverse audiences to engage and support their attendance.



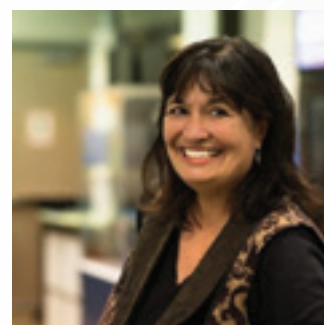
Women engineers, in particular, may be looking to advance to the next step in their careers, and part of that involves obtaining the executive training needed for career advancement. Because the types of female roles in technology are diverse, we can explore and apply best practices from what has been learned by women in other verticals – such as women in government, women in scientific laboratories or women in business. When we talk about success, we start with the premise that it is as unique and individual as each person that comes to the conference, with an understanding that it is also based on the goals that a woman sets and reaches for herself.

The 2019 WIE ILC was a great success. As we prepare for the 2020 WIE ILC, I would love to see more participation from female engineers, focused on energy and utilities. We are looking for female executives to speak at WIE ILC in 2020, to highlight and share their latest innovative work in the electric energy fields. We will continue to provide both technical and professional classes, training, and workshops that can help a woman in technical fields to continue to thrive. Our goal is to inspire women to be engaged and work to empower them in ways that can promote them in their careers.

The results of that survey can be found at <http://entrepreneurship.ieee.org>.

#### ABOUT THE AUTHOR:

**Kathy Herring Hayashi**, chair of the annual IEEE Women in Engineering International Leadership Conference (WIE ILC), has been involved in semiconductor software her entire career and currently works at Qualcomm Inc., analyzing and optimizing semiconductor workflows in large-scale computing environments. From start-ups to large companies, she has held a variety of positions including leadership roles in technical development, applications engineering and information technology.



# A MATTER OF SCALE

## HOW AN INVESTOR-OWNED UTILITY IN ILLINOIS INCORPORATED A SCALABLE APPROACH FOR DISTRIBUTION AUTOMATION WITH THE HELP OF A NEIGHBOR

BY ERIK BRANDSTAEDTER

Across the country, power outages are becoming the norm. Consequently, customers are growing increasingly frustrated, and more costs are being incurred by utilities, leaving them with no choice but to pass that cost along to customers. That is why the goal for every utility is to improve power reliability constantly. Providing reliable power does more than keep customers happy; it helps reduce economic and productivity losses. One investor-owned utility in Illinois had become all too familiar with frequent outages. Fortunately, when it looked for help, it didn't have to look far. A long-standing industry partner and neighbor, based in Bolingbrook, IL, was called upon to help the utility provide a scalable approach to distribution automation so the utility could provide reliable power to its 1.2 million customers in Illinois.

While it's almost impossible to predict when an outage may occur, technologies are available today that can help utilities restore power automatically and minimize the number of customers affected by sustained outages. Customers across Illinois experienced sustained outages due to not having a way of automatically restoring power. Whenever a fault or loss of voltage would occur in a non-automated system, a utility worker would need to be

notified and then send out a repair team to restore power manually. Across a service territory of 43,700 square miles, it can be extremely difficult and time-consuming to determine the location of an outage before traveling to fix it. While it is simple to minimize the reliability issue by implementing an automated system, this typically requires significant capital and financial investment to install the necessary pieces of equipment.

But other solutions were possible. The utility company knew that in working with one of its long-time suppliers and partners, they could collaborate to improve its power reliability on multiple existing 69 kV circuits. The electrical provider and its power systems provider collaborated in the past, and when the two companies put their best engineers together, customized, powerful solutions became possible. However, the vendor didn't manufacture sub transmission equipment to serve at the 69kV voltage level. To improve distribution system reliability, the provider's engineering team worked with existing SCADA system to provide FLISR (fault location, isolation and service restoration) functionality—something that had not been done before at the 69kV voltage level. →







### A new way to incorporate FLISR

When it comes to reliability improvements, FLISR is one of the most effective ways to improve reliability without exhausting critical human resources. Essentially, it's an automated way of restoring power as fast as possible to as many customers as possible. While FLISR can help minimize the impact of customers affected, it cannot prevent an outage.

Reliability metrics to evaluate FLISR operations:

- 1) The number of customers interrupted (CI),
- 2) The number of customer minutes of interruption (CMI).

In a 2014 Department of Energy study of five utilities with FLISR functionality established, FLISR was found to reduce the number of customers interrupted (CI) by up to 45 percent, and the customer, minutes of interruption (CMI) by up to 51 percent for an outage event. Both metrics are components of the equations that are used to calculate System Average Interruption Frequency Index (SAIFI) and System Average Interruption Duration Index (SAIDI).

For years, the utility felt the performance of its frequent and lengthy outages was unacceptable. As mentioned, the major reason for the sustained outages was the lack of a way of automatically restoring or redirecting power. At the time, the current system required a dispatcher to be notified of an outage. From there, a crew would be dispatched to travel to the circuit to ascertain the reason for the outage and rectify the issue to restore the circuit. This total process could take as long as six to eight hours

to complete. On average, it took one-third of that time to find the location of the fault. Often, the source of an outage may not be known until a customer flags it, such as reporting a down tree on a powerline.

The power solutions vendor and utility's engineers jointly installed a server computer located in a secure location equipped with the software provided by the vendor to facilitate FLISR functionality at the 69kV voltage level. With the FLISR software installed, the server computer can now process all the information it receives from the SCADA system to determine actions that need to be taken to minimize the number of customers affected during an outage. The initial solution incorporated 12 switches and eventually scaled to 44 switches across six (6) 69kV circuits that provide real-time and critical data that can be analyzed, acted upon and corrected.

FLISR applications provide greater visibility into outages and can automatically reroute power, ultimately minimizing the number of customers impacted by outages. With fewer and shorter power disturbances, a utility can improve its standard reliability metrics such as the System Average Interruption Frequency Index (SAIFI) and the System Average Interruption Duration Index (SAIDI).

### How it works

The FLISR software has a simplified one-line diagram that includes all 69 kV switches that participate in this automation logic. All devices on this one-line diagram have

data points mapped to them which are being exchanged with the existing SCADA system via an Inter-Control Center Communications Protocol (ICCP). Utilizing those data points from the field, the software sends commands back to the SCADA server, which then distributes the commands back out to the devices as needed.

It is unlikely that a single software package can be replicated for utilities across the country. There can even be several differences within an individual utility. One challenge going into this project was that FLISR had never been done at the 69kV voltage level. Typically, this solution is utilized at voltage levels between 5kV and 38kV. The vendor's team worked with the utility engineers to design, engineer, test, deliver and commission a system as a pilot involving twelve (12) 69kV switches.

During that pilot, the vendor trained utility operators to become self-sufficient and expand the system to grow the FLISR installation. The ability to scale the system independently from the vendor lead to significant savings for the Illinois utility provider and will continue to do so over the coming years. Completing the pilot project involving 12 switches and providing in-depth training to utility workers was completed within 12 months in 2016. With the first line being the most problematic portion of the system, the utility decided to expand to other lines in the system to try to capture more events. Over the next two years, the FLISR system was expanded to the currently participating 44 switches.

### Scalable changes made - positive results

While the main benefit of a centralized FLISR system has having the ability to minimize the number of customers subjected to an outage, the biggest benefit of this solution is that it enabled the electric provider to augment the FLISR functionality to its existing SCADA system, eliminating the need to make sweeping changes to the existing system.

Another reason the utility selected this software is because of the additional operation mode feature. Most automation solutions that are offered with FLISR functionality

offer only two modes of automatic operation, on or off. The software installed by the vendor provides three modes of operation: on, off and semi-automatic mode. Automated FLISR actions typically take a few seconds, while manually validated FLISR actions can take five minutes or more. The semi-automatic mode provides control room operators a report of suggested steps (switching orders) which provides the utility with critical insights and details on how and why the system will respond to the fault. This enables them to make the best decision to minimize the outage.

The semi-automatic mode also provides another layer of peace of mind. While some utilities might be wary of switching to a fully automatic system, the semi-automatic mode provides critical data and doesn't take any action by itself automatically. Initially, the utility let the system run in semi-automatic mode for the first six months after the completed pilot installation. During these first six months, the utility encountered three automation events that were captured in semi-automatic mode. The resulting switching orders gave the electric company the confidence to use the fully automatic mode and let the system run by itself for any future events.

Utilities are facing more pressure than ever to implement effective distribution automation solutions. Severe weather conditions are becoming more common, and customers and regulators are demanding that utilities increase reliability. By using this approach, The vendor leveraged existing switches and SCADA system to provide a very scalable approach to distribution automation without making a cost-prohibitive investment. While distribution automation is typically achieved by investing in equipment in the field such as overhead and padmount switchgear, with this solution, the utility can use instant data from the existing SCADA system to have FLISR functionality, without making a costly investment. Using the new FLISR software system, the utility can assess the situation and make decisions to restore power faster during an outage.

#### ABOUT THE AUTHOR:

**Erik Brandstaedter** is a distribution automation business development manager for G&W Electric and is based out of Washington, D.C. Prior to joining the G&W Electric LaZer® team in 2015, he spent six years working for ABB, both in the US and Germany. Brandstaedter earned his MBA from the School of International Business and Entrepreneurship in Berlin, Germany, and his Master of Science degree in electrical engineering from the University of Applied Sciences in Zittau, Germany. He is also a Certified Professional Electrician with a degree from the German Chamber of Industry and Commerce (IHK).





# SURVIVING HURRICANE IRMA

HORMOZ KAZEMZADEH AND SCOTT BISHOP



Lakeland at night

Located in the humid, subtropical heart of Florida, Lakeland Electric's transmission and distribution network regularly faces storm conditions ranging from typical thunderstorms to the most powerful tropical storms in the world. When inclement weather strikes their service territory, Lakeland must work quickly and safely to re-route or restore power to customers in very difficult situations.

In 2017, Hurricane Irma — a Category 5 Atlantic hurricane with winds as high as 160 mph—reached the state. The impact was staggering. When it struck, it downed or

interrupted a majority of the powerlines in Lakeland's network with fallen trees and airborne debris. At the height of the storm, 90,000 customers lost power — close to 75 percent of Lakeland's customer base.

Florida residents rely on numerous critical systems to survive, from air conditioning to life-support machines. Lakeland recognized the urgency of this widespread outage: Lives hung in the balance. Fortunately for everyone in their service territory, only five-days before the arrival of Hurricane Irma, the utility went live with a real-time operating system in their control room designed to manage electric distribution outages exactly like this one.

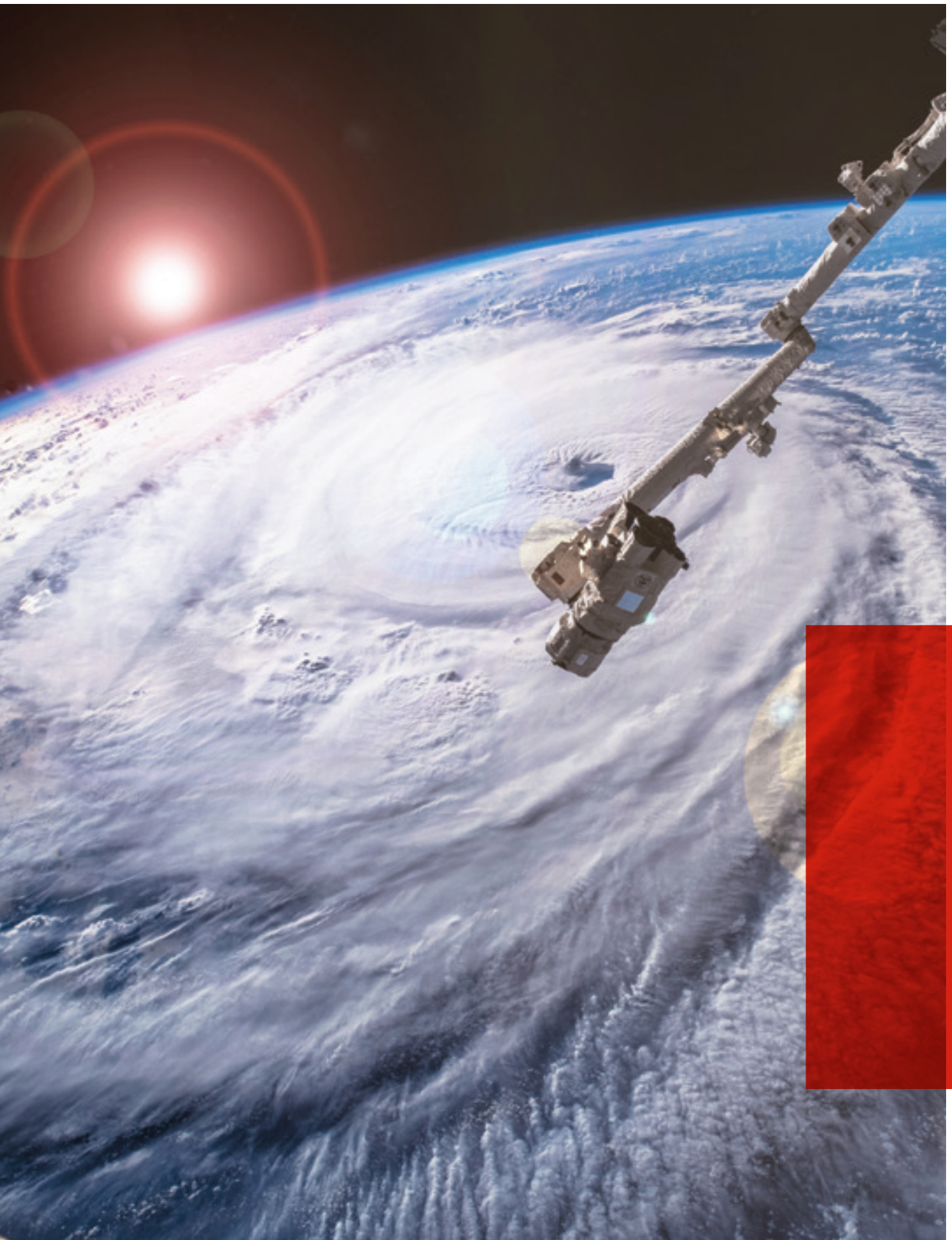
## Outage Management System

An outage management system (OMS) becomes integral to a utility's electric service when storms or disasters that cause significant outages occur in their service territory. →

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When inclement weather strikes their service territory, Lakeland must work quickly and safely to re-route or restore power to customers in very difficult situations.  
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Lakeland's OMS — supplied by a Minneapolis-based provider of open solutions — allowed Lakeland's operators critical access to the accurate, real-time status of their network, enabling them to efficiently manage outages and systematically restore power quickly and safely. With four operators and two field crew dispatchers working around the clock, Lakeland was able to restore power to about 60,000 customers within 48 hours and the remaining 30,000 customers within 12 days of Hurricane Irma.

Lakeland's OMS was implemented to better manage all areas of Lakeland's outage response times while keeping customers, management and regulators well informed about the scope, status and forecast of restoration efforts. The system utilizes a powerful outage analysis engine and Big Data database technology for processing thousands of inputs per minute, producing real-time, actionable information about the number, location and extent of power outages within the distribution system.

"The OMS provides our operators with a highly configurable and intuitive user interface to see what is most important at any given time, especially during a severe storm," said Scott Bishop, manager of system operations at Lakeland Electric. "Operators are able to quickly identify the highest-priority outage work and the nearest qualified response crew, then assign work with a click of a button."

Some of the key benefits of the OMS software used while responding to Hurricane Irma included:

- Timely and accurate awareness of customers without power including prioritization of VIP customers (e.g., medical) via AMI, SCADA and other data
- Fast processing of outage calls, network electrical data and job management via Big Data database technology
- Geographic network model mapping of outages with visualization (e.g., highlighting, etc.)
- Damage assessment information and hazards visible on network model map and attached to corresponding outage jobs
- Ability to efficiently locate and isolate faults
- Ability to assign available field crews to jobs with accurate information
- Ability to document damage notes and hazards on the outage job as it is being worked
- Integrated electronic switch orders with outage job steps
- Communication of timely and reliable information to internal and external stakeholders via text messaging, online outage maps and read-only OMS web access



An OMS dashboard like that in use by Lakeland Electric



## Advanced OMS features

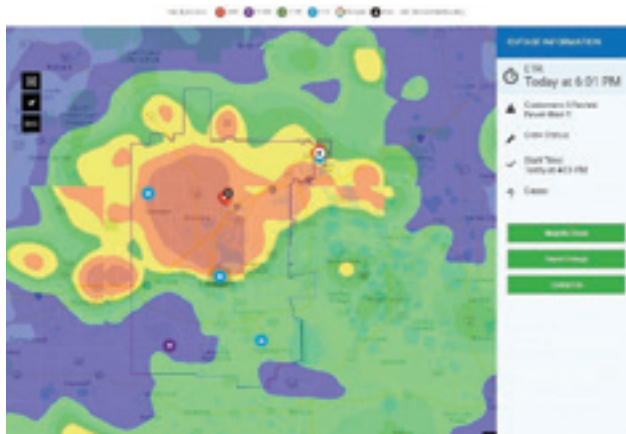
Lakeland's OMS is equipped with advanced storm management functionality, which enabled the following:

- Creation of optimal repair crew deployment plans to lower estimated time to restore (ETR)
- Calculation of a storm type and strength-specific ETR utilizing outage data, historical performance data, current repair crew staffing levels, etc.
- Remote monitoring of system and restoration efforts via read-only web access for non-operations utility stakeholders
- Study mode and save case functionality to save actual operational storm scenarios for future training purposes

Lakeland's outage awareness was increased dramatically through advanced call management functionality. In addition to call entry capabilities, call management interfaces with CIS, IVR, web portals and social media enabled customers to report power outages and learn about the status of their outage job using a variety of communication types. In the case of Hurricane Irma, Lakeland processed more than 1,800 calls to their OMS within 60 minutes.

Utility customers demand complete transparency and immediacy when it comes to outage awareness.

"Utilities today must do more than simply manage outage calls and outage jobs in order to add value to their restoration process," said Hormoz Kazemzadeh,



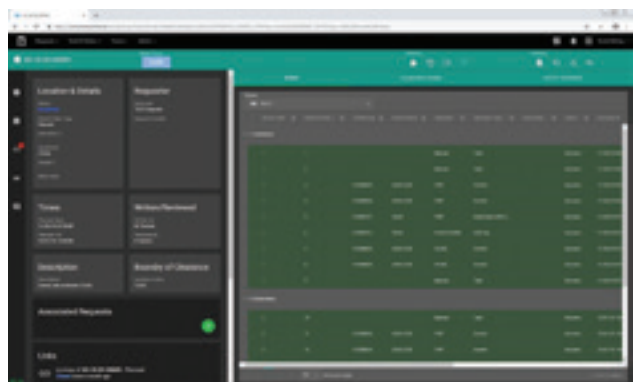
Lakeland's real-time, web-based outage map

Open Systems International's VP of distribution and smart grid business. "Utility customers demand complete transparency and immediacy when it comes to outage awareness. Fortunately, the OMS technology available today makes it easier than ever to deliver that."

To further enhance communication with their customers, Lakeland has also revamped their website outage map using real-time data from their OMS. This new outage map communicates where outages are located, where field crews are working and how many people are affected.

## Integrated switch order management

Like other utilities, Lakeland's switch order management activities have historically been independent of the real-time control system operations, managed via paper and pen. Driven by the need to increase the efficiency of creating and approving switch orders, improve operational safety by coordinating SCADA tags and interlocks to safety permits, enhance reporting and electronic



Switch order management functionality

recordkeeping, and provide additional advanced features such as the real-time network validation of switch orders, Lakeland has worked with its provider to implement an SOM planner software, enabling the next generation of switching through a standard web-based product natively integrated to OMS and the real-time, as-operated network model.

Operators are now able to drag and drop modeled data points into a switch order, along with tagging and execution of steps, in order to more effectively and efficiently manage their switching workload. In addition, study mode provides operators the means to preview the results of any switch order prior to executing in the real-time production system. Electronic audit logs help track and maintain the five W's — who, what, where, when and why — of all switching orders, making SOM a fully modern and integrated operational activity at Lakeland. →



### Risk versus reward

Just days before Hurricane Irma, Lakeland had a difficult decision to make: go live with a new OMS or keep the existing business processes and systems in place. The storm was rapidly approaching, forcing them to weigh the benefits versus the risks of going live. Potential risks of implementing the new system included:

- Operator learning curve – would they be prepared with the provided training?
- System reliability – would there be any system issues during cutover?
- System performance – would there be any performance issues given the inevitable flood of calls and outages resulting from such a major storm event?

After a brief deliberation, they agreed: The benefits of going live with the OMS far outweighed the risks. Extensive system testing, operator training, and business process training had occurred during the project implementation period, providing confidence that the system would be reliable and perform to the designed specifications. Lakeland was ready for the OMS to go live and needed the system's capabilities to manage the upcoming hurricane.

### Conclusion

Lakeland's implementation of the advanced OMS proved to be an invaluable and immediately useful investment during Hurricane Irma, just days after go-live. Lakeland and the vendor worked collaboratively to ensure not only a smooth product go-live, but that the system performed as expected during the storm. That OMS continues to provide Lakeland's operators with an easy-to-use, single operational system in which to efficiently manage all aspects of energy delivery, enabling them to better serve their customers while ensuring their network will recover quickly from any future outages.

## ABOUT THE AUTHORS:

**Hormoz Kazemzadeh** is a senior member of OSI's technical leadership team and has more than 25 years of experience in the utility industry. As the vice president of OSI's Distribution and Smart Grid Business Unit, Kazemzadeh oversees the overall direction of the company's distribution- and smart grid-related products and services, as well as the implementation of distribution and smart grid projects. He holds a Bachelor of Science in electrical engineering from Youngstown State University and a Master of Science in electrical engineering from Ohio State University.



Responsible for Lakeland's system control, reliability committee and crews, energy management and smart grid, **Scott Bishop** has 20+ years of operations, protection and control, and technology experience. Before joining Lakeland Electric, he held various positions at Georgia Power and Advanced Control Systems. Bishop has an associate degree in mechanical design, a bachelor's degree in technology management from Clayton University, and an MBA from Columbus State University in Georgia. In 1904, Lakeland Electric ([lakelandelectric.com](http://lakelandelectric.com)) was established as one of the first utilities to provide power in the Sunshine State. Today, Lakeland Electric is a fully integrated utility, generating more than 1,100 MWs of power, managing high-voltage transmission and low-voltage distribution over a span of 246 square miles, making it Florida's third-largest municipal utility and the 25th largest in the USA. With some of the most economically priced electricity in the state, Lakeland Electric is committed to providing safe, reliable, and competitive solutions to more than 120,000 customers. Through consistent and reliable investments in employees and technology, Lakeland Electric provides services that aim to meet busy consumer demands as well as encourage greater environmental consciousness, ultimately helping to enrich customers' quality of life.



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# DISRUPTION OF ADMS IMPLEMENTATION DEMANDS FOCUSED TRAINING





### **RICH CUMMINGS**

The breadth and speed of the digital change and transformation taking place within electric distribution are unparalleled. What started as a series of initial innovations like smart meters and smart switches rapidly progressed to the introduction of significantly more sophisticated and complex distribution solutions. Electric distribution operations control centers evolved from wall maps and printed trouble tickets to outage management systems (OMS). Moreover, control centers are quickly embracing and investing in advanced distribution management systems (ADMS).

Amid the industry-wide rapid transition to ADMS, utilities are struggling with the speed of change and the associated disruption to the control room and operations, as compared to what was traditionally only incremental change in the previous decades. Internally for utilities, the disruption takes the shape of multi-year and diverse projects, stacked into aggressive implementation and deployment timelines.

The industry now recognizes that successful transition to ADMS demands utilities build and maintain a workforce competent in ADMS. Ensuring successful adoption is difficult because the long-standing set of criteria used to determine success within power distribution is rapidly transforming into a whole new set of standards and competencies dictated by ADMS. The transition has been challenging to the industry and its workforce. Such challenges are due in large part to the volume and pace of change, as well as the industry's limitation of internal resources to provide the competency and training expertise needed. →

## Traditional Business Drivers of Distribution Success

Reduce cost of service

Reduce outage frequency and duration

Increase customer satisfaction

Work with and replace aged infrastructure

Reduce electrical losses

## New ADMS Business Drivers of Distribution Success

Manage data volume

Enable two-way power flow

Support distributed energy resources (solar/battery/wind)

Support the growth of more electric vehicles

Leverage data for condition-based maintenance

ADMS fundamentally changes and advances how a utility operates and manages its electric grid to ensure consistent, uninterrupted, resilient and high-quality power. Typically, changes incurred from ADMS implementation include distribution SCADA, advanced applications and outage management. Exacerbating such changes is the regular occurrence that field applications and companion web-based solution components often extend to a diverse set of user roles.

Within utility organizations, the impact of ADMS-related changes to people, processes and technology cuts across multiple divisions, service centers, departments and roles. Impacted workstreams include telecommunication and control room technicians, planning and area engineers, geographic information system (GIS) mappers, operators, dispatchers and field operations.

Utilities vary in their established internal processes and protocol for hiring and training distribution controllers and operators. Roles within the control room are often rigidly structured and organized, resulting in much time and effort to enact any level of change to the role requirements or tasks performed. In some cases, foundational competencies necessary for working in an ADMS system are gaps in control center job classifications. The successful training and transition of employees to ADMS is difficult due to the magnitude of ADMS's reach and the fact that ADMS completely redefines multiple existing job functions across already complex business processes within a utility. The changes incurred when implementing ADMS impact every aspect of a utility's distribution network and associated

job responsibilities. For example, the network model used in distribution operations resides inside ADMS and includes the inputs from GIS, SCADA and, potentially, other information technologies.

Additionally, the depth and critical nature of the industry's convergence between operations technology and information technology brought on by ADMS significantly impacts a broad spectrum of roles within the utility. Successful training solutions must understand and embrace this convergence to produce the level of understanding and competency needed for successful ADMS adoption across the organization.

Transitioning to ADMS is costly, and user adoption, success and ROI are not guaranteed. Utilities that enter into ADMS implementation without an understanding of the level of complexity and effort required for a successful transition, including the critical need for role-based employee training across multiple roles and workstreams, are at significant risk of limited adoption and potential failure in gaining the sought-after benefits from an ADMS investment.

**The changes incurred when implementing ADMS impact every aspect of a utility's distribution network and associated job responsibilities.**



## Beyond the control room

ADMS can completely or partially replace or consolidate multiple legacy grid management systems, which no longer integrate with new grid management technologies. ADMS also introduces new functionality and provides real-time optics, transparency and detailed information needed to manage all aspects of grid operations.

Because of the magnitude of change associated with the transition, utilities that focus their ADMS training solely on the control room will significantly compromise success across the enterprise. For example, if the ADMS implementation includes electronic switch order management and safety documents, then the following could be impacted:

- Safety policies and procedures related to lockout / tagout and clearances.
- How field positions like an electric foreman, troubleshooter and substation operator request and execute switching and request clearances.
- How telecommunications, control and SCADA resources are impacted by provisioning and commissioning new devices.

ADMS also significantly impacts field operations. For example, when an electric foreman and crew need to do work in the distribution system where automation is enabled, the individuals must have a working knowledge of the processes, procedures and equipment impacted as a necessary minimum requirement for worker safety. If the field worker is using a companion ADMS client in the field, the level of knowledge and understanding needed to incorporate new technology into existing work practices is significant and requires detailed training.

## Embracing and leveraging the interdependencies required for success

ADMS implementations and associated training must be orchestrated carefully because ADMS impacts every job role and business process associated with distribution. Entering into training efforts without acknowledging, understanding, and embracing the inherent system interdependencies will lead to workforce frustration, alienation and confusion. Organizational leadership's commitment to ensuring training efforts proactively address the technology, people and process requirements for success is essential. In most ADMS implementations, the amount of training required is more than expected and includes significantly more roles than expected. →

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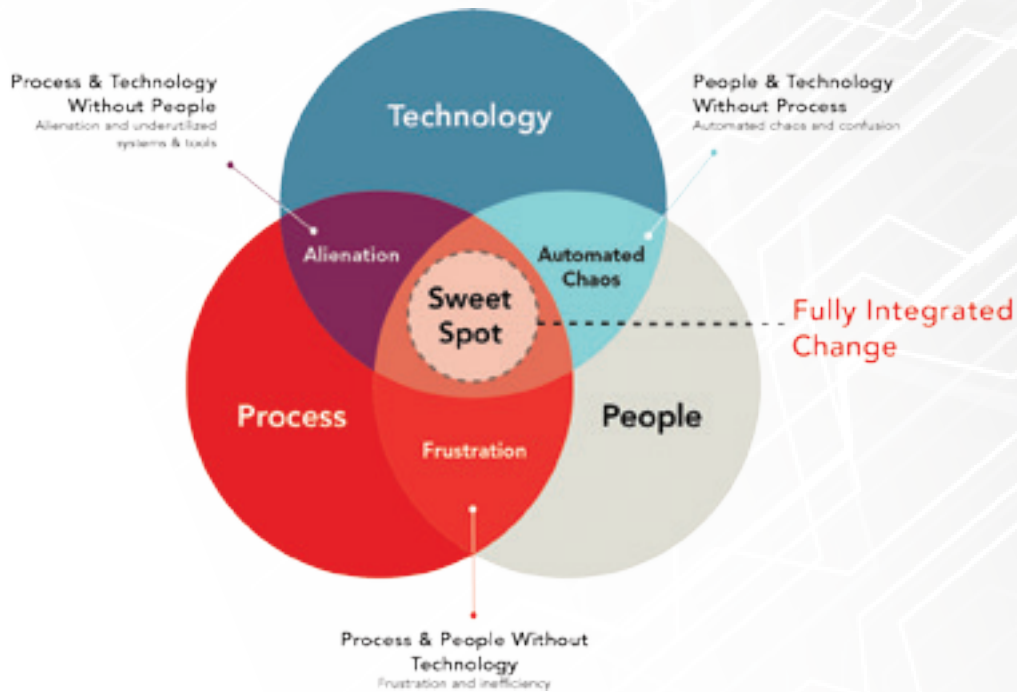
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#### THE DISRUPTIVE IMPACTS OF ADMS IN DISTRIBUTION OPERATIONS:

- Planning/area engineers are required to transition from 3rd party engineering analysis tools to ADMS.
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- Customer service reps receive all updates on crew status and estimated time of restoration through ADMS.
- Telecommunication and control technicians are required to implement new SCADA devices and monitor alarms.
- GIS mappers and/or system designers are required to update and increase data requirements for ADMS.
- Capacitor bank technicians are required to monitor VVO and support power factor improvement initiatives.
- Leadership and supervision may need updated dashboards and analytics to support business decisions.
- Operators must be competent in all elements of ADMS.

Industry trends show that ADMS is and will increasingly become an essential and very powerful asset used by utilities to respond to the rapidly evolving distribution landscape. Effective role-based training associated with all elements of ADMS and all work streams impacted by ADMS is critical for success. Lessons learned from utilities and vendors out in front in ADMS are extremely beneficial and should be sought out well in advance if possible.

#### ABOUT THE AUTHOR:

**Rich Cummings** is vice president, grid operations at the Mosaic Company. Cummings has spent more than 25 years working in distribution operations and control rooms and is a highly-respected expert in ADMS.



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# THE DIGITAL UTILITY SOUNDS COOL, BUT IT'S A LOT OF WORK, TOO





### **MIKE SMITH**

Digital transformation. It's everywhere, but what does it mean, and why does it matter to utilities?

For starters, the digital transformation is the use of digital technology (including sensors, two-way communications, and software) to solve traditional (electro-mechanical, analog, manual) problems. The longer, and perhaps more relevant definition includes the "transformation" part: the profound changes to processes that can drive significant improvement in financial performance, customer satisfaction, operational efficiency, safety and more. One might not even recognize a business after it has been transformed. (For instance, think about how transportation and hospitality markets look today after undergoing massive transformations).

The utility industry has been on the digital transformation road for more than a decade. Here, we will look at the utility industry's digital journey in three phases: the smart infrastructure build-out, data-driven use cases and industry transformation. In this context, we'll look at how utilities have had to re-invent themselves from risk-averse, electro-mechanical entities, to leaders at the forefront of the digital revolution, and what many call "Industry 4.0." →

## The smart infrastructure build-out

Utilities arguably entered the “smart” business 50 years ago with the introduction of SCADA/EMS in the late 1960s, but the much wider and deeper “smart” movement has really taken off with the realization of the smart grid over the last decade or so. The U.S. Energy Information Agency estimates that today, there are nearly 80 million smart meters deployed in the US alone. In addition to this digitization of the customer connection, utilities have embarked on digitizing much of their generation and T & D infrastructure with the installation of millions of IEDs, PMUs and other types of sensors across their systems.

These smart investments, with price tags that run into the billions for large utilities, are the foundation for the digital transformation of utility operations across the enterprise. While there is a relatively short list of initial use cases that were implemented in quick order once this infrastructure was up and running – more accurate and automated meter reads, remote connect/disconnect and increased visibility into remote operations come to mind – these early use cases were really more about establishing an initial ROI as a means of getting that infrastructure in place for future use cases than for fully leveraging this infrastructure for digital transformation.

## Data-driven use cases

One could borrow the 1992 presidential campaign quote, “it’s the economy, stupid” for utilities with “it’s the data, stupid.” While there have been massive investments and a lot of hype around this smart infrastructure, the real value has always been in the data. Arguably, whoever does the best job at leveraging this new data-rich environment will be left standing as the utility industry continues to undergo fundamental changes in its business.

Think about the landscape today as compared to just a few years ago. One-direction central station generation has given way to multi-directional power flows across distributed generation, customers have more choices (and higher expectations) than ever beyond what their utility can offer, and just about every function in a utility has changed dramatically. **Figure 1** presents a snapshot of what this new world looks like.

What is important here is not to get too lost in the hype and hold on to the realization that all of these new use cases are being enabled by the availability of more and better data. Need to improve outage metrics? Predictive analytics leveraging asset, weather and customer data is the ticket. Need to engage customers across a broad spectrum of programs in a newly competitive market? Go deep, leveraging your own



**Figure 1.** The utility operating landscape. The underlying smart infrastructure is enabling an operating environment that was unthinkable just a few years ago, inviting many new opportunities and challenges.



customer data and third-party data to profile customers at a granular level only dreamed of in years past. And how will utilities predict load with the proliferation of DERs and EVs? Traditional forecasting practices will give way to new algorithms and methodologies that are able to ingest and analyze massive new data sets from customers, grid devices and partners.

### Industry transformation

So, there has been a lot of change, but does change automatically equal transformation? No, but in the case of utilities, we are at the precipice of changes that are indeed transformative. Looking back at **Figure 1**, imagine an integrated, orchestrated utility that seamlessly manages EVs and their requisite charging station networks, microgrids, new solar and wind farms from third-party developers and prosumers entering and exiting the market every day, or even every minute. Now, that is a transformed utility... and this vision is not a small light in the distance. Parts of it are here today.



Utilities will become data companies that happen to be selling electrons.



What are the ways that a utility's business will change beyond what we see in **Figure 1**? Extend the use cases illustrated previously, and it's not too difficult to envision a very different utility. Gas stations give way to fast-charging stations; the utility as the trusted energy advisory that we've all been hearing about for years finally becomes a reality, providing a suite of products and services on the other side of the meter; and how about maintenance services for all of those third-party energy providers? Utilities just happen to be awesome at maintaining field assets.

Some industry commentators are saying things like "Utilities will become data companies that happen to be selling electrons." While this might be an extreme position, it is, at least, directionally correct. And yes, it's all going to be a heckuva lot of work, but what an exciting time to be in our industry!

### ABOUT THE AUTHOR:

**Mike Smith** is the principal industry consultant for the utilities group at SAS Institute. He is a 29-year veteran of the utility industry, having started as an analyst covering SCADA systems in 1990, and then leading numerous industry initiatives including founding the "smart grid" market's first dedicated publication in 1995 and co-founding the Utility Analytics Institute in 2012. He is a graduate of San Jose State University (BA, economics) and is a veteran of the US Army (Captain, Infantry) He can be reached at [mikef.smith@sas.com](mailto:mikef.smith@sas.com).



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# KUMI PREMATHILAKE



Meet Kumi Premathilake, our Powerful Force for Q3, 2019. With a background in chemical engineering and in a senior executive role with Aclara, Premathilake understands the science and technology behind both water and electric utilities. She is a gifted communicator – especially when addressing the needs of or encouraging the input from her colleagues, industry partners and utility customers.

Even as a child, Kumi Premathilake was drawn to how and why things worked the way they did. “I always wanted to be on the technical side,” explains Premathilake. “I watched my two older brothers take things apart, like my mom’s kitchen appliances, and I wanted to do the same fun things they did.”

While she received encouragement to satisfy her inquisitive mind, Premathilake attributes her love for math to her tenth-grade teacher. “She was very petite, and she had so much energy,” says Premathilake. “At the beginning of every class, she would put a problem on the chalkboard and ask us to solve it as fast as we could.” Premathilake credits the teacher’s drive and intelligence for inspiring her decision to become an engineer.

After graduating college with a chemical engineering degree, Premathilake took a position in research and development at Culligan International. There, Premathilake led teams to develop water purification and reclamation technologies. The job allowed her to satisfy her long-held fascination with water and energy. “I made a conscious decision to work in these verticals because they’re so critical and intertwined,” explains Premathilake.

“Producing energy requires water and producing clean water requires energy. Smart use of both of these resources is critical to long-term environmental and energy security, and human life itself.”

After nearly 16 years, Premathilake left Culligan to manage the product strategy and power solutions portfolio at Johnson Controls. At the time, Johnson Controls was a key player in the automotive industry. Lithium-ion batteries had recently come into play, and according to Premathilake, the company, wanted to move towards higher levels of electrification, while minimizing environmental impact. The company also started looking beyond the automotive industry, with an eye towards the power grid, bringing renewables online, uninterrupted power supply and power tools.

“  
The U.S. power grid is one of history's  
greatest innovations  
”

In 2015 Premathilake joined Aclara as the company's vice president of product management and business development. The opportunity allowed Premathilake to work with both water and energy for the first time in her career. Her work with Aclara has coincided with what Premathilake considers one of the best times to be in the energy industry. “The U.S. power grid is one of history's greatest innovations,” says Premathilake, “That grid was invented at least 100 years ago, so we are kind of in what I consider ‘Grid 2.0’ – only today, the industry calls it smart grid”.

Premathilake acknowledges that with so many renewables coming online at once, combined with the emergence of bidirectional power flow, and the need for utilities to have more visibility into the grid so they can react to downed lines or outages quickly, the modern grid has not evolved without its share of complications. She also sees this complexity as an opportunity to redefine how the industry resolves such challenges.

To address the market's most pressing issues, Premathilake and her team regularly speak with their utility customers. Concerns exist around things like aging infrastructure and assets or securing the grid from natural disasters and cyberattacks, but what Premathilake finds interesting is when she asks her utility customers what they would like to address, most utilities are really thinking about their long-term roadmap, and whether the solutions they have today will be scalable down the road, or can they innovate on those solutions in the future. →

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"We have found we need to think about how we can help position the utilities and how they help their customers. In the past, utilities didn't have to compete with the power provider in the next town over or to worry about non-traditional energy sources," says Premathilake. "Today, they have to take all of these into consideration. As the business model continues to change, it makes it even more critical for utilities to control the assets in the field." Premathilake and her team also have found that the majority of Aclara's customers prefer to work with providers who can integrate with other industry partners. "When we talk to our utility clients, they don't want 20 different solutions. They want all their partners to work together, making sure their solution providers are integrated. That integration is really important."

Currently, in addition to working on offerings in its product pipeline, Premathilake points out that at least 80 percent of the Aclara's workforce has engineering titles because that's where most of the company's investments lie. "We're a technology company first, and we continue to seed the pipeline with new ideas as we prepare to launch new products. We are especially excited about the work we are doing with a communications module that will go on any sort of distribution grid asset like a recloser or capacity bank that's managing the power quality for the utility, so it's going to have the utility get the information from those assets and also control the grid more effectively."

While her engineering background has been a tremendous asset towards becoming a leader in water and energy, Premathilake credits one of her early managers for demonstrating the value of effective communication. According to Premathilake, her manager had broad business experience, which was helpful. "What made him great with customers is that he could take a customer issue and translate it from technical engineering-speak, which is so important to clear communication. He always sought his customers' input, and I thought, 'that's the way I want to be.'"

It is a lesson that has served Premathilake well and one she has shared throughout her career. Her team at Aclara understands the importance of communicating to their customers about the things that are relevant to them and in a way that they will hear it. "The way we speak to a GM or division head is going to be different from how we speak with a network engineer or a customer service representative. They each have different concerns, so when our team talks with the different types of customers, we think about role-based interaction."

Premathilake says that when she started her job at Aclara, the company conducted a customer survey. Reviewing the responses, someone commented that each partnership between a vendor and its customer is like a marriage. "We start by promising our customers a lasting solution. That means we'd better make sure it's a good relationship and that the customer is happy." Premathilake remains mindful of the comment, but there is another, more personal goal by which she measures her success as a customer partner and professional colleague. "Any time I begin a job or assume a new position, I tell myself I will leave the place in better shape than when I started." Right now, Premathilake considers herself in the middle of her journey with Aclara, but asserts, "I am still on that journey here, but it has been very satisfying to look back on what we've accomplished so far."

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“

**Her team at Aclara understands the importance of communicating to their customers about the things that are relevant to them and in a way that they will hear it.**

”

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#### ABOUT KUMI PREMATHILAKE:

**Kumi Premathilake**, senior vice president, advanced metering infrastructure and utility automation, joined Hubbell in 2018 with the acquisition of Aclara by Hubbell. Kumi joined Aclara in 2015 as the SVP of advanced metering infrastructure and has more than 20 years of multi-industry experience that spans product management, marketing and engineering. Prior to joining Aclara, she worked at Johnson Controls, where she was director of product strategy and portfolio management for the Power Solutions Business. She started her career at Culligan International's commercial and industrial division, which serves the water treatment needs of the energy and power, oil and gas and food and beverage industries. Kumi holds a Bachelor of Science degree in chemical engineering from the University of Mississippi and a Master of Business Administration degree from the Kellstadt Graduate School of Business at DePaul University, Chicago.



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### AREA - LIGHTING

**Evluma**  
Tel: 925-998-4297  
[www.evluma.com](http://www.evluma.com)

### ARRESTERS, LIGHTNING, DISTRIBUTION - LINE TYPE

**ABB Installation Products**  
Tel: 1-800-326-5282  
[www.tnb.abb.com](http://www.tnb.abb.com)

### ARRESTERS, LIGHTNING, DISTRIBUTION - STATION

**Surplec, Inc**  
Tel: 819-821-3636 | 1-877-996-3636  
[www.surplechv.com](http://www.surplechv.com)

### ASSET MANAGEMENT

**Bentley Systems, Inc.**  
Tel: 610-458-5000 | 800-236-8539  
[www.bentley.com](http://www.bentley.com)

**Copperleaf**  
Tel: 604-639-9700  
[www.copperleaf.com](http://www.copperleaf.com)

**Doble Engineering Co.**  
Tel: 617-926-4900  
[www.doble.com](http://www.doble.com)

**Dynamic Ratings, Inc.**  
Tel: 262-746-1230  
[www.dynamicratings.com](http://www.dynamicratings.com)

**Elimpus Ltd**  
Tel: +441698740995  
[www.elimpus.com/](http://www.elimpus.com/)

**VIZIMAX Inc.**  
Tel: 1-450-679-0003  
[www.vizimax.com](http://www.vizimax.com)

### AUGERS - EARTH

**Tallman Equipment Co.**  
Tel: 630-860-5666  
[www.tallmanequipment.com](http://www.tallmanequipment.com)

### AUTOMATION PRODUCTS

**ABB Installation Products**  
Tel: 1-800-326-5282  
[www.tnb.abb.com](http://www.tnb.abb.com)

**S&C Electric Company**  
Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

**Siemens Process Industries & Drives**  
Tel: 770-740-3000 | 800-241-4453  
[www.usa.siemens.com/industry](http://www.usa.siemens.com/industry)

### AUTOMATION SYSTEMS

**Open Systems International, Inc.**  
Tel: 763-551-0559  
[www.osii.com](http://www.osii.com)

**S&C Electric Company**  
Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

## B

### BATTERIES & ACCESSORIES - DC BATTERY CHARGERS

**HindlePower**  
Tel: 610-330-9000  
[www.hindlepowerinc.com](http://www.hindlepowerinc.com)

### BATTERY CAPACITY AND MONITORING EQUIPMENT

**HindlePower**  
Tel: 610-330-9000  
[www.hindlepowerinc.com](http://www.hindlepowerinc.com)

### BATTERY CHARGERS

**HindlePower**  
Tel: 610-330-9000  
[www.hindlepowerinc.com](http://www.hindlepowerinc.com)

### BELTS - SAFETY AND BODY

**Tallman Equipment Co.**  
Tel: 630-860-5666  
[www.tallmanequipment.com](http://www.tallmanequipment.com)

### BLOCKS - CONDUCTOR STRINGING

**Condux Tesmec, Inc.**  
Tel: 507-387-8069 | 1-888-980-1209  
[www.conduxtesmec.com](http://www.conduxtesmec.com)

**Tallman Equipment Co.**  
Tel: 630-860-5666  
[www.tallmanequipment.com](http://www.tallmanequipment.com)

### BUCKET LINERS - AERIAL LIFT ACCESSORIES

**Hastings Fiber Glass Products, Inc.**  
Tel: 269-945-9541  
[www.hfgp.com](http://www.hfgp.com)

#### **BUSHINGS - COMPOSITE**

**Polycast International**  
Tel: 204-632-5428 | 1-800-665-7445  
[www.polycast.ca](http://www.polycast.ca)

#### **BUSHINGS - CONDENSER-TYPE-CAST EPOXY**

**Polycast International**  
Tel: 204-632-5428 | 1-800-665-7445  
[www.polycast.ca](http://www.polycast.ca)

#### **BUSHINGS - DISTRIBUTION APPARATUS (THROUGH 34.5KV)**

**Lindsey Manufacturing Co.**  
Tel: 626-969-3471  
[www.lindsey-usa.com](http://www.lindsey-usa.com)

**Polycast International**  
Tel: 204-632-5428 | 1-800-665-7445  
[www.polycast.ca](http://www.polycast.ca)

### **C**

#### **CABLE FAULT CURRENT LIMITING, UNDERGROUND**

**G&W Electric Co.**  
Tel: 708-388-5010  
[www.gwelec.com](http://www.gwelec.com)

#### **CABLE - ALUMINUM**

**American Wire Group, Inc.**  
Tel: 954-455-3050 | 1-800-342-7215  
[www.buyawg.com](http://www.buyawg.com)

#### **CABLE - CONTROL**

**Okonite Company, The**  
Tel: 201-825-0300  
[www.okonite.com](http://www.okonite.com)

#### **CABLE - COPPER**

**American Wire Group, Inc.**  
Tel: 954-455-3050 | 1-800-342-7215  
[www.buyawg.com](http://www.buyawg.com)

#### **CABLE - DIAGNOSIS**

**High Voltage, Inc.**  
Tel: 518-329-3275  
[www.hvinc.com](http://www.hvinc.com)

**OMICRON electronics**  
Tel: 1-800-664-3766  
[www.omicronenergy.com](http://www.omicronenergy.com)

#### **CABLE - GROUNDING**

**Hastings Fiber Glass Products, Inc.**  
Tel: 269-945-9541  
[www.hfgp.com](http://www.hfgp.com)

**Tallman Equipment Co.**  
Tel: 630-860-5666  
[www.tallmanequipment.com](http://www.tallmanequipment.com)

#### **CABLE - JUMPER**

**Hastings Fiber Glass Products, Inc.**  
Tel: 269-945-9541  
[www.hfgp.com](http://www.hfgp.com)

#### **CABLE - PULLING**

**Condux Tesmec, Inc.**  
Tel: 507-387-8069 | 1-888-980-1209  
[www.conduxtesmec.com](http://www.conduxtesmec.com)

**Tallman Equipment Co.**  
Tel: 630-860-5666  
[www.tallmanequipment.com](http://www.tallmanequipment.com)

#### **CABLE - TEMPORARY GROUND**

**Hastings Fiber Glass Products, Inc.**  
Tel: 269-945-9541  
[www.hfgp.com](http://www.hfgp.com)

#### **CABLE - UNDERGROUND DISTRIBUTION**

**Dow Chemical**  
Tel: 989-636-4842  
[www.dow.com/electrical](http://www.dow.com/electrical)

#### **CABLE - UNDERGROUND, POLYMER- INSULATED**

**Dow Chemical**  
Tel: 989-636-4842  
[www.dow.com/electrical](http://www.dow.com/electrical)

#### **CABLE ACCESSORIES - URD**

**ABB Installation Products**  
Tel: 1-800-326-5282  
[www.tnb.abb.com](http://www.tnb.abb.com)

**G&W Electric Co.**  
Tel: 708-388-5010  
[www.gwelec.com](http://www.gwelec.com)

#### **CABLE CUTTERS - HYDRAULIC**

**Tallman Equipment Co.**  
Tel: 630-860-5666  
[www.tallmanequipment.com](http://www.tallmanequipment.com)

#### **CABLE FAULT LOCATING - EQUIPMENT**

**High Voltage, Inc.**  
Tel: 518-329-3275  
[www.hvinc.com](http://www.hvinc.com)

**Phenix Technologies Inc.**  
Tel: 301-746-8118  
[www.phenixtech.com](http://www.phenixtech.com)

**VON Corporation**  
Tel: 205-788-2437  
[www.voncorp.com](http://www.voncorp.com)

#### **CABLE LASHERS (SPINNERS)**

**Tallman Equipment Co.**  
Tel: 630-860-5666  
[www.tallmanequipment.com](http://www.tallmanequipment.com)

#### **CABLE PULLING ACCESSORIES**

**Condux Tesmec, Inc.**  
Tel: 507-387-8069 | 1-888-980-1209  
[www.conduxtesmec.com](http://www.conduxtesmec.com)

#### **CABLE TRAY**

**ABB Installation Products**  
Tel: 1-800-326-5282  
[www.tnb.abb.com](http://www.tnb.abb.com)

#### **CABLES - HIGH VOLTAGE - XLPE**

**Dow Chemical**  
Tel: 989-636-4842  
[www.dow.com/electrical](http://www.dow.com/electrical)

#### **CABLES - MEDIUM VOLTAGE**

**American Wire Group, Inc.**  
Tel: 954-455-3050 | 1-800-342-7215  
[www.buyawg.com](http://www.buyawg.com)

**Dow Chemical**  
Tel: 989-636-4842  
[www.dow.com/electrical](http://www.dow.com/electrical)

#### **CALIBRATION - TEST AND MEASURE INSTRUMENT**

**DILO Company, Inc.**  
Tel: 727-376-5593  
[www.dilo.com](http://www.dilo.com)

**Willrich Precision Instrument Company**  
Tel: 866-945-5742  
[willrich.com/](http://willrich.com/)

#### **CALIBRATION AND TEST EQUIPMENT**

**Phenix Technologies Inc.**  
Tel: 301-746-8118  
[www.phenixtech.com](http://www.phenixtech.com)

#### **CAPACITORS - CONTROLS**

**S&C Electric Company**  
Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

#### **CAPACITORS - POWER FACTOR CORRECTION**

**VIZIMAX Inc.**  
Tel: 1-450-679-0003  
[www.vizimax.com](http://www.vizimax.com)

#### **CAPACITORS - SWITCHES**

**ABB Installation Products**  
Tel: 1-800-326-5282  
[www.tnb.abb.com](http://www.tnb.abb.com)

**Southern States, LLC**  
Tel: 770-946-4562  
[www.southernstatesllc.com](http://www.southernstatesllc.com)

#### **CIRCUIT RECLOSERS, AUTOMATIC - THREE-PHASE**

**G&W Electric Co.**  
Tel: 708-388-5010  
[www.gwelec.com](http://www.gwelec.com)

**S&C Electric Company**  
Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

#### **CIRCUIT SWITCHERS**

**S&C Electric Company**  
Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

**Southern States, LLC**  
Tel: 770-946-4562  
[www.southernstatesllc.com](http://www.southernstatesllc.com)

#### **CIRCUIT SWITCHERS - MOBILE**

**Southern States, LLC**  
Tel: 770-946-4562  
[www.southernstatesllc.com](http://www.southernstatesllc.com)



#### CLAMPS - GROUND

**Hastings Fiber Glass Products, Inc.**  
Tel: 269-945-9541  
[www.hfgp.com](http://www.hfgp.com)

#### CLAMPS - HOT LINE

**Hastings Fiber Glass Products, Inc.**  
Tel: 269-945-9541  
[www.hfgp.com](http://www.hfgp.com)

**Tallman Equipment Co.**  
Tel: 630-860-5666  
[www.tallmanequipment.com](http://www.tallmanequipment.com)

#### CLAMPS - TEMPORARY GROUND

**Hastings Fiber Glass Products, Inc.**  
Tel: 269-945-9541  
[www.hfgp.com](http://www.hfgp.com)

**Tallman Equipment Co.**  
Tel: 630-860-5666  
[www.tallmanequipment.com](http://www.tallmanequipment.com)

#### COMMUNICATION SYSTEMS

**S&C Electric Company**  
Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

**SISCO, Inc.**  
Tel: 586-254-0020  
[www.sisconet.com](http://www.sisconet.com)

#### COMPRESSION DIES

**Condux Tesmec, Inc.**  
Tel: 507-387-8069 | 1-888-980-1209  
[www.conduxtesmec.com](http://www.conduxtesmec.com)

**Tallman Equipment Co.**  
Tel: 630-860-5666  
[www.tallmanequipment.com](http://www.tallmanequipment.com)

#### COMPUTERS - SOFTWARE

**Copperleaf**  
Tel: 604-639-9700  
[www.copperleaf.com](http://www.copperleaf.com)

**EDX Wireless, Inc.**  
Tel: 541-345-0019  
[www.edx.com](http://www.edx.com)

**INTEGRATED Engineering Software**  
Tel: 204-632-5636  
[www.integratedsoft.com](http://www.integratedsoft.com)

#### CONCRETE - POLES

**The StressCrete Group**  
Tel: 905-632-9301 | 800-268-7809  
[www.stresscretegroup.com/utilitypoles](http://www.stresscretegroup.com/utilitypoles)

#### CONDITION ASSESSMENT SYSTEMS

**Doble Engineering Co.**  
Tel: 617-926-4900  
[www.doble.com](http://www.doble.com)

**OMICRON electronics**  
Tel: 1-800-664-3766  
[www.omicronenergy.com](http://www.omicronenergy.com)

#### CONDITION MONITORING EQUIPMENT

**Doble Engineering Co.**  
Tel: 617-926-4900  
[www.doble.com](http://www.doble.com)

**Morgan Schaffer Ltd.**  
Tel: 514-739-1967  
[www.morganschaffer.com](http://www.morganschaffer.com)

**OMICRON electronics**  
Tel: 1-800-664-3766  
[www.omicronenergy.com](http://www.omicronenergy.com)

#### CONDUCTOR - HIGH CAPACITY, LOW SAG - ACCC

**CTC Global Corporation**  
Tel: 949-428-8500  
[www.ctcglobal.com](http://www.ctcglobal.com)

#### CONDUIT - ACCESSORIES

**ABB Installation Products**  
Tel: 1-800-326-5282  
[www.tnb.abb.com](http://www.tnb.abb.com)

#### CONDUIT - PLASTIC

**ABB Installation Products**  
Tel: 1-800-326-5282  
[www.tnb.abb.com](http://www.tnb.abb.com)

#### CONNECTORS - BOLTED - DISTRIBUTION

**ABB Installation Products**  
Tel: 1-800-326-5282  
[www.tnb.abb.com](http://www.tnb.abb.com)

#### CONNECTORS - COMPRESSION, DISTRIBUTION

**ABB Installation Products**  
Tel: 1-800-326-5282  
[www.tnb.abb.com](http://www.tnb.abb.com)

**CTC Global Corporation**  
Tel: 949-428-8500  
[www.ctcglobal.com](http://www.ctcglobal.com)

#### CONNECTORS - COMPRESSION, TRANSMISSION

**CTC Global Corporation**  
Tel: 949-428-8500  
[www.ctcglobal.com](http://www.ctcglobal.com)

#### CONNECTORS - DEADEND, TRANSMISSION

**CTC Global Corporation**  
Tel: 949-428-8500  
[www.ctcglobal.com](http://www.ctcglobal.com)

#### CONNECTORS - GROUNDING

**ABB Installation Products**  
Tel: 1-800-326-5282  
[www.tnb.abb.com](http://www.tnb.abb.com)

#### CONNECTORS - PLUG-IN

**ABB Installation Products**  
Tel: 1-800-326-5282  
[www.tnb.abb.com](http://www.tnb.abb.com)

#### CONNECTORS - SUBSTATION

**ABB Installation Products**  
Tel: 1-800-326-5282  
[www.tnb.abb.com](http://www.tnb.abb.com)

#### CONNECTORS - TECK CABLE

**ABB Installation Products**  
Tel: 1-800-326-5282  
[www.tnb.abb.com](http://www.tnb.abb.com)

#### CONNECTORS, UNDERGROUND - TERMINATING

**ABB Installation Products**  
Tel: 1-800-326-5282  
[www.tnb.abb.com](http://www.tnb.abb.com)

#### CONSTRUCTION - POWER LINE AND SUBSTATION - 25 TO 735KV

**Asplundh Construction**  
Tel: 1-888-884-5426  
[www.asplundhconstruction.com](http://www.asplundhconstruction.com)

**Cantega Reliaguard**  
Tel: 780-448-9700  
[www.cantega.com](http://www.cantega.com)

**PLH Group, Inc.**  
Tel: 214-272-0500  
[www.plhgroupinc.com](http://www.plhgroupinc.com)

**Utility Lines Construction Services  
(ULCS)**  
Tel: 773 338-1000  
[www.sandc.com](http://www.sandc.com)

#### CONSTRUCTION AND PROJECT ENGINEERING

**S&C Electric Company**  
Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

#### CONSTRUCTION SERVICES

**Easi-Set Worldwide**  
Tel: 540-439-8911 | 1-800-547-4045  
[www.easiset.com](http://www.easiset.com)

**PLH Group, Inc.**  
Tel: 214-272-0500  
[www.plhgroupinc.com](http://www.plhgroupinc.com)

**S&C Electric Company**  
Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

**Utility Lines Construction Services  
(ULCS)**  
Tel: 1-877-884-5426  
[www.sandc.com](http://www.sandc.com)

#### CONSTRUCTION SPECIALIZED

**S&C Electric Company**  
Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

#### CONSULTANTS - POWER QUALITY

**S&C Electric Company**  
Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

#### CONSULTANTS - SCADA/EMS ENGINEERING

**Open Systems International, Inc.**  
Tel: 763-551-0559  
[www.osii.com](http://www.osii.com)

#### **CONSULTANTS - SUBSTATION DESIGN & ENGINEERING**

##### **Easi-Set Worldwide**

Tel: 540-439-8911 | 1-800-547-4045  
[www.easet.com](http://www.easet.com)

##### **S&C Electric Company**

Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

##### **Sargent & Lundy**

Tel: 312-269-2000  
[www.sargentlundy.com](http://www.sargentlundy.com)

#### **CONSULTANTS - T&D ENGINEERING**

##### **CTC Global Corporation**

Tel: 949-428-8500  
[www.ctcglobal.com](http://www.ctcglobal.com)

##### **S&C Electric Company**

Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

##### **Sargent & Lundy**

Tel: 312-269-2000  
[www.sargentlundy.com](http://www.sargentlundy.com)

#### **CONSULTANTS - UNDERGROUND AND UNDERWATER CABLE**

##### **Sargent & Lundy**

Tel: 312-269-2000  
[www.sargentlundy.com](http://www.sargentlundy.com)

#### **CONSULTING**

##### **S&C Electric Company**

Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

##### **Zenergy Finance**

Tel: 415-999-4559  
[zenergyfin.com/](http://zenergyfin.com/)

#### **CONSULTING ENGINEERING**

##### **Doble Engineering Co.**

Tel: 617-926-4900  
[www.doble.com](http://www.doble.com)

##### **S&C Electric Company**

Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

##### **Sargent & Lundy**

Tel: 312-269-2000  
[www.sargentlundy.com](http://www.sargentlundy.com)

#### **CONTAINMENTS, INDUSTRIAL & RADIOLOGICAL**

##### **Solidification Products**

International, Inc.  
Tel: 203-484-9494 | 800-758-3634  
[www.oilbarriers.com](http://www.oilbarriers.com)

#### **CONTRACTORS**

##### **S&C Electric Company**

Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

#### **CONTRACTORS - CONSTRUCTION**

##### **Asplundh Construction**

Tel: 1-888-884-5426  
[www.asplundhconstruction.com](http://www.asplundhconstruction.com)

##### **Easi-Set Worldwide**

Tel: 540-439-8911 | 1-800-547-4045  
[www.easet.com](http://www.easet.com)

##### **PLH Group, Inc.**

Tel: 214-272-0500  
[www.plhgroupinc.com](http://www.plhgroupinc.com)

##### **Utility Lines Construction Services (ULCS)**

Tel: 1-877-884-5426  
[www.ulcsinc.com](http://www.ulcsinc.com)

#### **CONTROL SYSTEM**

##### **Open Systems International, Inc.**

Tel: 763-551-0559  
[www.osii.com](http://www.osii.com)

#### **CONTROL SYSTEMS - ELECTRIC/ELECTRONIC**

##### **S&C Electric Company**

Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

#### **CONTROLLERS/CONTROLS - PROGRAMMABLE**

##### **S&C Electric Company**

Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

#### **CONTROLS**

##### **S&C Electric Company**

Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

#### **CONTROLS - SUPERVISORY**

##### **S&C Electric Company**

Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

#### **CONTROLS - VAR**

##### **ABB Installation Products**

Tel: 1-800-326-5282  
[www.tnb.abb.com](http://www.tnb.abb.com)

##### **S&C Electric Company**

Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

#### **CRIMPING TOOLS - ELECTRICAL**

##### **Tallman Equipment Co.**

Tel: 630-860-5666  
[www.tallmanequipment.com](http://www.tallmanequipment.com)

#### **CROSSARMS, WOOD - LAMINATED**

##### **Laminated Wood Systems, Inc.**

Tel: 402-643-4708 | 1-800-949-3526  
[www.lwsinc.com](http://www.lwsinc.com)

#### **CURRENT SENSORS**

##### **Lindsey Manufacturing Co.**

Tel: 626-969-3471  
[www.lindsey-usa.com](http://www.lindsey-usa.com)

##### **S&C Electric Company**

Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

#### **CUTOUTS, FUSED - ENCLOSED**

##### **S&C Electric Company**

Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

#### **CUTOUTS, FUSED - OPEN, LOADBREAK**

##### **S&C Electric Company**

Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

#### **CUTTERS - CABLE AND WIRE**

##### **Tallman Equipment Co.**

Tel: 630-860-5666  
[www.tallmanequipment.com](http://www.tallmanequipment.com)

#### **CYBER SECURITY**

##### **Open Systems International, Inc.**

Tel: 763-551-0559  
[www.osii.com](http://www.osii.com)

## **D**

#### **DATA ACQUISITION SYSTEMS**

##### **Open Systems International, Inc.**

Tel: 763-551-0559  
[www.osii.com](http://www.osii.com)

#### **DATA CONVERSION**

##### **Open Systems International, Inc.**

Tel: 763-551-0559  
[www.osii.com](http://www.osii.com)

#### **DETECTORS - CABLE FAULT LOCATING**

##### **High Voltage, Inc.**

Tel: 518-329-3275  
[www.hvinc.com](http://www.hvinc.com)

#### **DETECTORS - PARTIAL DISCHARGE**

##### **Doble Engineering Co.**

Tel: 617-926-4900  
[www.doble.com](http://www.doble.com)

##### **OMICRON electronics**

Tel: 1-800-664-3766  
[www.omicronenergy.com](http://www.omicronenergy.com)

##### **Phenix Technologies Inc.**

Tel: 301-746-8118  
[www.phenixtech.com](http://www.phenixtech.com)

#### **DIAGNOSTIC EQUIPMENT**

##### **Doble Engineering Co.**

Tel: 617-926-4900  
[www.doble.com](http://www.doble.com)

##### **OMICRON electronics**

Tel: 1-800-664-3766  
[www.omicronenergy.com](http://www.omicronenergy.com)

#### **DISTRIBUTED ENERGY RESOURCE MANAGEMENT SYSTEMS (DERMS)**

##### **Open Systems International, Inc.**

Tel: 763-551-0559  
[www.osii.com](http://www.osii.com)

#### **DISTRIBUTION AUTOMATION - COMMUNICATIONS**

**S&C Electric Company**  
Tel: 773-338-1000  
[www.sandc.com](http://www.sandc.com)

#### **DISTRIBUTION AUTOMATION SYSTEMS**

**ABB Installation Products**  
Tel: 1-800-326-5282  
[www.tnb.abb.com](http://www.tnb.abb.com)

**G&W Electric Co.**  
Tel: 708-388-5010  
[www.gwelec.com](http://www.gwelec.com)

**Open Systems International, Inc.**  
Tel: 763-551-0559  
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#### **EMERGENCY STORM SERVICES**

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[www.asplundhconstruction.com](http://www.asplundhconstruction.com)

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[www.asplundh.com](http://www.asplundh.com)

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[www.plhgroupinc.com](http://www.plhgroupinc.com)

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[www.charlesindustries.com](http://www.charlesindustries.com)

#### **ENCLOSURES - METAL**

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[www.charlesindustries.com](http://www.charlesindustries.com)

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[www.easiset.com](http://www.easiset.com)

#### **ENCLOSURES - NEMA TYPE**

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Tel: 1-847-258-8458  
[www.charlesindustries.com](http://www.charlesindustries.com)

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[www.hindlepowerinc.com](http://www.hindlepowerinc.com)

#### **ENERGY MANAGEMENT SYSTEMS**

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[www.oilbarriers.com](http://www.oilbarriers.com)

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[www.sureflowequipment.com](http://www.sureflowequipment.com)

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[www.thermalspray.com/industries/power-energy/](http://www.thermalspray.com/industries/power-energy/)

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[www.ctcglobal.com](http://www.ctcglobal.com)

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[www.elecemd.it](http://www.elecemd.it)

**Pickett**  
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[www.pickettusa.com](http://www.pickettusa.com)

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[www.sam.biz](http://www.sam.biz)  
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[www.sargentlundy.com](http://www.sargentlundy.com)

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[www.tallmanequipment.com](http://www.tallmanequipment.com)

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[www.lindsey-usa.com](http://www.lindsey-usa.com)

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[www.lindsey-usa.com](http://www.lindsey-usa.com)

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#### LABORATORIES

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#### LABORATORY EQUIPMENT AND SUPPLIES

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#### LADDERS - INDUSTRIAL

**Hastings Fiber Glass Products, Inc.**  
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[www.conduxtesmec.com](http://www.conduxtesmec.com)

**Winola Industrial Inc.**  
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[www.winola-industrial.com](http://www.winola-industrial.com)

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[www.cpi.com](http://www.cpi.com)

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#### METERS - PHASE

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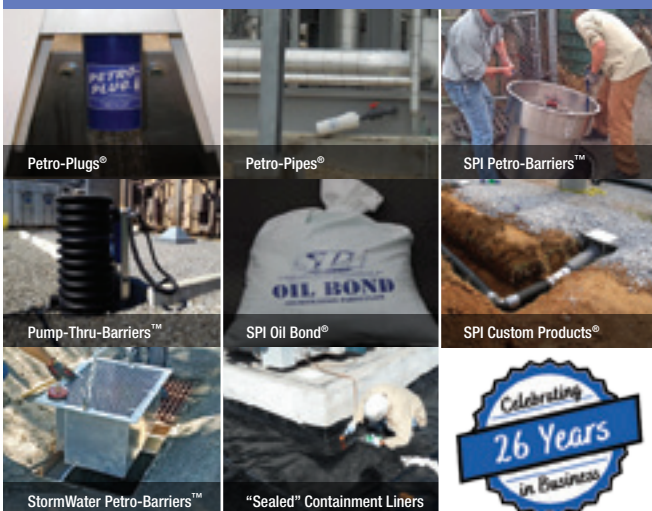
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[www.conduxtesmec.com](http://www.conduxtesmec.com)

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[www.scgrp.com/utilitypoles](http://www.scgrp.com/utilitypoles)

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[www.valmontutility.com](http://www.valmontutility.com)

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#### POLES - TRANSMISSION

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[www.oilbarriers.com](http://www.oilbarriers.com)

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Get the most out of protection testing without breaking the bank with the Doble F6150sv, your versatile all-in-one solution for testing IEC 61850-based systems.

### Designed With Your Crew in Mind

F6150sv has **6 built-in convertible sources** to meet your testing needs for 6 to 12 current sources, if required. F6150sv software features auto source bridging, enabling your team to bypass setting up time-consuming external connections.

### Maximize Efficiency on the Job

F6150sv's **Field Calibration Unit** minimizes interruptions for your team with its option to calibrate test sets in the field. Should you run into equipment issues, such as blowing a channel while testing, F6150sv is built to perform as usual. Simply remove the affected card and continue testing.

### Improve Overall Cost Savings

All software is supplied with F6150sv, eliminating the need to buy additional software modules. Speak to our team to learn more about F6150sv **Doble support** such as warranty options, calibration services, user training, and test plan assistance.



See the F6150sv's full features, benefits and specifications.

[www.doble.com/f6150sv](http://www.doble.com/f6150sv)

