



# Electric Energy T&D

## MAGAZINE

JULY-AUGUST 2012 Issue 4 • Volume 16

### Building a Stronger Grid with Energy Storage

INSIDE  
2013  
Buyers  
Guide



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**VLF-34E**

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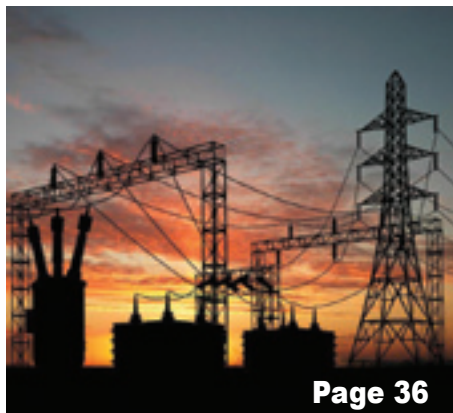
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## 8 Industry News 124 Advertisers Index

COVER PAGE IMAGE: Xcel Energy engineers check  
a 1-MW NaS battery, integrated with S&C Electric  
Company's PureWave® Storage Management System,  
as part of Xcel's "Wind-to-Battery" project.



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**Page 36**



**Page 30**

### 4 PowerPoints Energy Matters

Those of you who are familiar with the editorial comments from Mike Marullo will notice that a different face is now staring out at you from the page.

### 14 The Grid Transformation Forum: Electric Vehicles at play in the Smart Grid

This is the second installment of our 3-part interview with Dr. Russell Lefevre, a widely recognised IEEE Smart Grid technical expert and chair of the IEEE Steering Committee on Electric Vehicles (EV).

### 22 Green Ovations Smart Grid Customer Acceptance

Meter automation and the broader smart grid are fundamental prerequisites to improve efficiency, reduce the environmental impact of our energy usage, and promote green initiatives.

### 28 Building a Stronger Grid with Energy Storage

Energy storage technologies can help electric utilities increase grid efficiency, capacity, and reliability by supplementing power generation, supporting transmission and distribution systems, and meeting the evolving needs of energy consumers.

### 35 Moving Beyond the Meter

Popular technology media have been talking about the proposed benefits and potential drawbacks of a national power grid that can "learn" and adapt to power-consumption behaviors for several years now, and the concept of "smart grid" has worked itself into one of the most-talked about topics in the high-tech space.

### 38 Energy Micro Grids Growing Globally

According to a new report from the company, micro grid capacity worldwide will experience a compound annual growth rate (CAGR) of more than 22% over the next five years, reaching 4.7 gigawatts by 2017. Micro grids are integrated systems in which distributed energy resources (DERs) operate as a single, autonomous grid either in parallel to or isolated from the existing utility power grid.

### 41 In a Tight Spot

When it comes to clearing the strips of land along utility lines, or the rights-of-way, many contractors have struggled to find an efficient method of trimming trees.

### 43 The FIT Goes On... or Does it?

Ontario's Feed-in Tariff Program ("FIT Program") has been under review since last fall. The results and Government's ensuing decisions are coming to fruition.

### 46 Security Sessions Can you hear me now??

Making appropriate and acceptable trade-offs between cyber security (or even physical security) requirements and operational convenience is an on-going issue with no clear criteria for determining when one has gone too far.

### 48 Guest Editorial Energy Efficiency as a Strategic Priority Helps Businesses Realize Big Benefits

There are many reasons why electric utilities companies should be concerned about reducing their environmental footprint.





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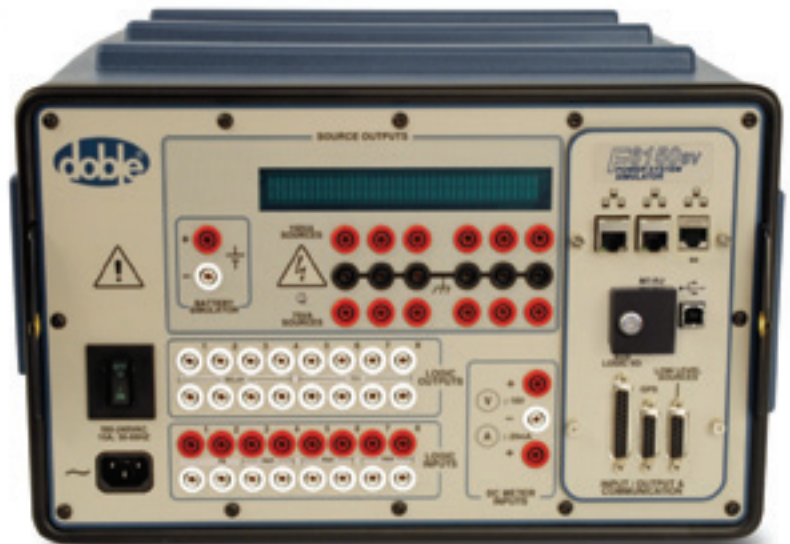
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# POWERPOINTS

## Energy Matters

Those of you who are familiar with the editorial comments from Mike Marullo will notice that a different face is now staring out at you from the page. I have taken over the position as editor of Electric Energy T&D magazine. Filling Mike's shoes will be no easy task but I will do my best to account for myself as I continue the tradition of providing you with news, opinions, observations, thoughts, ideas, and maybe a little humour as applied to the electrical energy industry around the world.

I am impressed and fascinated by electricity generation, transmission, and distribution. Jay Leno hit the nail on the head when he said "men love big dumb things" – steam engines, earthmovers, drilling rigs, turbines, locomotives, generators, hydro towers, and the like. That attraction notwithstanding, I am still very passionate about the environment and am a big fan of renewable energy. To work for a print and electronic publishing company that has such an eclectic readership and is so dedicated to providing a window on electricity T&D is a dream. I look forward to exploiting this vehicle to share, educate, and enlighten readers from all over.

Over the last decade and a half of working with Muni, IOU, Co-op, and renewable energy providers in the software, publicity, and editorial areas I have learned that there is probably the same number of questions and opinions on the subject of energy as there are consumers. I have also discovered there is a wide gap between consumer perception and actual knowledge of energy efficiency. I will work hard to narrow this gap.

I believe that climate change is not the result of deliberate or malicious human acts, or even due to something we could have easily predicted or avoided. It is, rather, an accident of chemistry, specifically that carbon dioxide has greenhouse climate effects. This accident is so novel and has come upon us so recently that global society has been caught largely unawares as to how it should respond. This scenario, to a great many people, is absolutely true. In the eyes of many others, however, climate problems affecting us today are simply the result of planet earth going through natural, cyclical phases of warming and cooling. No matter what you believe to be the contributing factors, climate change is on our doorstep and we, as responsible caretakers of our planet, must do something to mitigate related problems. Research shows that, even though consumers are aware of climate change, a large portion of them do not tie electricity usage to environmental impact. Eighty-five per cent cite individual usage of petroleum products as having a negative impact on their environment and over forty per cent feel electricity use is the culprit not understanding that traditional fossil fuel-based power generation is a major producer of carbon emissions.



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Because I live quite close to the north shore of Lake Ontario I have a front-row seat to the soap opera that's unfolding around offshore wind. To take advantage of the incredible potential to harvest energy from this natural wind tunnel, Ontario plans to install 60 turbines that will span eastward 25 kilometres or so. However, even the best laid plans come at a price. It seems one of nature's most important laws: *For every action, there is an equal and opposite reaction*, is alive and well. It must be! NIMBY (Not in My Backyard), NOPE (Not on Planet Earth), and BANANA (Build Absolutely Nothing Anywhere) crowds are springing up everywhere ready to do battle with any group they feel presents a threat of any kind to their way of life or their beliefs. In this case the problem for the people who live right on the shore is that wind turbines will ruin their view of the lake. I've looked out across that stretch of water many times and fail to see how 60-metre high towers sitting two to four kilometres offshore with 500 metres of separation on either side could screw up anyone's view. But that's just me.

It is my hope that one day soon we will see a world where governments deal with the fossil fuel dilemma in energy time rather than political time. According to John Hofmeister we need to be working with a fifty-year road map to even come close to a reliable, affordable, sustainable fossil-free energy future. I figure he knows

of what he speaks – as president of Shell Oil from 2005 to 2008, he was on the front-lines of the oil production business. I consider myself to be an optimist, but even the most hardened of optimists need reinforcing at times and I'm not ashamed to admit Hofmeister has more than once been a cauldron of wisdom and sanity in a world still mired in a sea of black gold.

A while ago I mentioned in an article something that absolutely floored me and often think about it when I need a reality check. I overheard a group, of thirty something's, talking about renewable energy. I was impressed. "Finally," I thought. "This important subject is getting some traction." As members of the group were expressing different opinions, a young lady piped up saying wind energy was a good thing but we had to be careful because there could come a point at which too many turbines spinning at the same time around the globe would slow the earth's rotation. Another person then offered their take on renewable power stating that if we insist on harnessing tidal energy it could disrupt the moon's gravitational pull on the world's oceans putting the entire planet in jeopardy by forcing the moon out of its orbit. And there went my balloon. On the up-side, it reinforced the need for more attention to our plight and that education is not just important, it could well be the vital underpinning to making sure the future of renewable energy sticks.

Like they say, *there's no such thing as bad publicity.*

# POWER POINTS



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101-101-104	98.71	0	95%	OK
101-101-105	98.5	0	95%	OK
101-101-106	98.72	0	95%	OK
101-101-107	98.7	0	95%	OK
101-101-108	98.02	0	95%	OK
101-101-109	98.7	0	95%	OK
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## First Solar Installs 10 Millionth Power Plant PV Module

Milestone reached at 550 megawatt Desert Sunlight Solar Farm

**Tempe, AZ, June, 2012** - First Solar, Inc. (Nasdaq: FSLR) announced its Engineering, Procurement and Construction (EPC) team has installed its 10 millionth solar photovoltaic (PV) module in a utility-scale solar power project. The installation took place at the 550 megawattAC (MW) Desert Sunlight Solar Farm solar project that the company is constructing for NextEra Energy Resources and GE Energy Financial Services. First Solar is the largest PV solar power plant construction firm, and was recently recognized by Engineering News-Record as the fifth largest construction firm in the power sector.

The Desert Sunlight project is part of First Solar's 2.7 gigawattAC (GW) utility-scale solar project pipeline in North America, which will support 7,000 supply chain and construction jobs over the next several years. Desert Sunlight, located near the community of Desert Center in Riverside County, Calif., is creating an average of 400 construction jobs.

"Today's (June 25) milestone underscores First Solar's leadership in delivering integrated PV solar power plants, and it's only just the beginning," said Jim Lamon, First Solar Senior Vice President of Engineering, Procurement and Construction and Operations and Maintenance. "It's also fitting to install our 10 millionth EPC module at the Desert Sunlight project, which will set a solar record as well.

When completed in 2015, it will be one of the two largest PV solar projects in the world, along with the 550 MW Topaz project we're building in San Luis Obispo County."

First Solar has cumulatively produced almost 80 million of its advanced thin-film solar modules, enough to circle the earth almost 2.5 times. The total represents a peak generating capacity of more than 6 GW, enough to power 3 million homes and displace over 4 million tons of CO<sub>2</sub> per year.

## Ontario's Largest Transmission Project Producing Power

Ontario Government Brings More Clean, Reliable Power Online, Creates 500 Jobs

**June, 2012** - Ontario's largest transmission infrastructure project in 20 years is now transmitting electricity. The Bruce to Milton transmission expansion project will connect more than 3,000 megawatts of clean, renewable energy to Ontario's grid - enough power for Milton, London, Guelph, Chatham, Mississauga, Brampton, Hamilton and St. Catharines, combined.

Hydro One completed the transmission line six months ahead of schedule and employed approximately 500 workers at the peak of construction activity. The project involved constructing more than 700 transmission towers, and stringing more than 180 kilometres of transmission wire from the Bruce Peninsula to Milton.

Strengthening Ontario's electricity infrastructure is an important part of the McGuinty government's plan to build a modern, clean, reliable electricity system - ensuring the province has the electricity it needs to power homes, schools, hospitals and the economy.

### QUICK FACTS

- Ontario is modernizing 80 per cent of its energy infrastructure.
- The Bruce to Milton transmission line will enable more clean energy to come online from the refurbished units at the Bruce Power nuclear facility and 25 large solar and wind projects announced last summer.
- The province invested \$9 billion to upgrade 5,000 kilometres of transmission lines - the equivalent distance between Toronto and Whitehorse, Yukon to ensure a reliable electricity system.





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## PSE&G Lauded for Innovative Energy Efficiency Program for Hospitals

### NJ Utility Named an NJBIZ Healthcare Hero

Newark, NJ, June, 2012 - PSE&G, New Jersey's largest utility, was named an NJBIZ "Healthcare Hero" in recognition of its innovative energy efficiency program

for hospitals. The award was given as part of the newspaper's annual program that honors the efforts of individuals and organizations that are making a significant impact on the quality of health care in New Jersey.

PSE&G won in the innovation category for its \$129 million hospital energy efficiency initiative, one of only four programs in the U.S. that specifically targets hospitals for energy efficiency improvements and the only one in which the utility bears all of the upfront capital costs.

"While investing in energy efficiency may seem like an unconventional role for a company like ours, it's where we see the utility of the future," said Ralph LaRossa, PSE&G's president and chief operating officer. "We have been providing energy solutions to our customers for over 100 years and this is a natural extension of our work. Helping our customers make the sometimes costly upfront investments in energy efficiency allows them to use energy wisely, reduce their costs and help the environment. We're incredibly proud of our work in this realm and honored to share the spotlight with people and organizations that are making New Jersey better."

Hospitals are prime candidates to reduce energy consumption because they are 24-hour-a-day, seven-day-a-week facilities that use large amounts of energy. Large upfront costs and long pay-back times associated with energy efficiency improvements can make it difficult for hospitals to make investments that would lower their energy bills and help their bottom line.

PSE&G's program helps hospitals reduce the fiscal burden associated with making capital improvements that can reduce energy costs. It allows hospital leaders to make energy efficiency upgrades without distracting them from their core mission of providing quality healthcare and achieving positive outcomes. It frees up money and creates savings that can be invested in life-saving equipment and training.

The utility provides hospitals with a free investment-grade audit, then proposes various cost effective energy conservation measures that will make a substantial impact on the hospital's energy efficiency and utility costs. These upgrades might include replacing boilers, chillers, motors and pumps or installing sophisticated energy management systems, high efficiency lighting, etc.

PSE&G provides up-front funding for this work, and the hospital repays a portion of the total cost at zero percent interest over 36 months. For the hospitals currently enrolled in the program, the average amount they will repay is about 30 percent. Once the hospital's portion of the grant is repaid, the utility savings continue to benefit their bottom line.

NJBIZ's Healthcare Heroes honors the people and organizations that are leading New Jersey through a rapidly changing health care landscape. More than 350 hospital and healthcare professionals attended the awards breakfast at The Palace at Somerset Park.

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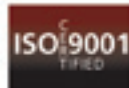
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## New IEEE 3000 Standards Collection™ Simplifies Guidance for Industrial & Commercial Power Systems

User-friendly approach to power system guidelines will make it easier to find the most up-to-date recommendations on safe and efficient electricity generation

**Piscataway, NJ, June, 2012** - IEEE, the world's largest professional association advancing technology for humanity, announced the launch of the IEEE 3000 Standards Collection™ for Industrial & Commercial Power Systems, which sets guidelines and establishes standards for virtually every aspect of the power generation process. The new standards collection will update and eventually replace the venerable IEEE Color Books on which the industry has long relied, and make it easier for power engineers to find the most up-to-date best practices and solutions for virtually any power system venue or application.

Power engineers have used the IEEE Color Books for decades to find recommendations and practical guidelines for every aspect of the design, installation, maintenance, and operation of industrial and commercial power systems. Over the years, however, as the scope and content volume of the IEEE Color Books has grown, it has become increasingly difficult to update and revise them fast enough to keep pace with rapidly evolving technologies.

The IEEE 3000 Standards Collection provides a fresh approach, splitting up the thirteen Color Books into smaller, more narrowly focused technical standards. Each standard within the collection is made up of a large number of "dot" standards (approximately 70 in all), which focus on a specific technical topic. For example, "IEEE 3001 Standards: Power Systems Design", will be made up of a number of individual dot standards, each of which will provide recommended practices for a specific power system design topic, such as: evaluating service requirements, applying power distribution apparatus, instrumentation and metering, etc. Because these standards will be shorter and more narrowly focused, the revision, balloting, and approval process will be more timely and efficient than in the past. At the same time, with the ability to locate and access any dot standard online, power engineers will be able to more quickly zero in on the relevant information they need.

### First New "dot" Standards Now Available

IEEE has published the first three of these dot standards:

- IEEE 3007.1™: Recommended Practice for the Operation and Management of Industrial and Commercial Power Systems
- IEEE 3007.2™: Recommended Practice for the Maintenance of Industrial and Commercial Power Systems
- IEEE 3007.3™: Recommended Practice for Electrical Safety in Industrial and Commercial Power Systems.

Covering power plant maintenance, operations, and safety, the IEEE 3007.1 standard is organized into three broad categories: documentation, system operation, and control responsibilities, including switching and clearing. The IEEE 3007.2 standard covers the fundamentals of equipment maintenance, including maintenance strategies and

testing methods. IEEE 3007.3 standard addresses all aspects of electrical safety in industrial and commercial power systems and provides clear guidelines aimed at promoting the understanding of the fundamental concepts of electricity hazards.

The IEEE 3000 Standards Collection will continue to be published over the next several years. The collection will include an introductory standard (IEEE 3000 Standard: Fundamentals), which will provide a framework for all subsequent dot standards. It will offer a generalized overview of power system design, installation, operation, and maintenance, with references to the dot standards that provide more detailed information on specific applications and environments.

For more information about the IEEE Standards Collection, visit: <http://standards.ieee.org/IEEE3000standards>.

IEEE 3007.1, IEEE 3007.2, and IEEE 3007.3 are available for purchase from the IEEE Standards Store. To learn more about IEEE-SA, visit us on Facebook at <http://www.facebook.com/ieeesa>, follow us on Twitter at <http://www.twitter.com/ieeesa> or connect with us on the Standards Insight Blog at <http://www.standardsinsight.com>.

## DTE Energy Offers Cash Incentives for Businesses to Adopt New Federal Lighting Standards

**Detroit, MI, June 15, 2012** - DTE Energy is offering special cash incentives to business owners who invest in new energy efficient lighting technologies under a new federal program. The incentives will be available through July 31, 2012, as part of the company's Energy Efficiency Program for Business.

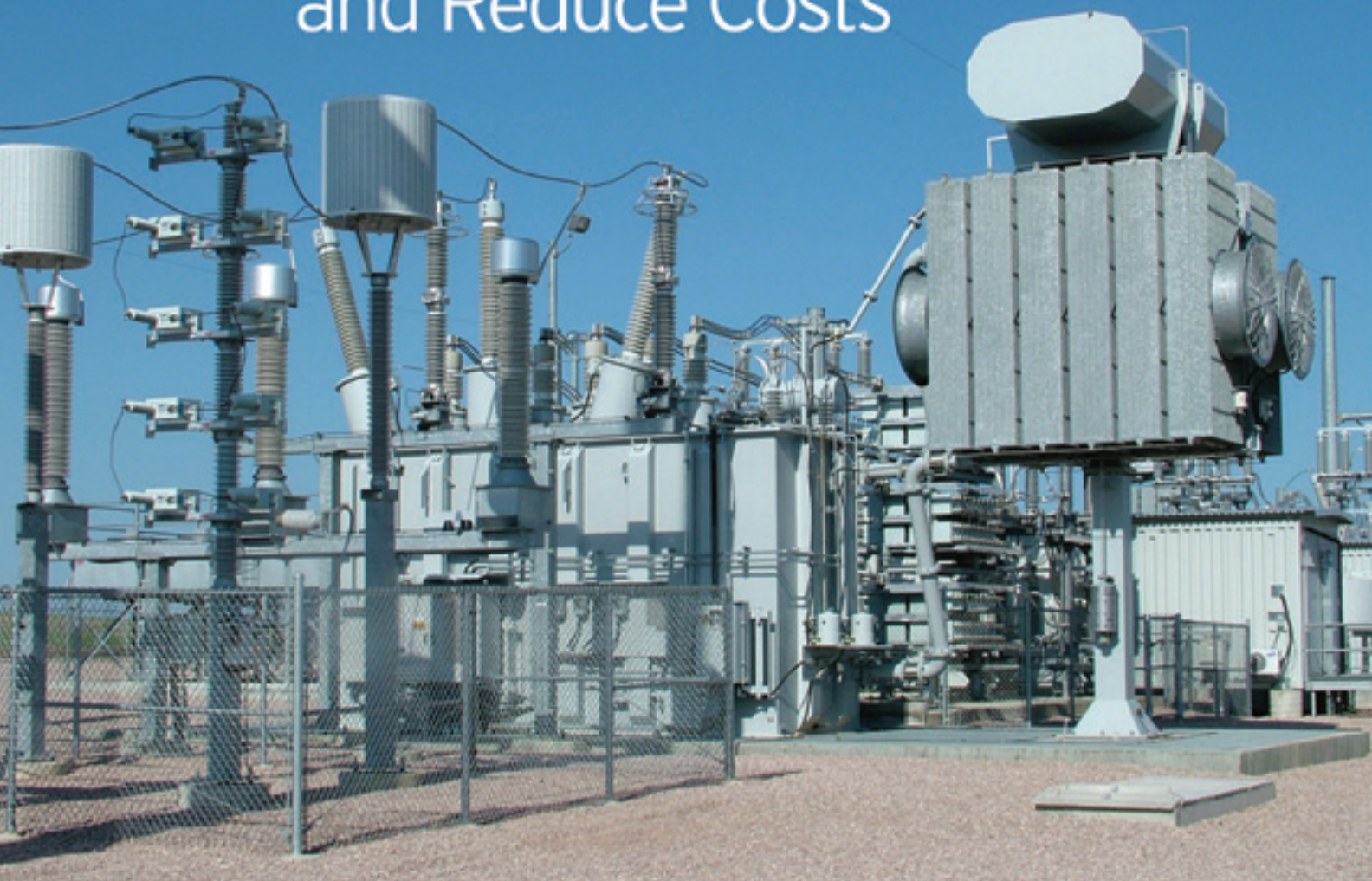
The cash incentives are available to businesses that convert older model, T12 fluorescent lights to high performance or low wattage-high performance T8 lamps and electronic ballasts. U.S. Department of Energy legislation calls upon importers and manufacturers of the commonly found T12 fluorescent lights to stop making the those products. It is expected that shortly after the new federal rules take effect, cash incentives will no longer be offered for this common retrofit.

"We realize this legislation could significantly affect many of our business customers," said Bill Clemens, manager of energy efficiency program for DTE Energy. "We want to help our customers cover a portion of the investment needed to upgrade to the latest energy efficient technology. By retrofitting their outdated lights now, businesses can not only take advantage of the incentives that will likely be discontinued, but they will also avoid increased costs of replacing those lights in the future."

The Energy Efficiency Program for Business ([dteenergy.com/saveenergy](http://dteenergy.com/saveenergy)) was launched in 2009 to help DTE Energy customers save money by using less energy. The program offers customers a wide array of energy efficiency ideas and incentives. Customers can earn incentives if they make improvements from a list of qualified efficiency upgrades for both gas and electric technologies, including energy-efficient lighting, drives, controls, heating ventilation and air conditioning and more. For more information, please visit the program website at [www.dteenergy.com/saveenergy](http://www.dteenergy.com/saveenergy).



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## Electric Vehicles at play in the Smart Grid

Jon Brock, President, Utility and Energy Advisor, Desert Sky Group LLC and Smart Grid RoadShow Chair speaks with Dr. Russell Lefevre, Chair of the IEEE Steering Committee on Electric Vehicles

This is the second installment of our 3-part interview with Dr. Russell Lefevre, a widely recognised IEEE Smart Grid technical expert and chair of the IEEE Steering Committee on Electric Vehicles (EV). Dr. Lefevre is a Fellow of the IEEE and the American Association for the Advancement of Science, past president of IEEE-USA, and the Aerospace and Electronic Systems Society of IEEE. The interview is conducted by Jon Brock, EnVision 2030 Contributing Editor and the Smart Grid RoadShow Chair. This session addresses the regulation and policies that need to change as a result of EV adoption and various storage options that may emerge as the industry evolves.

One of the areas people talk about for maintaining the charge in the car is battery swapping. One goes into a battery swapping vendor and exchanges a depleted car battery for a fully charged one. Whereas consumers in the U.S. are rejecting this idea, users in China are finding the exercise necessary. Because a large portion of the population lives in high-rise units that do not provide assigned parking spaces, battery swapping is the logical choice. Another interesting thing that consumers are saying is that they only want to plug in when they need to. It's like gas. If they go to their electric car and turn it on to see the battery is half charged, they don't feel much like plugging in. Many will wait until it gets down to a quarter charge and then plug in.

Consumers are voicing other concerns: They say there aren't enough charging stations and charging times are too long. This brings up the subject of *charging levels*. Level 1 is 120 volts, 5 to 15 amps. This level is suitable for a Chevrolet *Volt*, a plug-in hybrid. The consumer plugs in and waits ten hours for a full charge. However, it would take much longer for a fully electric vehicle, such as a Nissan *Leaf*, to reach full charge.

Level 2 is 240 volts, 20 to 30 amps, and that's much faster. Depending on which battery is being charged it can still take from three to eight hours, still a fair amount of time. However, surveys have indicated that most *Leaf* and *Volt* owners do not purchase the level 2 charger. They apparently are satisfied with running their cars without a fully charged battery.

The thing about Level 1 and Level 2 is that operational standards have been established by the Society of Automotive Engineers (SAE) and vendors know how to meet those standards. The fact that Level 1 and Level 2 standards exist is a very big deal.

**Brock:** How does industry convince consumers that the Smart Grid will be able to handle EVs on a mass-adoption scale?

**Lefevre:** The consumers, the people I know who even have a glimmer of buying a PEV are not really concerned about whether the grid can handle it or not. They have no real understanding of how power gets to their house. All they know is that you plug in a lamp and turn it on and it works. They just accept it. It's there and if it goes away during a power outage, they're not particularly concerned about it because they know it will come back on sooner or later. The potential impact of EVs on the grid would probably not enter significantly into their decision to buy a car.

What concerns them most is cost, conveniences, and range anxiety. As for cost, the industry is currently working on that: Consumers get tax breaks and other kinds of incentives. Surveys show, however, that customers aren't willing to limit when to charge. They don't want utilities telling them that they have to plug in at night. They want to come home at 6 p.m. and plug in, something that concerns people in the industry who worry about clusters. For example, at 6 p.m. customers still have air conditioning on and could be drying clothes all of which puts excess draw on the power source.



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Level 3, which means a very fast charge, will be of vital importance but at this time nobody knows what Level 3 really is. There are no standards at play but fast chargers are definitely showing up. Fast chargers will not be installed in home situations, only at outside locations. People are expecting that a fast charge will charge an EV in a matter of minutes similar to the time it takes to fill their gas tank at a regular filling station. Even a fast charge will likely take longer than that.

The burning question becomes, "How can utilities gain the confidence of consumers?" There are, in fact, a lot of things that can be done. Energy providers can reach consumers by forming partnerships with automobile distributors that offer the Nissan *Leaf* or Chevrolet *Volt* or EVs from other manufacturers. Utilities can work with these distributors to educate the consumer about such concerns surrounding range anxiety or batteries for example. The Electric Drive Transportation Association (EDTA), the preeminent U.S. industry group dedicated to the promotion of electric drive, maintains a portal. In addition, the EDTA GoElectric Drive website – goelectricdrive.com – offers a tremendous amount of information that is very useful to consumers.

**Brock:** Once acceptance begins to ramp up in a big way, what regulatory and policy issues must be addressed in order to successfully provide power?

**Lefevre:** The regulatory people aren't particularly concerned. What they are carefully watching are issues around transmission lines particularly the shortage of lines yet to fully integrate renewable energy into the grid.

On the policy side, China has a national strategy to become the largest supplier of electric vehicles in the world. The country expects to have 25 million cars on the road in 2015 and they want 10 per cent of those to be electric. The European Commission has a Green Cars initiative, funded with 5 billion euros, to accelerate the development of EVs. The United States has earmarked 3 billion dollars from the American Recovery and Reinvestment Act (ARRA) of 2009 to promote electric transportation. The U.S. funding has been used in several ways. Of particular importance is the support of battery research and the deployment of charging stations in many places throughout the nation.



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During the current Congress, two major legislative events have taken place in the U.S. House of Representatives and in the Senate.

In the House, the proposed legislation is called, “The Electric Drive Vehicle Deployment Act of 2011 (H.R.1685).” The major element of the bill is that the Department of Energy (DOE) should select ten deployment communities to put up electric vehicle infrastructure, e.g. charging stations. There will be tax credits for people to buy electric vehicles and grants to develop some of the infrastructure. The selected communities will have to put up matching funds, but there will also be bonds, loans, and loan guarantees. This is a fair-sized deal.

The bill called for US\$300 million to develop these ten deployment communities. The legislation was inspired by a document entitled “The Electrification Roadmap,” which came out in November 2009. It is the brainchild of a number of high level corporate people at companies that include PG&E, Nissan, the battery manufacturer A123 Systems, and the charging system deployer Coulomb Technologies. The point of the exercise is that electric vehicles will be in the field some time and when they arrive, communities will be able to handle the specific needs. If the vehicles are allowed to enter the market naturally without some preparation of the areas, they run the risk of shooting themselves in the foot as it will take decades to come to anything like a significant level of deployment. To this end, “The Electrification Roadmap” recommended putting a fair amount of money into deployment communities to encourage people to buy electric vehicles and to use the entire infrastructure. It is hoped that two things will come of this: One, usable data on consumer behaviour; and two, the take-up by the early adopters will motivate the rest of this community to purchase electric vehicles. They will see that it makes sense to take advantage of the infrastructure. Further, it is hoped that other communities who see the success will emulate the deployment communities using private capital. Overall, the idea will be the driver to get electric vehicles on the streets more rapidly.

In the Senate, a similar bill (S.948) was introduced by Lamar Alexander, R-Tenn. and Jeff Merkley, D-Ore. In congress Alexander is one of the biggest promoters of electric vehicles.

It is unlikely that these bills will be acted on in this Congress but it is encouraging that they have been introduced in a bipartisan manner.

**Brock:** What technological challenges must be addressed to successfully provide and store power for EVs once adoption takes place?

## Lefevre:

**Batteries:** Battery technology is one of the long poles in the tent. The price of a battery right now is \$900 per kilowatt hour. The industry wants to get it down to \$500 per kilowatt hour by 2015. The thing about batteries is that electricity has been around for a long time and people have been working on batteries for all that time. There simply isn't anything like Moore's Law for batteries. According to Moore's Law you can double the number of transistors on an integrated circuit every two years. But battery improvements are very incremental. There is no history showing that technology will be able to double the energy density every two years.

However, there is some headway out there. In February 2012 at the Advanced Research Projects Agency-Energy (ARPA-E) Summit, Envia Systems unveiled a Lithium-Ion battery that achieves 400Wh/kg at \$150/kWh. These values are well beyond the current state-of-the-art and offer the possibility of making a family-size automobile available at \$20-25,000 without subsidies. Envia Systems believes that these batteries will be commercially available in 2015. There is some skepticism that this can be accomplished since there have been highly publicized breakthroughs in the past that have not actually come to pass but the available information is encouraging.

**Intelligent on-board power management:** The IEEE Control Systems Society had an interesting article about this called “Battery Management Systems,” published in Control Systems Magazine in June 2010. This is another piece of intellectual property that IEEE is working on that will help improve the EV and EV battery performance.

**Storage:** Storage is another big deal for renewables. Among other things, the industry talks about having stationary batteries that grab solar energy during the day and feeds it to the electric vehicle at night. Think about that: Solar energy is DC and batteries are all DC, so this should be relatively easy to do. You don't have to convert AC electricity, which comes out of your wall plug, to DC to charge the battery. Everything is very nice and convenient. However, batteries designed to accomplish this task are quite expensive at the moment. Tesla and their partner SolarCity have a commercial product that is interesting.

**Wireless charging:** At this point it's interesting to bring out one piece of research that is going on – wireless charging. It is possible to charge batteries wirelessly and there are some people who think that it will be possible to wirelessly charge these batteries while they are in a moving vehicle. It sounds fantastic, but some R&D folks are looking at it.



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**Power Electronics:** We need to work on things like power electronics, motor drives, and other electric machines. For example, as you go to more and more electric kinds of vehicles, you might combine the alternator and the starter into one unit, making it smaller and more efficient. Then you could think about electromechanical power trains and vehicle controllers. There is a company called Hybrid Electric Vehicle Technologies (HEVT), Inc. that makes electrical control units that are based on artificial neural networks. Think about that, we're talking about some very high-tech stuff. Ali Emadi, a founder of HEVT and a member of IEEE, is recognized as one of the best researchers in the world on Hybrid Electric Vehicles.

**Brock:** Thank you Dr. Lefevre for your valuable insights about EV policy and various storage options. We look forward to continuing this dialogue in the future on other EV-centric topics.

**Lefevre:** You are welcome, Jon. The pleasure is mine.

**Jon Brock** is president of Desert Sky Group LLC, an advisory firm based in Denver, Colorado providing independent and unbiased advice and consulting services to the utility and energy industry. Jon also serves as EET&D Magazine's EnVision 2030 contributing editor and is the chair of the Smart Grid RoadShow. EnVision 2030 interviews and presentations are focused on the long-term evolution of the Smart Grid and grid-related technologies.

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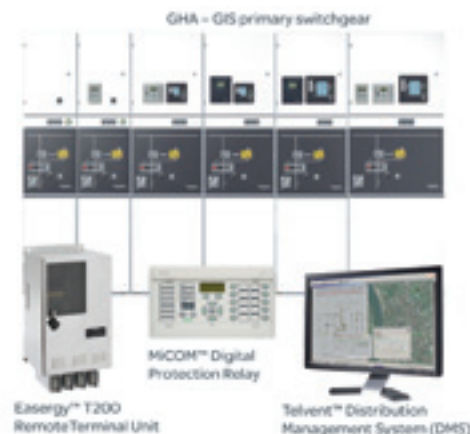
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# GREEN OVATIONS

Innovations in Green Technologies

## Smart Grid Customer Acceptance

Understanding Utility Customers Today to Support the Smart Grid of Tomorrow

By Zac Canders, Science Applications International Corporation (SAIC)



Meter automation and the broader smart grid are fundamental prerequisites to improve efficiency, reduce the environmental impact of our energy usage, and promote green initiatives. Policies are in place nationwide at several levels supporting – even requiring – the deployment of smart grid. However, many obstacles must still be overcome. Some are technical, such as creating new electric operating system algorithms to optimize and manage generation down to in-home automation. Others are policy driven; for example: How will critical loads be prioritized for supply and disconnection when the grid is under stress? What rate structures give customers fair combinations of incentives and benefits to change consumption patterns? To what degree will critical peak events allow customers to accept or decline participation? Most of these obstacles can be addressed with known and proven approaches, but another domain of obstacles has cropped up that could challenge progress and may be less readily resolved: customer acceptance.

Smart grid is in its very early stages, driven by basic economic value and by policy. The progress to date of projects funded by the American Recovery & Reinvestment Act, as well as various other implementations across the United States, have shown the industry the need for customer education and active early participation by utilities to support new technology adoption. Specifically, many of these utilities have asked their customers to accept smart meters placidly, without realizing that some customers will vigorously protest. For decades, utilities conducted infrastructure upgrades with minimal customer involvement, concern, or reaction; so the industry assumed customer acceptance was static. Utility customers benefited from accurate meters, improved billing services, and responsive call centers. Utilities conducted metering implementations as infrastructure improvements to reduce operating costs, so the selected technologies went relatively unnoticed.

### Before There Were Smart Meters

The transition from meter readers to mobile automatic meter reading (AMR), to one-directional fixed networks, and finally to two-way advanced metering infrastructure (AMI) saw little, if any, customer involvement or engagement. The cost savings and associated benefits from technological improvements of the meter-to-cash business process were the primary justification. The utilities realized cost savings through the automation of meter data collection, analysis, and data sharing across various internal systems and then passed these savings on to

their customers. Early metering implementations were supported by relatively simple business cases that clearly spelled out investment value in terms of workforce and vehicle reduction, increased meter accuracy, new mechanisms for revenue assurance, and more detailed usage data to support innovative rate structures. Typically, utilities deemed justifying the metering implementations to customers as external to the business case, as cases rested principally on the operating benefits of the technological upgrades. The fact that the investment generously benefitted customers, too, was not reflected in the business case or investment justification, so utilities did not require or seek customer participation.

### Metering in 2012

Smart metering is different. Unlike AMR and AMI meters, smart meters communicate with a customer's appliances, and include a service switch to remotely enable or disable the entire electric service. Justifying smart meters to utility constituents, regulators, and customers has not followed the traditional utility business case, implementation, or customer communication models. While electric utilities are still in the business of moving electrons in reliable, secure, safe, and environmentally responsible ways, they now face increased scrutiny of operation and maintenance costs, pressures from their boards to deliver increased financial performance, and an emerging trend to encompass customer requirements into smart grid business cases. When operations, maintenance, and system improvement costs rise, prices have to be adjusted to continue to serve customers' energy needs. Regulated and non-regulated utilities must always act responsibly and keep their customers' best interest in mind. A regulated utility will not set their prices to recover the costs of things regulators deem unnecessary, and a non-regulated utility can't accept the risk of spending capital on consumer-type services that cannot be justified.

Many of the initial smart metering business cases did attempt to quantify savings associated with customer education, motivation, and participation in utility programs enabled by smart metering. Specifically, online presentation of a customer's usage data, current as well as historical, provides the avenue required to understand energy patterns, cost, and environmental impact. For those customers that choose to take advantage of it, this means to explore energy usage could drive energy management decisions. This data granularity and frequency of reporting requires the technological advancements of smart meters. Because some customers object to smart meters, it consequently requires well-designed marketing and communications campaigns to inform and educate customers.



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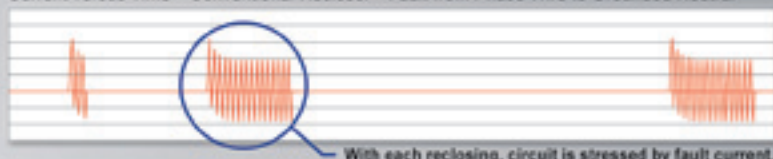


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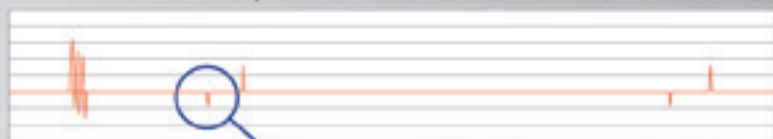
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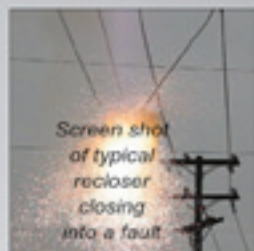


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The new educator role has required utilities to approach smart metering with various marketing techniques that were previously limited to niche research in the utility sector:

1. **Traditional Utility Marketing:** Print flyers, radio broadcasting, and news coverage
  - a) **Benefits:** Proven approaches to identify, satisfy, and keep customers informed and engaged in utility programs and services
  - b) **Risks:** High start-up costs associated with testing, launching, and managing campaigns
2. **Social Media Marketing:** Facebook, Twitter, public forums, focus groups, and YouTube
  - a) **Benefits:** Reach niche audiences that are typically passionate and engaged in subject matter. These mediums provide a forum for customers to respond with opinions and ideas. Low cost to test, launch, and manage campaigns that have potential for high impact and visibility
  - b) **Risks:** Not reaching target or entire audience. These are non-traditional marketing approaches for utilities and may be challenging to design, implement, and determine cost-to-customer impact benefits. Audience and input may be difficult to manage as campaigns may reach individuals outside of service territory

For example, some U.S. utilities are studying the opportunities of, or even transitioning from, monthly register reads to smart metering solutions that gather residential usage data at intervals such as hourly, 15 minutes, or even five minutes. Customers can visit secure on-line portals that present their smart meter usage data for analysis, comparison, and associated consumption costs. Through the comprehensive marketing tools listed above utilities are providing their customers with resources to become more educated, participate in the management of their monthly energy bills, and understand and accept the realities of smart metering. Additionally, the use of traditional and social media marketing is providing these utilities with insight into the diverse communication preferences, levels of energy involvement, and attention to the green decisions each customer may, or may not, have.

## The Dynamic Utility Customer

Utilities are beginning to realize that today's utility-customer relationship is extremely dynamic, and the terms of customer acceptance are not the same for all. Coupled with the reality that regulated utilities are not mandated to behave more like customer-driven businesses intensifies the problematic

approach to addressing and managing customer concerns and specific groups questioning utility investments. As time goes by, regulators may see the need for utilities to spend money on more customer-focused programs and communications.

For example, a few utilities have been asked by their regulators to explore, or offer, smart meter opt-out programs to address customer concerns and debates that surround health, accuracy, and privacy. Others have decided against providing opt-out. These decisions provide significant evidence that customer involvement can shape and even transform utility services. The opponents of smart meters have utilized non-traditional marketing strategies to spread their concerns to nationally visible levels. Specifically, these groups have developed websites, news articles, and social media campaigns that highlight their following claims:

1. **Health:** Smart meters produce radio frequency (RF) emissions that may be harmful.
2. **Privacy:** Regardless of communication medium, when the utility obtains interval data reads, customers may become vulnerable to misuse that could expose those data and compromise the customers' privacy
3. **Accuracy:** Higher bills potentially associated with accuracy of meter measurements.

## Smart Meter Customer Acceptance

While the specific strategies to address customer concerns surrounding smart meters have varied by utility, most can be addressed through some form of active customer education. To address RF concerns, utilities have referenced numerous studies from globally recognized organizations like the Federal Communications Commission, the California Council on Science and Technology, and the World Health Organization that provide conclusive evidence that the levels of smart meter RF emissions are well below recognized safety standards. Utilities have addressed privacy concerns through online educational links detailing the encryption and security standards in place to protect and manage customer usage data. Utilities have addressed accuracy claims with traditional programs to independently test and validate meter accuracy. Utilities are starting to learn that education is a key tool to smart meter understanding and acceptance, and this will hold true for future smart grid initiatives.





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# GREEN OVATIONS

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## Today's Smart Meter Challenges Are Tomorrow's Smart Grid Opportunities

Meter automation produces benefits greater than its cost for many utilities just by improving basic energy delivery and utility operating efficiency. Future smart grid capabilities that leverage the smart metering infrastructure can produce very large additional efficiencies and environmental benefits through customer involvement. A major lesson learned from smart metering implementations is that involving customers in energy decisions requires involving them in the supporting technology choices. While some customers' insistence on opting out may not be limited to smart metering, the notion of opting out may be here to stay. Demand response, critical peak pricing, home automation, time of use rates, and automatic load control will require additional investments in grid infrastructure as well as marketing and communications campaigns to raise customer awareness. If current customer dynamics hold true, the ascendant importance of customer education will continue as well.

## Smart Grid Customer Acceptance

To support broader smart grid acceptance, customers must have the tools, resources, and options to manage and realize energy savings, have a meaningful environmental impact, and change wasteful consumption habits, or to do none of those things, if that is what they choose. This requires utilities to accept that not all customers share the same energy goals, and not all customers are affected by the same marketing and educational options. Utilities must support various means to communicate smart grid opportunities, provide technology options, and address current and future customer concerns and questions. The lessons learned from today's smart metering implementations highlight tomorrow's smart grid opportunities.

1. **Health:** In-home displays, smart applications, and load control technologies will likely leverage wireless communications. Customer questions and concerns will persist.
2. **Privacy:** Sharing of data associated with customers, smart appliances, plug-in electric vehicles, or distributed generation assets will become a concern.
3. **Accuracy:** The accuracy of metering technologies to support plug-in electric vehicles and other time of use specific devices may raise discussions and, in some customer groups, anxiety.

In-home displays, direct load control devices, programmable controllable thermostats, and smart appliances represent the range of emerging in-home technologies that may enable customers to leverage the capabilities of their smart meters and become increasingly effective in the daily management of their energy. Cross-industry collaboration among vendors, utilities, and customers may continue to require comprehensive customer education and awareness to guarantee not only device interoperability, but also meaningful experiences that encourage, or even automate, customer participation. Understanding individual customer drivers and reacting appropriately will continue to be a major challenge in the pursuit of energy efficiency.

## Conclusion

Smart grid collaboration among the energy generator, supplier, utility, and customer is required to enable automation and ultimately realize spectacular efficiencies. The connected grid vision is obtainable only when customers have the means to become involved, and that cannot happen without education from the entities that provide their energy. Smart meter implementations serve as a clear indicator that utility customers are becoming increasingly dynamic and the terms of acceptance are not the same for all. Going forward, the marketing, communication, and educational opportunities utilities choose to provide may also require an understanding from the start that some customers may not be interested or will disagree. Customer acceptance has emerged as an important predictor of the efficiencies that can be obtained through smart grid.

## About the Author

**Zac Canders** is a project manager at SAIC with extensive experience leading design, development, configuration, implementation, and support of smart grid solutions and services across the United States. He has provided his expertise at the country's largest investor-owned utilities and municipalities, where he directly managed advanced metering infrastructure, meter data management, complex electric distribution, and enterprise resource planning projects. Canders holds a BS in electrical engineering and biomedical engineering from the University of Rhode Island, an MBA from Suffolk University, and is in the process of completing a MSF from Bentley University.







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# Building a Stronger Grid with Energy Storage

By Jim Sember, Vice President, Power Quality Products, S&C Electric Company

Energy storage technologies can help electric utilities increase grid efficiency, capacity, and reliability by supplementing power generation, supporting transmission and distribution systems, and meeting the evolving needs of energy consumers. While best known for its ability to facilitate integration of renewable resources into the grid by managing intermittency, energy storage can serve many purposes. And, in its diverse forms, storage is proving itself essential to building a smarter, more responsive grid.

From stationary large-scale batteries and flywheel plants to compressed air energy storage (CAES) and distributed systems such as community energy storage (CES), development and deployment of storage is accelerating. While a key driver of this movement remains the proliferation of distributed renewables, the current and future applications of storage reach beyond the collection, buffering, and dispatch of wind, concentrated solar, tidal power, and other variable “green” resources.

From generation and transmission to distribution and consumption, energy storage can play a vital role in nearly every facet of the Smart Grid, driving its evolution. The benefits of storage are broad and deep. It can reduce wear-and-tear and reliance on traditional generators and other grid assets, and lower peaking costs. Storage can supply ancillary services, such as fast-response frequency regulation, short bursts of power that stabilize the grid. For distribution systems, storage can rapidly regulate voltage levels, provide economical peak load shaving and substation load leveling, and help utilities defer or eliminate more costly system upgrades. For residential and commercial consumers, storage provides reliable backup power, enhances power quality, and manages peaks without requiring demand reduction.

Still in its infancy, grid-purposed energy storage holds tremendous potential to fortify and transform our electric infrastructure, a fact that's reinforced as more projects demonstrate groundbreaking results.

## Grid-Tied Wind Energy Storage System Delivers on Its Promise

Battery-based energy storage has not yet been widely deployed on the grid. Up-front costs have been a significant barrier, making it challenging for utilities to justify deployment. And, until very recently, large-scale projects demonstrating the vast benefits battery storage can bring to the grid have not been readily undertaken. Questions about what storage can do to integrate renewable generation have been largely theoretical. Xcel Energy® undertook a significant research project in order to answer the questions of “how much” and “what are the benefits,” so that the electric power industry can justify investments in grid-tied battery storage and begin realizing its enormous potential for renewables integration and dispatch and other key goals.

A major U.S. electric and natural gas utility operating in eight states, Xcel is the nation's premier utility wind power provider and fifth largest solar energy supplier. Based in Minneapolis, Xcel is demonstrating unparalleled leadership in leveraging renewables and grid-scale storage systems for a cleaner energy future. In fact, Xcel's “Wind-to-Battery” project, initiated in 2009, is proving just how ideally suited battery storage is for making distributed renewable generation much less variable and much more dispatchable—critical benefits due to the proliferation of distributed renewables in the U.S. and globally.

Despite wind's variability and dispatch issues, the project has demonstrated that the amount of power and energy needed to allow a wind plant to work more compatibly with the grid is relatively modest. For roughly 20 to 40% of a wind plant's nameplate power rating and just 2 to 6 hours of battery storage, utilities can quickly realize most of the benefits energy storage has to offer in today's market.

Xcel's project set out to evaluate the effectiveness of a 1-MW (7.2-MWh) sodium-sulfur (NaS) battery-based system for integrating wind energy into the grid. They tested the system's core capabilities, which included time-shifting energy, wind smoothing, and dispatched wind leveling. They also evaluated battery storage for grid frequency regulation services. Xcel chose NaS storage because of its superior energy density and storage capacity, ability to withstand large numbers of charge-discharge cycles, dynamic operation, and large-scale deployment potential. Fully charged, this battery could power 500 homes for more than seven hours.



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# Building a Stronger Grid with Energy Storage

Xcel's system consisted of S&C Electric Company's PureWave® Storage Management System (SMS) connected to NGK Insulators' NaS battery and the 11.5-MW MinWind Energy LLC wind plant in Luverne, Minnesota. These elements comprised the standalone power conversion system, which was installed by S&C at a new substation near the Xcel and MinWind substations. MinWind's plant connects to a 34.5-kV power grid. The system includes interfaces for the wind plant and the grid; emergency backup power to regulate battery temperature; and components for local and remote performance monitoring, data collection, system control, and other communications. A variable scale factor allowed the system to operate as if connected to a 10-MW, 5-MW, or 1-MW wind plant, so that different generation-to-storage ratios could be explored.



**Xcel Energy's Groundbreaking "Wind-to-Battery" Storage Project**

This large-scale battery storage system captures wind energy and dispatches it to the electric grid as needed. It also reduces the impacts of wind variability and unpredictability and provides frequency regulation to stabilize the grid.

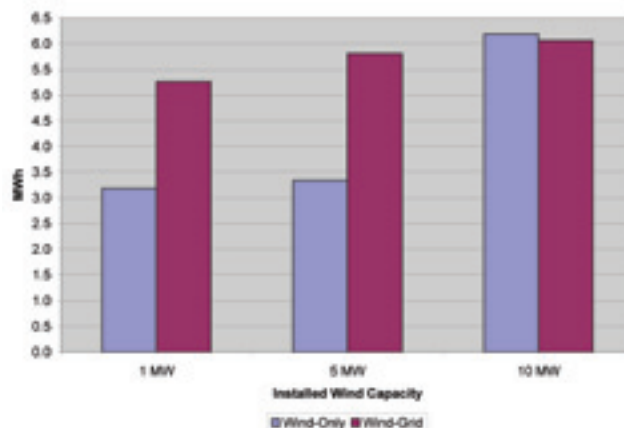
Source: Xcel Energy

The first domestic application of the NaS battery as a direct wind energy storage device, this project thoroughly examined the system's ability to time-shift wind energy from off-peak to on-peak availability, smooth wind variability (ramp rate control), limit deviations between actual and scheduled wind output (wind leveling), and follow frequency regulation signals as a generator and a load. This landmark project allowed the grid-tied battery system to operate as a traditional power plant, including selling its stored wind energy on the Midwest Independent System Operator (MISO) market and responding to internal Automatic Generation Control signals to supply frequency regulation services that stabilize the grid.

Due to the limitations of existing renewable energy integration methods and Xcel's expectations of high renewable penetration into their operating systems, the results of their Wind-to-Battery storage project were pivotal. Xcel's extensive testing of their battery-based system yielded positive performance results in all modes of operation, including basic generation storage, wind smoothing, dispatched wind leveling, and frequency regulation. All modes of operation provided dynamic voltage regulation. Final results became available in December 2011.

## Generation Storage Scenarios and Results

The system was tested to explore charging due to wind only and wind plus grid storage. Charging times were fixed at 8.5 hours with 4 hours allowed for grid charging. Xcel scheduled the NaS battery to discharge during set peak periods and recharge during set off-peak periods at a rate proportional to and coinciding with MinWind's power output. The system performed as expected over a six-week test period, during which data was collected at one-minute intervals. A 1-MW battery connected to a 5-MW wind plant yielded the best results, and it was concluded that an optimal ratio of plant-to-storage was between 5:1 and 10:1. To allow full battery charging from only the wind plant itself most of the time, the optimal point is probably closer to 30% of plant power rating with an energy capacity of 2 to 6 hours.



### Applying Wind Power Generation to Battery Storage

Average MWhrs of effective system charging (6 MWhrs is fully charged) for a 1-MW battery applied to various-sized wind plants. Average system charge energy is provided for both wind-only and wind-grid charging options; optimal ratio of wind plant-to-storage falls between 5:1 and 10:1 for this wind resource.

Source: Xcel Energy

## Wind Smoothing (Ramp Rate Control) Results

To reduce wind power variability, the PureWave® SMS was programmed to counter increases and decreases in power output, mitigating the wind plant's naturally high ramp rates. This approach gives system operators more time to respond to power output changes, enabling more strategic dispatch decisions and increasing grid reliability.

Xcel tested the system in wind smoothing mode for 18 days in different scenarios (with 1-MW, 5-MW, and 10-MW plant capacities) for 20, 40, and 60 minutes. Each configuration was tested for two days, with data collected at 10-second intervals. For all configurations, the system smoothed wind output as expected for the majority of the time. For example, during the 20-minute 5-MW test, the system effectively limited the ramp rates for most events. During the 1-MW test, it successfully limited the rate of change for all ramping events.





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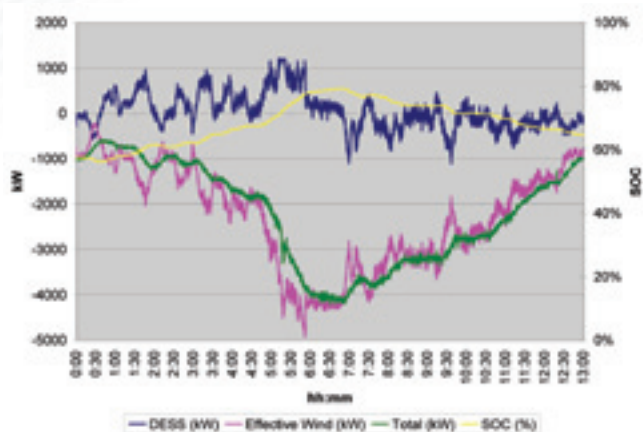
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## Building a Stronger Grid with Energy Storage

These results demonstrate the effectiveness of energy storage in mitigating wind intermittency. Additional investigation determined the optimal storage-to-wind ratio for generation shifting to be suitable for limiting wind generation ramp rates too, and that both tasks could be coupled to maximize system benefits.



### Wind Smoothing (Ramp Rate Control)

Results for a 1-MW battery connected to a 5-MW wind plant over 13 hours, with a time constant of 20 minutes and a scaling factor of 43.3%. DESS is the system (SMS); SOC is the state of charge.

Source: Xcel Energy

## Wind Leveling (Dispatched Wind) Results

Predicting and scheduling wind power output is problematic by nature. MISO's "day ahead" requirement means wind plant operators must predict output 14 to 38 hours in advance in order to sell wind energy on that market. Using the battery-based system in wind leveling mode over six separate days for 5.5-hour to 8.4-hour periods, Xcel consistently reduced the uncertainty of their wind plant power output. For all tests, they collected data at one-minute intervals and updated the combined power set-point every 30 minutes.

Whenever actual wind power output deviated from the scheduled output value, the battery charged or discharged energy to compensate for the difference. This charge-discharge method enabled Xcel to achieve steady output control for all scenarios (1-MW, 5-MW, and 10-MW), as expected. The 1 MW battery system effectively leveled 1-MW of installed wind capacity. Optimal results were achieved with a 5-MW wind plant.

In all cases, the battery responded swiftly and precisely to plant power output changes, providing highly effective dispatched wind leveling. These results support the use of energy storage to improve wind plant operations and economics.

## Frequency Regulation Results

In addition to tests focused on wind energy, Xcel evaluated the use of their large-scale battery storage system to provide grid ancillary services, both as a load and as a generator, to the MISO market. The system followed a frequency regulation signal that Xcel generated based on changes in the Area Control Error (ACE) for MISO.

## Xcel Energy's Wind-to-Battery Project

By Frank Novachek, Xcel Energy Director of Corporate Planning

As the nation's No. 1 wind power provider and No. 5 solar energy provider, Xcel Energy has demonstrated its renewable energy leadership in the utility industry. We continue to pursue wind and other types of renewable generation technologies in line with a strategic vision of a clean energy future.

However, as more wind capacity comes on line and meets a greater amount of our customers' needs, system impacts will become inconsequential and have to be addressed. With a large penetration of wind already in our portfolio, Xcel Energy is seeking innovative ways to integrate renewable energy. One potential solution is large-scale electrochemical energy storage, which we demonstrated with our 1 megawatt, 7 megawatt-hour sodium sulphur (NaS) battery system in Luverne, Minnesota.

By supporting the wind-to-battery energy storage demonstration project, Xcel Energy, the project's funders, and customers have benefitted in a number of ways.

We have gained a better understanding of the advantages flexible energy storage may have over traditional natural gas peaking resources once energy storage prices become competitive with those of traditional peaking resources because flexible energy storage is both a dispatchable load and a dispatchable generator. Our improved expertise in identifying the essential storage functions that are of value to the grid and its utility customers will ultimately result in better service at lower costs.

We also better understand how to determine the price range for energy storage deployments that will be cost effective for our customers, and we are using that information to provide input to the energy storage industry.

Now that the testing is complete, the actual commercial use of the battery energy storage system will be providing fast-response, ancillary services to the Midwest Independent Transmission System Operator.

The potential for affordable energy storage systems in the next five to ten years is real, and because of this demonstration and associated analyses, Xcel Energy is in a much better position to know when it will be right for our customers.



Novachek with Xcel Energy's one-megawatt NaS battery system, which integrates wind energy into the grid.

Source: Xcel Energy

**Frank Novachek** has more than 30 years of diverse experience with the company. Now based in Denver, Col., Frank's focus and leadership on the R&D of plans and strategies around energy storage, is crucial to growing Xcel's current status. He holds a bachelor's degree in physics from Colorado State University and an MBA from the University of Colorado.



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# Building a Stronger Grid with Energy Storage

Frequency regulation stabilizes the electric grid by helping generation-load balancing authorities maintain ACE within limits set by the North American Electric Reliability Corporation (NERC) control performance standards.

Frequency regulation testing was conducted for six 24-hour periods using two different ACE dead-band ranges, each for three days. The system's NaS battery performed very well, responding rapidly and accurately at control set-points. It demonstrated excellent, continuous ramping capabilities, following fast-changing set-points issued by Xcel's Northern States Power (NSP) Energy Management System. The battery never exceeded one 7.2-MWh discharge cycle per day (averaged 0.81 cycles over two test variations). Further investigation of economics involved simulations of selling this particular battery system's power into MISO's current ancillary services market and confirmed significant potential for delivering quality frequency regulation services and contributing to profitability.

## The Expanding Role of Energy Storage

Working in close collaboration with S&C and NGK, Xcel Energy successfully demonstrated the diverse performance and economic benefits of energy storage through its "Wind-to-Battery" initiative, which helps provide a roadmap for a smarter, greener, and more adaptable grid. Based on the project's groundbreaking results, it's clear that the benefits of grid-tied storage, and specifically battery-based storage, can more than justify up-front investments (when 4 to 6 hour energy storage systems become cost-competitive with traditional gas-fired resources) for use with renewables and beyond. A fairly modest amount of battery storage can make wind farms and other renewable plants a much better fit for our grid today. Broader scale storage deployment over time will undoubtedly continue to reinforce this fact.

While energy storage has been proven to address renewables integration and intermittency, and can be dispatched effectively, its role is rapidly expanding. Storage supports a growing array of applications not exclusively linked to renewables, such as grid frequency regulation, reliable local backup power, microgrids and dynamic islanding, and multiple aspects of power quality. At the same time, more applications are emerging, including new and reinvented forms of electrochemical technologies for larger-scale grid storage and "distributed bulk" storage, additional storage-based grid ancillary services such as "black start" for service restoration, and even bundled energy storage solutions for the grid.

Another innovative new application is Community Energy Storage, a Lithium-Ion battery-based system that meets the need for storage at the grid's edge. Small pad-mounted units, CES systems offer many of the same benefits as larger storage devices, but they can be easily distributed along residential feeders. During grid outages, a standard 25-kVA CES unit, such as S&C's PureWave® Community Energy Storage System, can provide reliable backup power to multiple homes for 1 to 3 hours. Utilities can aggregate

the functionality of up to 1,000 grid-tied CES units with S&C's IntelliTeam® DEM Distributed Energy Management System. The DEM allows units to act collectively as a single scalable energy storage plant and improve power quality, increase voltage control across feeders, increase efficiency through power factor correction, and provide asset relief through peak shaving, allowing utilities to defer distribution system build-outs. CES batteries can also integrate and buffer residential-scale renewable resources, and recharge from the grid during off-peak hours, a functionality that Xcel Energy (partnering with S&C and FIAMM Group) will begin testing later this year at the SolarTAC facility in Aurora, Colorado. By leveraging CES fleets, utilities can help make our power infrastructure more reliable, efficient, and intelligent.

Energy storage, when widely and strategically deployed in its diverse forms, provides a green alternative and complement to traditional resources. For instance, when storage supplies the grid with frequency regulation services, the need for inefficient fossil-fuel-based generation resources is reduced or eliminated. Energy storage can also address an array of power quality issues—from increasing system reliability by reducing power losses to improving demand-side management by *meeting* peak demand—as well as renewables integration and ancillary services, all of which directly impact our aging infrastructure. These issues will continue to be compounded by increased integration of renewable generation far into the future, making storage essential. As peak loads grow and more variable resources come online, energy storage is certain to play a pivotal and indispensable role in balancing and stabilizing sources and loads, which means a stronger grid is on the horizon.



### About the Author

Jim joined S&C Electric Company in 2003 and is currently Vice President of Power Quality Products in Milwaukee, Wisconsin. During his tenure, his division's PureWave® Storage Management System has been selected for many significant

distributed storage projects conducted in the last few years in the U.S. Working with the nation's largest utility company, S&C has provided turnkey product and service solutions for four Sodium-Sulfur (NaS) battery projects totaling 7.0 MW (43 MWh) through the end of 2008. The PureWave® SMS has been deployed in 19 projects totaling 30 MW with four different battery technologies. The projects were designed to expand the use of distributed energy storage throughout the grid to incorporate system reliability improvements, islanding, and ancillary service support.

Jim holds 8 U.S. patents and is an IEEE member. Jim received a BSEE degree from Cornell University in 1979 and an MBA from the University of Wisconsin, Milwaukee in 2002.



# Moving Beyond the Meter

## Examining Monitoring Systems That Need Improvements to turn Data into Actionable Knowledge

By Zbigniew Banach, ComEd,  
and Brett Sargent,  
LumaSense Technologies

### While in its early stages of deployment, it appears “smart grid” has gone mainstream.

Popular technology media have been talking about the proposed benefits and potential drawbacks of a national power grid that can “learn” and adapt to power-consumption behaviors for several years now, and the concept of “smart grid” has worked itself into one of the most-talked about topics in the high-tech space. In a sense, the concept has arrived, even though the technology itself is still evolving.

One of the negative side effects of this growing conversation, however, is that “smart grid” has become a fairly general term – it can be likened to using the word “communications.” In other words, it means a lot of different things to a lot of different people. For many people in the United States, smart grid is equated to Advanced Metering Infrastructure (AMI). While a smart meter can be *part* of the smart grid, it’s important to realize that it’s the endpoint – the last part of the grid. But a lot can happen between the actual generating point and the end. Smart endpoint does not equal smart grid.

### So where do the actual “smarts” behind the grid come from?

The ability to find, process and act on information is needed in order for something (or someone) to be considered smart. While the smart meter plays a critical part of the grid by helping utilities and consumers analyze their energy usage, there are plenty of other players in this equation who need certain bits of information to ensure the grid stays reliable in the first place. In the world of transmission and distribution, plant substation managers also need smarter ways to glean and analyze relevant information they can use to keep their assets running smoothly. This is one area that has seen far slower advancement compared to the world of AMI technology such as metering.

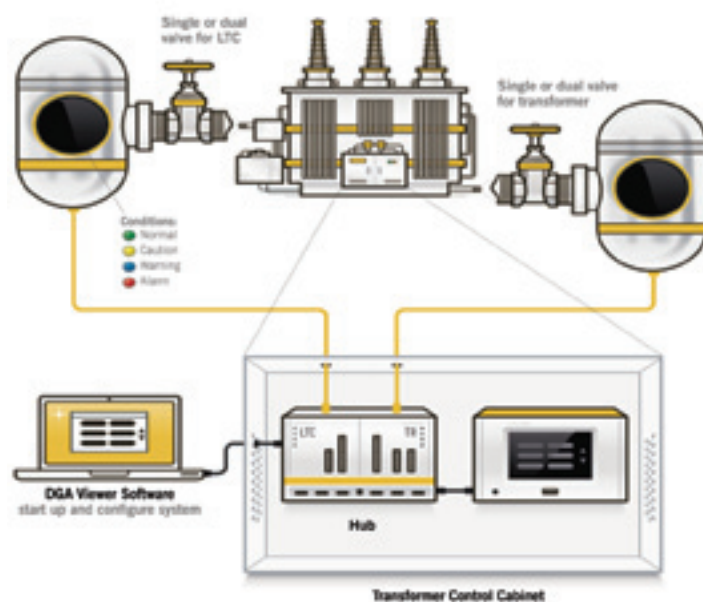
Many utilities, for instance, still struggle with finding ways to prove the information they do gather from assets such as transformers is good information. Only recently have some (but not all) companies solved this problem and no longer have to question whether the information they receive from alarm monitors is correct and actionable. Still, there is ample room for growth in monitoring, how monitoring can be implemented and the information that can be derived from it.

While the smart grid may mean different things to different people, this much is true: all the players involved need to get smarter about accomplishing the same thing. In this case, that means digging deeper for data and decoding what that data means to stabilize the power grid infrastructure.

### And that’s going to take a lot more than a meter.

#### A Closer Look at DGA Monitoring

##### DGA SYSTEM DIAGRAM



**SmartDGA** – Newer, more flexible DGA systems are giving facilities the ability to combat a variety of issues and improve condition-based monitoring programs for utilities.

Most professionals who are tasked with managing transmission and distribution infrastructure already subscribe to the notion that grid infrastructure modernization is the most important step to achieving a smarter grid. This is due to the simple truth that many critical assets in the national power grid (e.g. underground cables and transformers) are near their originally intended useful lives, and will only be pushed harder as demand continues to grow. This is a perfect opportunity to apply the smart grid concept to extend asset life.

To be fair, this isn't a problem that can be solved overnight, but there are specific monitoring fixes that can and should be made to improve condition-based monitoring programs for utilities. One of these specific areas is dissolved gas analysis (DGA), which remains one of the most important tools utilities have in monitoring transformer performance. The oil samples undoubtedly provide important information, and most companies have some sort of DGA program to track transformer health.

A recent targeted survey of approximately 50 electric utilities and transformer manufacturers conducted by LumaSense Technologies, for instance, showed that more than half of the respondents (66 percent) considered online DGA to be "very important" in conditioning monitoring programs, with transformer DGA being the most important item monitored. The same survey, though, also validates that oil sampling is happening less and less frequently, with most respondents saying they sampled oil for lab analysis either once every six months or once a year. That's a far cry from the way things used to be when utilities had more resources and could sample much more often. And considering the increased demand on today's transformers coupled with their age, less frequent monitoring is unequivocally the wrong approach because the probability of an incident occurring between samples is rising.



The other drawback is higher costs resulting from the manually intensive process. All of these hurdles (in addition to monetary issues) contribute to the infrequent sampling rates that threaten to hamper infrastructure reliability. The seemingly obvious answer is automated technology, or online DGA monitoring. Statistics show, however, that less than 5 percent of transformers have a form of online DGA monitoring.

While this red flag may scream for the need to implement more online solutions, several issues remain that must be addressed before the industry sees an increased adoption rate.

### Installation, Operations and Maintenance

In layman's terms, the harder the installation, the higher the reluctance. Installation times for online DGA systems range from half a day to five days. The contributing factors depend on whether separate stands for the instruments, additional oil lines to and from the transformer or load-tap changer (LTC), complex wiring and additional supports are needed. Another challenge is outage scheduling because many utilities do not allow installations to happen while transformers are in service.

Then there's the issue of where the installations take place. Transformers, by necessity, are placed in some of the least environmentally friendly conditions, which means DGA instrumentation must endure harsh conditions. But they don't always succeed – instrumentation has been known to freeze in cold weather, dry out in hot weather, and short out in wet weather, etc. This also contributes to higher costs because packaging designed to guard against these conditions are not inexpensive.

Additionally, due to these locations, transformers and LTCs are typically not visited frequently, which means it may be months between checks on the equipment. Oil leaks on monitoring systems can result in devastating circumstances for a transformer or LTC. The connections between a DGA instrument and the transformer or LTC mean longer plumbing runs to and from the instrument. Translation: there is a greater probability of oil leakage.

So what's the answer here? Generally speaking, DGA monitors have traditionally been too expensive, invasive, oversized, hard to install and required close monitoring. All of these factors drive costs up. The utility industry isn't the first, however, to encounter such problems with technology. In the medical field, for instance, pacemakers once had the same criticisms. Modular systems are a potential solution to this problem because they are generally less expensive, easier to install, less invasive, and can be more reliable. This is the type of solution that can help achieve widespread use and enhanced grid reliability, and continues to improve from year to year.

### Data Acquisition and Analysis

The biggest problem facing the industry right now is the inability to take data and convert it into useful information. If companies don't have a way to turn that data into actionable insights, it's as good as useless. Older DGA instrumentation merely provided results and numbers, with no guidance except for an alarm when a certain set point was exceeded (set points, by the way, that were determined by the utility). Given the amount of manual data analysis required to extract useful information from the data, the next wave of instrumentation can and should help them interpret this data. Realistic expectations include guidance for understanding readings and comparisons to standards.



But this also brings us back to one of the original points – how can an operator know he or she is viewing data that can be trusted? As in most conservative industries, companies tend to rely on the tried-and-true systems that have been in use for decades. New technologies are at a clear disadvantage because they are unknown, and substation managers aren't willing to take the risk – not with hundreds of thousands of potentially unhappy customers waiting in the wings. An alternative approach to evaluating new technologies, however, is exploring relevant sensing technologies that are well known and established in other industries. For example, non-dispersive infrared (NDIR) technology has been proven for decades in industries such as automotive and medical devices that have to carefully track emissions. The same technologies can be applied in load tap changers, and can be even more appealing if industry accepted analytics (Duval's Triangle, Rogers Ratio, Key Gases, etc.) are incorporated directly into the instruments to boost data reliability.

Another step in the right direction is an industry-wide push for standardization. The ability to communicate in a standard format (DNP3.0, IEC61850, Modbus, etc.) is of paramount importance, but the good news is that most DGA instrument providers are already there, and if not, are quickly moving in this direction.

### Price

While the above-mentioned technical features are compelling, the biggest pain point may still be initial cost. Online DGA monitors can cost anywhere from \$10,000 to \$60,000 and require a detailed business case. Many utilities can't afford to sacrifice functionality. Ironically, they can't afford the prices for the feature-rich systems for their transformer fleets either. Spending \$50,000 for an instrument for one transformer, after all, is difficult to justify even when protecting a multi-million dollar asset.

Simply put, costs must come down. Instrumentation installations are often evaluated as a percent of costs of the transformer or LTC. If instrumentation prices come down, instruments are a lower percentage of costs and thus can be deployed on smaller assets and become more widespread.

Another important factor here to consider beyond the price being paid for instrumentation is the total cost of ownership (TCO). TCO refers to initial installation costs, and maintenance costs throughout the life of the asset. When TCO is considered, utilities take into account the full cost of owning the monitor throughout the life of the transformer and can make a better-educated decision.

### Finding Our Smarts

Of course, DGA monitoring is only one solution that can have an impact in improving grid infrastructure health, but it's a highly important one, and a very significant impact.

The smart grid in general feels quite promising because it allows technology to adapt to market conditions and consumer habits. In much the same way, infrastructure technology also needs to help utilities and substation operators analyze and adapt to the way assets are functioning. Reductions in maintenance, complexity and cost can help pave the way lined with actionable information.

While smart metering may initially be the most visible aspect of the smart grid currently, smart monitoring of the entire infrastructure is required to produce a grid that meets the expectations of stakeholders at large. The meter is only one aspect of the overall infrastructure picture. Making the grid truly smart will require a holistic approach that begins with a focus on meters, but also incorporates a concurrent concentration on transmission and distribution through to generation.

### About the Authors



**Zbigniew Banach** is the Transformer Monitoring Equipment Specialist for ComEd. He determines equipment monitoring needs for substation equipment; develops and maintains guidelines for equipment monitoring; and performs economic analysis of monitoring equipment.

Prior to his current position, he was the Superintendent of Technical and Maintenance training programs for Exelon Nuclear. His responsibilities included Accreditation of Nuclear Training, technical qualification for Exelon's Nuclear power plant employees, and management of training programs. His technical background includes plant instrumentation systems, nuclear reactor protection & control systems, and substation transformer monitoring. He has over 35 years of experience in the utility industry. Zbigniew earned a B.S. degree in Electrical Engineering Technology from Purdue University and completed training in the Kellogg Executive Programs at Northwestern University.



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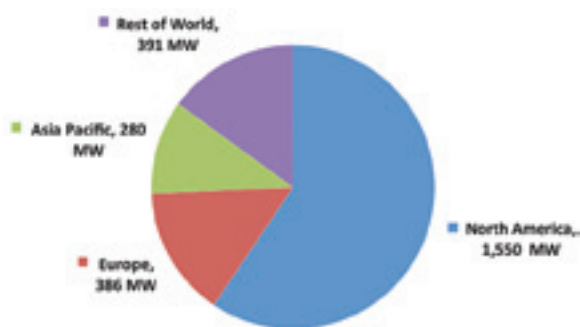
Electric, where he was Global Sales Leader for GE Energy T&D Products division. Previously, Brett was Vice President of Global Sales for LumaSense for five years. Brett holds a BS in Electrical Engineering from Widener University, MS in Nuclear Engineering from Rensselaer Polytechnic Institute, and MBA from Georgia State University.

# Energy Micro Grids Growing Globally

By Varun Nagaraj, SVP of Product  
Management Echelon Corporation  
Co-author: Peter Asmus, Senior  
Analyst Pike Research

## Pike Research says that interest in micro grids is growing internationally.

According to a new report from the company, micro grid capacity worldwide will experience a compound annual growth rate (CAGR) of more than 22% over the next five years, reaching 4.7 gigawatts by 2017. Micro grids are integrated systems in which distributed energy resources (DERs) operate as a single, autonomous grid either in parallel to or isolated from the existing utility power grid. They offer customers and distribution utilities a host of new ways to bolster reliability and manage variable, bidirectional resources. In addition, their smaller scale results in far fewer line losses, a lower demand on transmission infrastructure, and the ability to rely on more localized sources of power generation. All of these benefits are stimulating increased demand for micro grids on a worldwide basis. Notably, micro grids have seen tremendous growth in a range of application scenarios including campus environments, military operations, remote/off-grid settings, community/utility systems, and commercial and industrial markets.



Micro Grid Capacity by Region, World Markets: 1Q12  
Source: Pike Research

“Several new players have recently entered the micro grid market, signaling that a new race is on to take advantage of the significant opportunity that micro grids represent on a worldwide basis,” says senior analyst Peter Asmus, Pike Research. “Most notably ABB, the Swiss industrial giant that is a leading player in transmission and distribution infrastructure, and Boeing, the veteran defense contractor that is engaging with Siemens in a strategic alliance to serve the

U.S. military, as well as San Diego Gas & Electric – one of the leading utilities in this space – and Green Energy Corporation, which is addressing the interoperability of various controls and communications platforms being deployed for micro grids.”

Even though they provide tremendous benefits, micro grids still face significant barriers to wide scale adoption. Today, not a single national government has developed an integrated or comprehensive policy creating a viable, vibrant market for customer-driven micro grids. With the exception of Denmark, few countries are even examining the complex policy issues involved when aggregating DERs not owned by utility companies on a broad scale. While North America is still clearly the leader in terms of planned capacity, the developing world remains the most promising long-term market.

The energy sector is of vital importance in the developing countries that have limited access to energy sources. Demand often exceeds supply in high-growth developing countries. Moreover, the grid infrastructure is often old and prone to technical and non-technical losses. In these circumstances, incorporating micro grid concepts can provide a modicum of stability in emerging countries. Two case studies in India and South Africa illustrate the value of integrating distributed generation to compensate for disruptions in utility-supplied power.

## The Palm Meadows Community, India

The Palm Meadows Community in Hyderabad, India is an 86-acre integrated gated community with 335 homes and residential services.

The Palm Meadows community ties into the grid at a dedicated substation and sources energy in bulk from the utility. The community also runs diesel generators and will incorporate solar generated rooftops in the future that will feed energy back into the grid, creating a solar infrastructure with payback options. Residences within the community are equipped with Echelon's Open Smart Grid Protocol (OSGP)-compatible smart meters that connect into data concentrators at distribution transformers and feed near real-time usage information to the Echelon Networked Energy Systems (NES) system software.



## Energy Micro Grids Growing Globally



Grene Robotics' Skynet Management Application automatically turns on local generation if utility-delivered power is inadequate. The Skynet software interfaces with the NES system software and creates a bill for the customer that reflects the actual use of lower cost grid power and more expensive locally generated power. The residences now have the option of reducing usage at times when the more expensive energy is being supplied. And today, the Palm Meadows micro grid is providing reliable service even during frequent utility grid outages and are enabling the residences to make intelligent trade-offs between comfort and cost. The deployment of solar powered roofing will also help reduce overall costs in the future.

Kiran Penmatcha, CEO of Grene Robotics said of the recent deployments, "Like a national power grid, the Palm Meadows micro grid manages generation, distribution, and the regulation of the flow of electricity to its households. Today, the community is evaluating the integration of solar generated electricity for the future. Tomorrow, the community may look to add other applications, such as outdoor lighting control on the same infrastructure."

### Clearwater Mall, South Africa

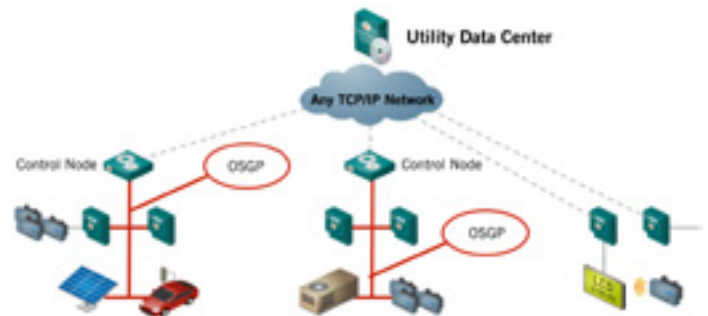
The frequency and length of blackouts in South Africa can have devastating effects on its commercial sector. For example, the local South African public utility had to institute a system of rolling blackouts over a period of four months to balance electricity demand, in which supply was interrupted at least once or twice a day lasting an average of four hours per outage.

The tenants at the Clearwater Mall, consisting of nine anchor stores and hundreds of local and international fashion stores, fast food outlets, restaurants, banks, electronic goods and other specialty stores, require reliable electricity for business continuity. Electric energy has a direct and immediate impact on revenue for these tenants. Without electricity, businesses will suffer and the livelihoods of the workers and consumers will be impacted.

The mall's new retail micro grid solution, based on Echelon partner PMT's Metering online energy management application, employs Echelon's OSGP-compatible smart meters, data concentrators, and NES system software to sub-meter individual tenant energy usage. This allows tenants to pay only for their actual energy usage rather than the industry norm of paying for energy on a square footage basis. Tenants can now opt-in to power supplied by local back-up generation when blackouts occur, and the Clearwater Mall can track billing by energy source and allocate tariffs based on actual use.

Such micro grids are likely to be a best practice in developing countries grappling with intermittent power supply, and are also applicable in environmentally conscious countries that are aggressively incorporating renewable and intermittent energy sources into the distribution network.

Open Standards for Micro Grid Deployments Prevent Vendor Lock-In and Increased Costs Utility of facility managers who are considering a micro grid should look to implement a standards-based and multi-application infrastructure and avoid vendor lock-in. OSGP is one such standard.



OSGP is a family of standards published by the European Telecommunications Standards Institute (ETSI) optimized for smart grid applications, and enabling independent implementation of interoperable meters and other smart grid devices from multiple vendors on the same network. Built on open ISO/IEC and IEEE standards, OSGP adds additional security and reliability services necessary to properly network and manage devices in the smart grid. As applications are deployed, such as point-of-use monitoring and control of power usage, OSGP enables utilities to reduce peak loads and pass on energy cost savings to consumers. With OSGP-compliant solutions, utilities or facility managers can avoid vendor lock-in and purchase best-in-class products to achieve better ROI.

### Conclusion

Micro grid deployments have helped the Palm Meadows Community and the Clearwater Mall achieve their specific local goals, including providing reliable energy and a reduction in carbon emission. These micro grid implementations have also provided value to their consumers.

The concepts and implementations have demonstrated results in India and South Africa. They have the ability to be replicated worldwide in order to improve power reliability and to integrate renewable generation. Micro grids can be a driving force for a more sustainable environment.

### About the Authors



**Varun Nagaraj** brings more than 20 years of high-tech product planning and strategy success and experience to Echelon. Varun was the CEO of NetContinuum (acquired by Barracuda Networks), served as EVP of Marketing and Customer Operations for Ellacoya (acquired by Arbor Networks), and was a VP of Product Management and

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**Peter Asmus** is a senior analyst contributing to Pike Research's Smart Grid and Smart Energy practices, with a focus on wind energy as well as emerging energy distribution models such as microgrids and virtual power plants. Asmus has 20 years of experience in energy and environmental

markets, both as a writer and research consultant.

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## In a Tight Spot

Michigan tree trimmer uses compact equipment for distribution rights-of-way

When it comes to clearing the strips of land along utility lines, or the rights-of-way, many contractors have struggled to find an efficient method of trimming trees. For open areas, manufacturers have developed large-scale mechanical trimmers equipped with saw blades mounted on long booms. But for distribution lines in metropolitan areas and other confined spaces, contractors are caught in a tight spot — literally. Most resort to using chain saws and bucket trucks, slowly working their way down the line. However, for Kappen Tree Service this approach simply wouldn't work.

As with many utilities on Kappen's client list, part of the DTE Energy ongoing preventive maintenance program, is to visit each community in their service area, on average, every four to five years to clear trees away from pole-to-pole power lines. The utility contracts all of their line clearance work to professional tree-trimming services who follow accepted industry standards for line clearance, including directional pruning.

Detroit Edison generates, transmits, and distributes electricity to 2.1 million customers in southeastern Michigan. This makes it the largest electric utility in Michigan and one of the largest in the nation.

Based in Cass City, Michigan, Kappen Tree Service has been clearing rights-of-way for 20 years. Today, it services between 4,000 and 5,000 miles each year, depending on budgets. Kappen holds contracts with multiple electric utilities for doing work along a variety of transmission, sub-transmission and distribution lines.

Much of the contractor's work started in the "thumb" of Michigan, where the landscape mainly consists of farmland and wood lots. Here it was easy for crews to get in and out with the seven large-scale mechanical trimmers in their fleet. However, Kappen eventually started getting distribution contracts farther south into the metropolitan Detroit area, where heavier traffic and smaller working areas limited the use of large equipment. "In the Detroit area, you can't just drive down the road like you can in the northern part of the state," said Warren Kappen, part owner of Kappen Tree Service.

As Kappen's work started to shift south, he began looking for a more efficient alternative to trimming trees with chain saws and bucket trucks. "We probably have 100 bucket trucks, but those guys have to raise the machine, trim the branch with a chainsaw, come back down, and move the truck ahead to the next tree," he said. Kappen also wanted something that could maneuver better than his bucket trucks. "They work in some of the small areas, but they're just so clumsy."

Eventually, Kappen discovered a new breed of equipment — the compact tree trimmer. These machines use a mini-excavator chassis, but instead of having a hydraulic arm and bucket, they're equipped with a saw blade on a nonconductive, hydraulically telescoping boom, similar to the larger equipment on the market.



*Kwik-Trim compact tree trimmer*

The design of a compact tree trimmer lends itself well to the metropolitan applications that Kappen faces. With its small footprint, zero-turn radius and 360-degree boom swing, the machine is able to maneuver much easier than other trimming equipment. Upon reaching the jobsite, it can quickly drive along the right-of-way without wasting any time being repositioned. Plus, the quiet operation is ideal for residential areas.

Furthermore, compact tree trimmers are easy to transport, thanks to their small size. Unlike large-scale mechanical trimmers, which typically require a tractor-trailer to haul, compact trimmers can be towed from site to site on a standard trailer behind a pickup truck.

## In a Tight Spot

After discovering this new type of equipment, Kappen purchased a Kwik-Trim compact tree trimmer from Loftness in February 2011 and put it right to work, averaging about 20 hours on the machine per week. Immediately, he noticed the time savings the new trimmers offered.

"On a really good day, a two-man bucket crew might be able to trim 64 trees," said Kappen. "That's with both men averaging four trees per hour on an eight-hour day." On the other hand, the compact tree trimmer works nearly four times quicker for Kappen. "I've seen one man do 250 trees in a day with this thing."

To transport the compact trimmer, Kappen hauls the unit on the same trailer as his skid steer mowers. "We pull the trimmer and mowers with a trailer behind a diesel dually pickup," he said. "The guys move around pretty easily like that."

Despite the advantages of the compact trimmer, it doesn't quite replace Kappen's larger trimmers, which reach up to 70 feet high, versus the 53-foot maximum cutting height of the Kwik-Trim. Therefore, Kappen continues to use his large trimmers mostly along transmission and sub-transmission lines, while reserving the Kwik-Trim mainly for smaller distribution rights-of-way.

For the tall branches that hang over the compact trimmer's reach, Kappen's crew comes back around to do the cleanup work by using off-road trucks and climbing trees. Nonetheless, Kappen finds that the compact machine still saves a tremendous amount of time. "If we can get 90 trees out of 100 with the Kwik-Trim, we'll save a lot of time," he said. "Over the course of the season, it saves us hours...days...even weeks."

Through these time savings, Kappen believes the compact trimmer is able to help him bid contracts more competitively. "Whether we get paid by the tree or by the

mile, we make more money by trimming trees faster," he said. "And the next time we bid a job, we can come in a little lower." After putting about 900 hours on his compact trimmer, Kappen is considering purchasing another unit. He also plans on putting the machines to more use. "We're trying to do more with the Kwik-Trim because the utilities want us to cut even more trees," he said.

As the industry evolves, more contractors will search for ways to increase efficiency and meet tight budgets. Consequently, a compact tree trimmer may be an ideal addition to many fleets, thanks to its ability to access areas where bucket trucks or large trimmers can't go. As for Kappen's success with a compact trimmer, "It's working out well," he said. "This thing definitely saves us time."

### About the Authors



**Bryce Goodell** is a technical writer with the Promersberger Company, a full service communications agency. He has nearly a decade of experience working with a broad range of clients.



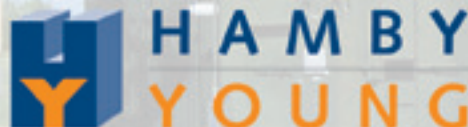
**James Owens** has been with DTE Energy over 31 years and is currently a Line Clearance Supervisor/Facilitator. He is certified as both an arborist and a Utility Arborist. Owens is also licensed to use pesticides. He attended Michigan State University and spent seven years as a Journeyman Tree Trimmer before joining DTE.

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# THE BIGGER PICTURE

BY BERNADETTE CORPUZ,  
BORDEN LADNER GERVAIS LLP



## The FIT Goes On... or Does it?

### Ontario Power Authority proposes New Rules for Province's Feed-in Tariff Program

Ontario's Feed-in Tariff Program ("**FIT Program**") has been under review since last fall. The results and Government's ensuing decisions are coming to fruition. On March 22, 2012, the Ontario Government released the results of its review ("**FIT Review**") of the FIT Program which revealed several recommendations for program changes. The Government crystallized its direction when the Minister of Energy issued, on April 5, 2012, a direction ("**Minister's Direction**") to the Ontario Power Authority ("**OPA**") to continue the FIT Program (and microFIT) in a manner consistent with policies set out in the Minister's Direction. The OPA responded immediately with drafts of proposed new FIT Program rules ("**FIT 2.0 Rules**") and contract ("**FIT 2.0 Contract**").

#### THE NEW RULES: Is it the same game?

A developer can expect greater challenges to obtain a FIT 2.0 Contract under the new rules, which provide for application windows, procurement limits and a complicated priority ranking system.

#### PRICING: Do we still want to play?

The draft FIT 2.0 Rules introduce a new price schedule which, as expected, reduces the prices paid for wind and solar. The pricing for other technologies remains unchanged. Price adders for Aboriginal and community projects have been maintained where the economic interest of Aboriginal and community participants exceed 15% (formerly the minimum was 10%). The draft FIT 2.0 Rules include new definitions and provisions relating to Aboriginal and community projects which will require careful review when structuring such projects.

The Minister's Direction also stipulates that price schedules and inflation escalators will be reviewed and updated annually in November to take effect as of January 1.

In a significant departure from the existing FIT Program, an applicant offered a FIT 2.0 Contract will be offered the pricing in effect when the contract offer is made, not the price in effect when the application was filed.

The provisions of Exhibit B dealing with payment of compensation when certain projects have been curtailed have been deleted – a note to draft states that a provision will be inserted in conjunction with developments in the SE-91 Renewable Integration Initiative of the Independent Electricity System Operator.

#### A NEW PRIORITY POINTS SYSTEM: How you win.

The proposed FIT 2.0 Rules include a system of priority rankings based on the significant involvement of groups not historically in the business of generating electricity – community, Aboriginal and public sector groups. A new priority points system clearly assigns priority to projects that have a community, Aboriginal or municipal, education or health ("**MUSH**" sector) component, whether as a direct participant in the project or as supporting entity. The rules, by design, make it very challenging for a developer to obtain points in these categories.

Of the seven categories of points set out in the priority points table below, only two categories do not require some type of community, Aboriginal or MUSH sector involvement. One point may be awarded for the somewhat misnamed category of "system benefit", a point for fuel type that is unavailable to wind and solar projects. Two points may be awarded for "project readiness" which is narrowly defined in relation to access rights, but as most serious applicants should be able to meet this requirement, it is unlikely that an applicant will gain significant competitive advantage through this category.



**PRIORITY POINTS TABLE**

PROJECT TYPE	PRIORITY POINTS
Community Participation Project	3
Aboriginal Participation Project	3
Education or Health Participation Project	2
NON-PROJECT TYPE	PRIORITY POINTS
Municipal Council Support Resolution	2
Aboriginal Support Resolution	2
Project Readiness	2
Education or Health Host	2
System Benefit	1

The rules do not permit a project to obtain more than one type of participation project points but do permit certain combinations of project and non-project type points under certain circumstances. The proposed rules are complex and necessary clarifications would be welcome in the final versions. That said, the rules to obtain participation points are not likely to change significantly in concept.

## PROJECT ELIGIBILITY: Can I even still play?

A number of changes have been made to eligibility requirements, some of which affect specific renewable fuels. For example, ground-mount PV projects may not be located on property that include Class 1, 2 or 3 lands, or organic and specialty crop lands. Ground-mount solar PV projects may also not be located on or adjacent to residential lands nor on commercial and industrials property if it is the primary use of such property. Solar projects cannot exceed 10 MW and cannot utilize inverters and panels which have manufacturer's capacity ratings which exceed 120% of the proposed contract capacity. Waterpower projects continue to be limited to a maximum of 50 MW. Incremental and behind-the-meter projects are no longer allowed. There are also specific provisions for co-locating projects and limitations on developers submitting similar projects during the same application period.

A key amendment requires a proposed project to be located within a certain distance from the facility's contemplated connection point. The FIT 2.0 Rules do not yet specify this connection distance, but large FIT projects are more likely to be affected by an unduly short connection distance.

The FIT 2.0 Contract maintains domestic content requirements, set at 50% for wind and 60% for solar facilities.

## CONNECTION MATTERS: What it all boils down to...

The FIT 2.0 Rules no longer include the infamous Economic Connection Test ("ECT"). Although the existing ECT list will be terminated, connection availability continues to be, as expected, a critical factor. What this means practically is that applications will first be ranked in accordance with the priority points system describe above. Then, applications will be assessed, in order of rank, as to whether there is available transmission and/

or distribution capacity, as applicable. The FIT 2.0 Rules urge applicants to consult with the applicable transmitter or distributor prior to submitting an application but the OPA reserves its discretion to determine whether an application can pass the applicable transmission or distribution availability test.

## GAME TIME: When, exactly, does the new game start? How many can play?

Unlike the initial open-endedness of the FIT Program, the issuance of contracts will now be subject to periodic procurement limits set by the OPA in its discretion.

In addition, the OPA intends to announce application periods during which applications may be submitted. The OPA may also determine the type of FIT Project that may be the subject of a particular application submitted during an application period.

While the timing of the first application period and procurement limits have not yet been determined, we can anticipate early calls for 50 MW of microFIT and 200 MW of small FIT projects (less than 500 kW) as a result of the Minister's Direction. In addition, emphasis will be placed on projects (small and large FIT) with greater than or equal to 50% community and Aboriginal equity participation and on hydroelectric projects.

## TRANSITION: What of applications previously in the queue?

Applications that were submitted prior to April 5, 2012 will be subject to the new FIT 2.0 Rules and pricing. An applicant may resubmit a pre-existing application during an application period and will be able to maintain its original time stamp. The subject project of a resubmitted application must be located on the same site, and the applicant must be the same person except that a change in ownership is permitted for the purpose of qualifying the project as a participation project. If a pre-existing application is not resubmitted during the first application period for the applicable project size, the pre-existing application will automatically be terminated.

Existing FIT Contracts are not affected by the new rules. However, the OPA is offering those who hold existing FIT Contracts the opportunity to terminate those contracts and receive back the application security without being subjected to any penalty.

## WHAT ABOUT THAT CONTRACT?

The proposed form of FIT 2.0 Contract contains a number of substantive changes that should be carefully considered by a developer and its proposed financiers. New provisions provide the OPA with the right to terminate for convenience and issue stop work orders. In addition, liquidated damages may be imposed without any ability to extend the term to the full 20 years after actual COD. Supplier representations have been enhanced and the parameters to invoke a force majeure claim tightened. And new events of default have been introduced that relate to the priority project categories.





## THE FINAL WORD, FOR NOW

The comment period on the draft rules and contract closed on April 27, 2012. Finalized versions were expected on May 7 but as of the date of writing remain under consideration by the OPA.

The Government has clearly communicated that it supports the continuation of the FIT Program. But the proposed changes may pose new challenges for project developers and their financiers. Industry participants suggest that the new pricing works for knowledgeable developers. The ability to obtain significant priority ranking will be a challenge given the complicated structures and requirements relating to the associated participation groups. And all of this is in the necessary backdrop of connection availability and a new form of contract that is significantly tougher on suppliers.

Time will tell whether the new program can sustain the same level of activity as in the first two years of the FIT Program. Of course, the intention may very well be that it not.

## ABOUT THE AUTHOR

**Bernadette Corpuz** is a Senior Associate in the Electricity Markets Group of the law firm Borden Ladner Gervais LLP (BLG). As a member of the Electricity Markets Group, Bernadette advises a wide range of energy market participants, including distributors, transmitters, generators, and commercial users with respect to a variety of commercial and corporate transactions related matters, including mergers and acquisitions, financing and energy markets. You can reach Bernadette at [BCorpuz@blg.com](mailto:BCorpuz@blg.com).



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With William T. (Tim) Shaw  
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# SECURITY SESSIONS

## Can you hear me now??

Making appropriate and acceptable trade-offs between cyber security (or even physical security) requirements and operational convenience is an on-going issue with no clear criteria for determining when one has gone too far. As a general 'rule of thumb' security and convenience are on opposite sides of the equation; as you increase one you generally decrease the other. The challenge is in finding the optimal balance between the two. A major point of conflict for these opposing forces is in the area of remote access to critical systems. Remote access may mean connecting from elsewhere in a plant or facility, connecting from across a corporate WAN or even (ugh!) connecting from across the Internet. The challenge is allowing such access while retaining acceptable security – *Tim*.

On the front cover of a recent edition of CONTROL magazine the editors highlighted (as they put it) a growing trend among automation vendors and plant owners towards enabling remote electronic access to plant systems for the purpose of enabling rapid (remote) vendor support, access by plant personnel who are off-site and access by corporate IT support personnel and users.

Aside from pointing out that this is far from a recent trend (vendors enabled dial-in phone access as far back as the 1980s and migrated to access over the Internet in the 1990s) it also highlights the constant battle between what is secure and what is convenient. To be fair, the editors did point out that the available technologies used for remote access were more varied today than in the past. As a former vendor I can vouch for that statement.

In the 1980s we usually employed 'dumb' terminals to interact with remote customer systems via character-oriented command line interfaces (think the DOS command tool in Windows or telnet), all connected via analog dial-up phone lines running at blinding 2400/4800 bits/second. In the 1990s we switched

to graphical X-terminals and much faster modems (or even Internet connectivity) for remote access. In the 2000s, as Microsoft's Windows operating system became the predominant platform for much of the automation technology, and Internet connectivity became ubiquitous, we often used the Remote Desktop capabilities (or commercial products with similar capabilities) to connect to distant systems. Today a system, and even a rack or skid of equipment, may come with an embedded cellular gateway that allows the vendor to make a direct connection to the equipment through the 3G/4G cellular phone system and to interact with the system/equipment via a web interface. (And the customer may not even be aware that this capability exists!)

In general terms, any such remote access capability would be seen as a highly desirable attack pathway by someone trying to gain malicious access to your systems and networks. Obtaining remote access means not having to breach your physical security mechanisms and a much lower chance of an attacker getting caught. There are many techniques available for breaking into and hijacking a TCP/IP communication session. Similarly there are attack methodologies for gaining unauthorized access to wireless networks. Breaking into an analog phone connection is mere child's play in comparison (and something hackers have been able to do for years). So although enabling remote access to critical systems is very convenient, it carries a high risk if not done well.

Two major differentiations need to be made about remote access and they involve endpoint security. If remote access to your critical systems is only allowed from a fixed location (or a small set of them) that is (are) also controlled by your organization, then you can probably provide adequate endpoint security. You can control the equipment used to make the remote connection. You can control access to that equipment. You may even have control over the communications channels used. And you can manage and limit the personnel who are given the credentials used to establish remote access.



# SECURITY SESSIONS

On the other hand, if you have the more typical kind of remote access, you merely provide an 'open to all comers' access point (e.g. a VPN gateway facing out to the Internet) and hope that your security mechanisms are adequate to fend-off the people who periodically attempt to gain unauthorized access.

The amount of physical security and cyber security required to adequately ensure that remote access will not be co-opted by a malicious actor depends on a range of factors, and most particularly on the trustworthiness of the networks used and the physical facilities/locations from which access is initiated. I broadly categorize remote access into three slightly different scenarios:

- Remote within the physical constraints of a plant/facility – In this scenario you control the physical security and access, the communication infrastructure used (typically a private LAN) and personnel access authorization.
- Remote within a corporate wide-area network that uses "private" infrastructure – In this scenario you have endpoint control, although it may vary from location to location without the corporation. You control the communication infrastructure and connections thereto and personnel access authorization. Of course there is a much greater "attack surface" in this scenario due to the number of personnel with WAN access.
- Remote across public networks, particularly the Internet or the phone system (wired/cellular) – In this scenario you only control the physical security and personnel access at your 'end' of the connection. Anyone with access to the public network can attempt to make an unauthorized connection into your systems.

One of the biggest problems with 'typical' remote access (the third scenario above) is the lack of control over what is happening at the other end of the connection. If a vendor is granted remote access to your systems then you have to be concerned about their physical security, their vetting of authorized personnel and their management of the systems and credentials used to establish such remote access. As a threat agent who wants to attack your critical systems I might find it much easier to penetrate or compromise a vendor organization with lax security and procedures than to try and attack you directly.

This notion brings up the whole issue of supply chain vulnerabilities. The term "remote access" takes on other meanings if I elect to use your vendor's organization to attack your systems. What kind of procedures do you use to validate and verify the software updates and patches sent to you by your vendors? Do you just install them with no questions asked? Lots of organizations do.

It is possible to enable remote access to critical systems in a manner that provides high assurance of adequate cyber security. This is more than just setting up a VPN gateway and issuing credentials. Of course having strong encryption and strong authentication are a necessary component. But, there also have to be procedures in place, and suitable physical security, at the remote end. Your procedures have to consider the possibility of endpoint compromise;

whether it is a stolen company laptop with your client VPN software or a malicious actor (or intimidated employee) in the remote organization. There are well understood techniques used to address these issues ... but that will be the subject matter for a future column. – *Tim*.

## ABOUT THE AUTHOR

**Dr. Shaw** is a Certified Information Systems Security Professional (CISSP), a Certified Ethical Hacker (CIEH) a Certified Penetration Tester (CPT) and has been active in industrial automation for more than 35 years. He is the author of *Computer Control of BATCH Processes* and *CYBERSECURITY for SCADA Systems*. Shaw is a prolific writer of papers and articles on a wide range of technical topics has also contributed to several other books and teaches several courses for the ISA and participates in several committees. He is currently Principal & Senior Consultant for Cyber SECURITY Consulting, a consultancy practice focused on industrial automation security and technologies. Inquiries, comments or questions regarding the contents of this column and/or other security-related topics can be emailed to [timshaw4@verizon.net](mailto:timshaw4@verizon.net).

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## Guest Editorial >

# Energy Efficiency as a Strategic Priority Helps Businesses Realize Big Benefits

By Chris Smith, Global Energy Efficiency Practice Leader,  
DuPont Sustainable Solutions



### Energy Efficiency Equates to Cost-Savings

Ultimately the development of renewable energy sources must be the way we generate energy in the future. However, there are a number of serious barriers that are preventing widespread adoption of renewable technologies. Cost and impracticability are at the top the list, and renewables are not yet able to be scaled up for enterprise level use. Simply creating incentives for green initiatives is not enough to transform an entire market either. Right now companies seem less interested in specific green initiatives like carbon reduction and more prepared to leverage energy management programs for cost reductions that can be linked to profitability.

Most industrial companies realize the link between energy efficiency and operational efficiency. By reducing variable costs associated with energy consumption, companies can effectively mitigate the risk of long-term volatility in energy markets. Until renewable forms of energy are in wide-spread use, companies need to optimize energy efficiencies to reduce their overall footprint. It is imperative for companies to realize the benefits of an integrated energy management system; the cost-savings and the reputation of being a more sustainable company.

### Implementing an Energy Strategy Requires Cultural Change

While many business leaders see the value in driving energy efficiency, they also often mistakenly believe that energy management requires a big capital investment. This can be a major hang-up for companies that are already dealing with tightened budgets. Contrary to this way of thinking, DuPont has found that more than 40% of total energy efficiency improvement opportunities can be achieved through minor, low cost, continuous energy improvement projects that are grounded in corporate culture change. Energy reduction can be considered part

There are many reasons why electric utilities companies should be concerned about reducing their environmental footprint. Aligning with tightened government regulation, lowering costs through increased energy efficiency, responding to volatile commodity prices, and meeting consumers' demands for businesses to go green are all strong motivators to adopt internal energy management initiatives. As the suppliers of energy, utilities providers are often more intensely scrutinized for their own internal energy and environmental practices. In the U.S., where utilities often use "dirty" energy such as coal, this is especially true. However, as both producers and industrial consumers of energy, utilities companies are uniquely placed to help lead changes in energy efficiency, and thereby realize significant financial benefits and increased resilience to supply shocks. As utilities make strides with their own energy efficiency programs, they will be in a position to collaborate with other industries and policy-makers to advance energy efficiency.

of the cost "portfolio." Because efficient use of energy has not been utilities' major focus, companies can make significant gains with a "block and tackle" strategy of addressing the minor, low cost efficiency opportunities.

The most successful companies realize that long-term energy efficiency is dependent on a larger cultural shift. Just achieving quick wins in terms of energy cost-savings and lowered risk does not equate to long-term sustainability. However, the cultural shift that allows for these quick wins also lays the groundwork to deploy other energy management technologies and a holistic energy management system, which paves the way for innovation in the future. Companies must understand the impact energy and materials have on their business and view their consumption as a strategic issue.

Creating a culture of sustainability through a comprehensive energy management system involves not just identifying certain parts of the business to focus on, such as the supply chain, to reduce consumption, but looking at the organization's energy consumption holistically. Operational and financial benefits will be incremental if companies evaluate energy efficiency initiatives without the understanding that efficiency is part of a larger strategic platform. Additionally, if energy management is not elevated in importance within the organization it will never compete with other operational improvement initiatives. To ensure the necessary allocation of resources, it is crucial to get buy-in from top leadership.



Unfortunately, utilities companies have an uphill battle when trying to frame energy consumption as a strategic issue. Currently, the regulatory environment has not created an incentive system that maximizes the societal value of a unit of energy. Most regulated utilities operate on the concept of cost-plus, which nearly guarantees a margin for utilities companies, no matter what the cost to consumers. In other words, utilities are not incentivized to reduce cost or their own energy consumption unless they are in a truly competitive environment. However, it is crucial for utilities to understand that this model will soon go away and consumers are beginning to demand more sustainable businesses. Even if the model does not change in the immediate future, utilities companies will continue to miss out on the important cost-savings that energy efficiency provides as well as the reputational benefits.

### What Is Needed for a Successful Energy Management System?

An energy management system is highly dependent on change – both in terms of employee behavior and management processes. This is the first step in developing a culture that values - and drives - energy efficiency. An effective system requires commitment and active engagement from top leadership. The most sustainable and energy efficient cultures are those where leaders actively demonstrate the cultural values. For example, management should weigh the energy efficiency of a plant as heavily as they do how to attract and retain current customers. In the end, it is the culture and core values of an organization that dictate many business priorities. If companies cultivate the right culture, their business priorities will align with greater energy sustainability and operational efficiency.

A second crucial element to shifting workplace culture is ownership by line management. Over the course of DuPont's experience, we have found that responsibility for energy efficiency must be felt across the organization. A company cannot localize the burden of energy efficiency to one part of the organization and expect success. What ensures long-term sustainability of workplace culture is an integrated approach that relies on integration of core values to the company's business strategy and processes. To implement an effective energy management system, the entire structure of the organization must be involved in the process, from employees, to line managers, all the way up to top management.

A successful energy management system is also dependent on setting measurable goals and metrics. The most successful companies will set short and long term energy efficiency goals in order to measure progress at different intervals. Instituting a process for performance management, including measurement, is key as accurate metrics allow for data-driven decision-making. Not only that, data helps company leaders provide justification for actions and initiatives. All employees should understand the goals and how their daily activities impact energy efficiency.

As a best practice, businesses should consider creating a Center of Competency to provide additional structure to an energy management system. The Center should "own" the corporate energy management system and use their centrality to disseminate best practices across the company. A Center of Competency connects leaders responsible for energy at the site-level to other senior leaders in the company both at other sites and at the corporate level.

Finally, training must underpin any energy management system. Training employees to understand how energy efficiency improvements impact the bottom line is critical. A better understanding of how industrial equipment consumes energy is vital for electric utilities providers. Educating employees on how to calculate energy usage and identify process improvements for the areas they manage will allow for shared ownership over energy efficiency efforts. The goal is to empower employees to start identifying opportunities they can own to add to the energy efficiency program.

### The Next Step: Industry Collaboration

Ultimately, as individual companies across various industry sectors realize energy efficiency in their own operations, the goal is to have these business leaders and specialists come together to address the worldwide energy challenge. By shifting the cultures of individual utilities companies, the sector as a whole will slowly follow as sustainability becomes a point of parity. At this point, significant change to energy supply and consumption will start to happen at the industry level, which is where we can see the biggest impact on energy consumption and efficiency. Large, industrial companies tend to have the largest environmental footprints due to the amount of energy they consume and the resulting environmental output. The biggest gains in energy efficiency will be made at the industry level vs. by consumers or businesses on their own.

Electric utilities companies, as both producers and consumers of energy, are in a particularly unique position to drive the energy changes that are needed. They are able to have an impact on energy practices as large consumers of energy as well as producers of energy that is consumed by industry peers. What is needed is collaboration between the private sector, government and policy bodies and consumers. Such was the case with the US Army, in response to a legislative mandate to reduce energy cost by 30% by 2015.<sup>1</sup> At the army installation at Fort Knox, for example, the Army was able to reduce absolute energy use by 58% through a utility energy service contract.

### The Bottom Line

Implementing an energy management system provides an array of benefits and is a critical step in creating a culture of sustainability. It facilitates compliance with tightened government regulation, lowers costs through increased energy efficiency, mitigates risk of volatile commodity prices and provides significant reputational benefits. An energy management system also lays the foundation for ongoing improvements in sustainability, ensuring that initial cost-savings and benefits are not simply incremental. To ensure that an energy efficiency initiative is fully integrated into the whole of the company's structure and processes, utilities companies

must focus on leadership, empowering line management, setting measureable goals and metrics, building a Center of Competency and providing sufficient training.

In the short term an energy management system will help address a corporation's energy consumption. In the long term, the solutions to drive worldwide energy change will hinge on many different facets – advanced technologies, developing renewable energy sources, collaboration between the private sector, government, and consumers. Utilities, as an energy producer and consumer, will play a critical role in changing energy consumption globally.

### ABOUT THE AUTHOR

Christopher A. Smith is a Global Leader of the Energy Efficiency practice for DuPont Sustainable Solutions, one of the fastest growing divisions at DuPont and a recognized global leader in operations management consulting. Christopher has worked directly with clients across a range of industries, including aerospace and aviation, chemicals, energy and utilities, manufacturing, mining and metals processing, oil and gas, pulp and paper, and transportation. He is currently responsible for global business strategy and profitability as well as hands-on strategic counsel to a broad client base of Fortune 500 executive teams around the world.

<sup>1</sup> Lachman, Beth, et al. "Making the Connection: Beneficial Collaboration Between Army Installations and Energy Utility Companies" Rand Corporation 2011

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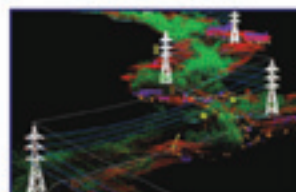
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OLDCASTLE ENCLOSURE SOLUTIONS  
Tel: (303) 209-8000 • 888-868-5214  
[www.oldcastleprecast.com](http://www.oldcastleprecast.com)

### CABLE - COPPER

AMERICAN WIRE GROUP, INC.  
Tel: (954) 455-3050 • 800-342-7215  
[www.buyawg.com](http://www.buyawg.com)

### CABLE - DIAGNOSIS

IMCORP  
Tel: (860) 873-8000  
[www.imcorp.com](http://www.imcorp.com)

### CABLE FAULT CURRENT LIMITING, UNDERGROUND

SUPERPOWER INC.  
Tel: (518) 346-1414  
[www.superpower-inc.com](http://www.superpower-inc.com)

### CABLE - FIBER OPTIC

AFL  
Tel: (864) 433-0333  
[www.aflglobal.com](http://www.aflglobal.com)

AMERICAN WIRE GROUP, INC.  
Tel: (954) 455-3050 • 800-342-7215  
[www.buyawg.com](http://www.buyawg.com)

DOW WIRE & CABLE  
Tel: 1-800-441-4DOW  
[www.dowwireandcable.com](http://www.dowwireandcable.com)

OLDCASTLE ENCLOSURE SOLUTIONS  
Tel: (303) 209-8000 • 888-868-5214  
[www.oldcastleprecast.com](http://www.oldcastleprecast.com)

### CABLE - GROUNDING

AMERICAN WIRE GROUP, INC.  
Tel: (954) 455-3050 • 800-342-7215  
[www.buyawg.com](http://www.buyawg.com)

HASTINGS FIBERGLASS 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 FIBERGLASS PRODUCTS INC.  
Tel: (269) 945-9541  
[www.hfgp.com](http://www.hfgp.com)

### CABLE - OPTICAL GROUND WIRE

AFL  
Tel: (864) 433-0333  
[www.aflglobal.com](http://www.aflglobal.com)

DOW WIRE & CABLE  
Tel: 1-800-441-4DOW  
[www.dowwireandcable.com](http://www.dowwireandcable.com)

### CABLE - PREASSEMBLED CABLE DUCT

OLDCASTLE ENCLOSURE SOLUTIONS  
Tel: (303) 209-8000 • 888-868-5214  
[www.oldcastleprecast.com](http://www.oldcastleprecast.com)

### CABLE - PULLING

CONDUX TESMEC INC.  
Tel: (507) 387-8069 • 1-877-854-1750  
[www.conduxtesmec.com](http://www.conduxtesmec.com)

NESCO SALES AND RENTALS  
Tel: (260) 824-6340 • 1-800-252-0043  
[www.nescosales.com](http://www.nescosales.com)

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

### CABLE - RESTORATION

NOVINIUM CABLE LIFE EXTENSION  
Tel: (206) 529-4828  
[www.novinium.com](http://www.novinium.com)

UTILX CORPORATION  
Tel: (800) 252-0556  
[www.utilx.com](http://www.utilx.com)

### CABLE - SHIELDED

OKONITE COMPANY, THE  
[www.okonite.com](http://www.okonite.com)

### CABLE - SUBMARINE

NOVINIUM CABLE LIFE EXTENSION  
Tel: (206) 529-4828  
[www.novinium.com](http://www.novinium.com)

OKONITE COMPANY, THE  
[www.okonite.com](http://www.okonite.com)

### CABLE - TEMPORARY GROUND

HASTINGS FIBERGLASS PRODUCTS INC.  
Tel: (269) 945-9541  
[www.hfgp.com](http://www.hfgp.com)

### CABLE - UNDERGROUND, POLYMER-INSULATED

DOW WIRE & CABLE  
Tel: 1-800-441-4DOW  
[www.dowwireandcable.com](http://www.dowwireandcable.com)

OLDCASTLE ENCLOSURE SOLUTIONS  
Tel: (303) 209-8000 • 888-868-5214  
[www.oldcastleprecast.com](http://www.oldcastleprecast.com)

### CABLE - UNDERGROUND, RESIDENTIAL

DOW WIRE & CABLE  
Tel: 1-800-441-4DOW  
[www.dowwireandcable.com](http://www.dowwireandcable.com)

NOVINIUM CABLE LIFE EXTENSION  
Tel: (206) 529-4828  
[www.novinium.com](http://www.novinium.com)

OLDCASTLE ENCLOSURE SOLUTIONS  
Tel: (303) 209-8000 • 888-868-5214  
[www.oldcastleprecast.com](http://www.oldcastleprecast.com)



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## CABLE ACCESSORIES - URD

DOW WIRE & CABLE  
Tel: 1-800-441-4DOW  
[www.dowwireandcable.com](http://www.dowwireandcable.com)

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
[www.utilitytnb.com](http://www.utilitytnb.com)

THOMAS & BETTS CANADA - UTILITY  
DIVISION  
Tel: (450) 466-1102, x234  
1-800-466-1102, x234  
[www.tnb.ca](http://www.tnb.ca)

## CABLE CUTTERS - HYDRAULIC

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

## CABLE FAULT LOCATING - EQUIPMENT

ELSYS INSTRUMENTS, LLC  
Tel: (845) 238-5419  
[www.elsys-instruments.com](http://www.elsys-instruments.com)

HIPOTRONICS INC.  
Tel: (845) 279-3644  
[www.hipotronics.com](http://www.hipotronics.com)

INNOVATIVE UTILITY PRODUCTS CORP.  
Tel: (479) 410-2098  
[www.iupcorp.com](http://www.iupcorp.com)

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

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

THIES ELECTRICAL DISTRIBUTING CO.  
Tel: (519) 621-2524  
[www.djinfo.com/tedc](http://www.djinfo.com/tedc)

## CABLE LASHERS (SPINNERS)

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

## CABLE PULLING ACCESSORIES

BALLANTINE INC  
[www.ballantineinc.com](http://www.ballantineinc.com)

CONDUX TESMEC INC.  
Tel: (507) 387-8069 • 1-877-854-1750  
[www.conduxtesmec.com](http://www.conduxtesmec.com)

## CABLE TRAY

OLDCASTLE ENCLOSURE SOLUTIONS  
Tel: (303) 209-8000 • 888-868-5214  
[www.oldcastleprecast.com](http://www.oldcastleprecast.com)

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
[www.utilitytnb.com](http://www.utilitytnb.com)

## CABLES

AMERICAN WIRE GROUP, INC.  
Tel: (954) 455-3050 • 800-342-7215  
[www.buyawg.com](http://www.buyawg.com)

CABLEK INDUSTRIES  
Tel: (514) 421-7171  
[www.cablek.com](http://www.cablek.com)

CYBERXLINK  
Tel: (951) 824-1572  
[www.cyberxlink.com](http://www.cyberxlink.com)

DOW WIRE & CABLE  
Tel: 1-800-441-4DOW  
[www.dowwireandcable.com](http://www.dowwireandcable.com)

TELEFONIKA CABLE AMERICAS CORP  
Tel: (630) 457-2035  
[www.tfcable.com](http://www.tfcable.com)

## CABLES - BARE COPPER

AMERICAN WIRE GROUP, INC.  
Tel: (954) 455-3050 • 800-342-7215  
[www.buyawg.com](http://www.buyawg.com)

## CABLES - HIGH TEMPERATURE SUPERCONDUCTING

SUPERPOWER INC.  
Tel: (518) 346-1414  
[www.superpower-inc.com](http://www.superpower-inc.com)

## CABLES - HIGH VOLTAGE

OKONITE COMPANY, THE  
[www.okonite.com](http://www.okonite.com)

## CABLES - HIGH VOLTAGE - XLPE

DOW WIRE & CABLE  
Tel: 1-800-441-4DOW  
[www.dowwireandcable.com](http://www.dowwireandcable.com)

## CABLES - MEDIUM VOLTAGE

AMERICAN WIRE GROUP, INC.  
Tel: (954) 455-3050 • 800-342-7215  
[www.buyawg.com](http://www.buyawg.com)

DOW WIRE & CABLE  
Tel: 1-800-441-4DOW  
[www.dowwireandcable.com](http://www.dowwireandcable.com)

NOVINIUM CABLE LIFE EXTENSION  
Tel: (206) 529-4828  
[www.novinium.com](http://www.novinium.com)

OKONITE COMPANY, THE  
[www.okonite.com](http://www.okonite.com)

## CAPACITORS

ABB  
Tel: (514) 856-6266  
[www.abb.ca](http://www.abb.ca)

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

## CAPACITORS - CONTROLS

BECKWITH ELECTRIC COMPANY  
Tel: (727) 544-2326  
[www.beckwithelectric.com](http://www.beckwithelectric.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

## CAPACITORS - POWER FACTOR CORRECTION

PHASECO, INC.  
Tel: (281) 893-7522  
[www.phaseco.com](http://www.phaseco.com)

SCOTT ENGINEERING  
Tel: (909) 594-9637  
[www.scott-eng.com](http://www.scott-eng.com)

## PRODUCTS AND SERVICES

### CAPACITORS - SWITCHES

SOUTHERN STATES, LLC.  
Tel: (770) 946-4562  
[www.southernstatesllc.com](http://www.southernstatesllc.com)

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
[www.utilitytnb.com](http://www.utilitytnb.com)

THOMAS & BETTS CANADA - UTILITY  
DIVISION  
Tel: (450) 466-1102, x234  
1-800-466-1102, x234  
[www.tnb.ca](http://www.tnb.ca)

### CIRCUIT BREAKER COMPONENTS

SPX TRANSFORMER SOLUTIONS, INC.  
FKA WAUKESHA ELECTRIC SYSTEMS, INC.  
Tel: (800) 835-2732  
[www.spxwaukesha.com](http://www.spxwaukesha.com)

### CIRCUIT BREAKERS

INCON POWER RELIABILITY PRODUCTS  
Tel: (207) 283-0156 • 1-800-872-3455  
[www.incon.com](http://www.incon.com)

INSULBOOT A DIV. OF PLASTIC DIP  
MOLDINGS  
Tel: (215) 766-2020  
[www.insulboot.com](http://www.insulboot.com)

ROMAC  
Tel: (800) 843-5473  
[www.romacsupply.com](http://www.romacsupply.com)

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

### CIRCUIT BREAKERS - MEDIUM AND HIGH VOLTAGE

BELYEA COMPANY, INC.  
Tel: (610) 515-8775  
[www.belyeapower.com](http://www.belyeapower.com)

FIRSTPOWER GROUP LLC  
Tel: (330) 963-2050  
[www.firstpowergroupplc.com](http://www.firstpowergroupplc.com)

INSULBOOT A DIV. OF PLASTIC DIP  
MOLDINGS  
Tel: (215) 766-2020  
[www.insulboot.com](http://www.insulboot.com)

T & R ELECTRIC SUPPLY COMPANY INC.  
Tel: (605) 534-3555  
[www.t-r.com](http://www.t-r.com)

### CIRCUIT BREAKERS - MODIFICATION AND REPAIRS

FIRSTPOWER GROUP LLC  
Tel: (330) 963-2050  
[www.firstpowergroupplc.com](http://www.firstpowergroupplc.com)

MAGNETECH INDUSTRIAL SERVICES  
Tel: (330) 830-3500 • 800-837-1614  
[www.magnetech.com](http://www.magnetech.com)

### CIRCUIT BREAKERS - OIL

FIRSTPOWER GROUP LLC  
Tel: (330) 963-2050  
[www.firstpowergroupplc.com](http://www.firstpowergroupplc.com)

### CIRCUIT BREAKERS - OUTDOOR

INSULBOOT A DIV. OF PLASTIC DIP  
MOLDINGS  
Tel: (215) 766-2020  
[www.insulboot.com](http://www.insulboot.com)

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

### CIRCUIT BREAKERS - SF6

FIRSTPOWER GROUP LLC  
Tel: (330) 963-2050  
[www.firstpowergroupplc.com](http://www.firstpowergroupplc.com)

HITACHI HVB, INC.  
Tel: (770) 495-1755  
[www.hvbi.com](http://www.hvbi.com)

MISTRAS GROUP  
[www.mistrasgroup.com](http://www.mistrasgroup.com)

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

### CIRCUIT BREAKERS - VACUUM

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

### CIRCUIT RECLOSERS, AUTOMATIC - THREE-PHASE

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

### CIRCUIT SWITCHERS

INSULBOOT A DIV. OF PLASTIC DIP  
MOLDINGS  
Tel: (215) 766-2020  
[www.insulboot.com](http://www.insulboot.com)

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)

### CIS SOLUTIONS

DAFFRON & ASSOCIATES, INC.  
Tel: (314) 569-9600  
[www.daffron.com](http://www.daffron.com)

### CLAMPS - GROUND

HASTINGS FIBERGLASS PRODUCTS INC.  
Tel: (269) 945-9541  
[www.hfgp.com](http://www.hfgp.com)

### CLAMPS - HOT LINE

HASTINGS FIBERGLASS PRODUCTS INC.  
Tel: (269) 945-9541  
[www.hfgp.com](http://www.hfgp.com)

HUBBELL POWER SYSTEMS INC.  
Tel: (573) 682-5521  
[www.hubbellpowersystems.com](http://www.hubbellpowersystems.com)

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



# PRODUCTS AND SERVICES

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

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

## CLOCKS AND TIME DISPLAYS

SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

## CLOTHING - FLAME RESISTANT

TRUE NORTH GEAR  
Tel: (800) 873-5725  
[www.truenorthgear.com](http://www.truenorthgear.com)

TYNDALE COMPANY, INC.  
Tel: (800) 356-3433  
[www.tyndaleusa.com](http://www.tyndaleusa.com)

## COATINGS

CROSSLINK TECHNOLOGY INC.  
Tel: (800) 563-3769  
[www.crosslinktech.com](http://www.crosslinktech.com)

DOW WIRE & CABLE  
Tel: 1-800-441-4DOW  
[www.dowwireandcable.com](http://www.dowwireandcable.com)

## COATINGS - ANIMAL GUARD

CROSSLINK TECHNOLOGY INC.  
Tel: (800) 563-3769  
[www.crosslinktech.com](http://www.crosslinktech.com)

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MOLDINGS  
Tel: (215) 766-2020  
[www.insulboot.com](http://www.insulboot.com)

## COATINGS - BUS BAR

CROSSLINK TECHNOLOGY INC.  
Tel: (800) 563-3769  
[www.crosslinktech.com](http://www.crosslinktech.com)

## COATINGS - CORROSION PREVENTION

CROSSLINK TECHNOLOGY INC.  
Tel: (800) 563-3769  
[www.crosslinktech.com](http://www.crosslinktech.com)

PUBLIC UTILITIES MAINTENANCE INC  
Tel: (718) 740-4540  
[www.puminc.com](http://www.puminc.com)

SABRE GALVANIZING SERVICES  
Tel: (817) 852-1950 • 877-596-1301  
[www.sabregalvanizing.com](http://www.sabregalvanizing.com)

## COATINGS - FIRE RESISTANT

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

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CROSSLINK TECHNOLOGY INC.  
Tel: (800) 563-3769  
[www.crosslinktech.com](http://www.crosslinktech.com)

## COATINGS - PROTECTIVE

CROSSLINK TECHNOLOGY INC.  
Tel: (800) 563-3769  
[www.crosslinktech.com](http://www.crosslinktech.com)

## COATINGS - SEMICONDUCTING

CROSSLINK TECHNOLOGY INC.  
Tel: (800) 563-3769  
[www.crosslinktech.com](http://www.crosslinktech.com)

## COATINGS - SILICONE

CROSSLINK TECHNOLOGY INC.  
Tel: (800) 563-3769  
[www.crosslinktech.com](http://www.crosslinktech.com)

## COMMUNICATION SYSTEMS

C4I INC.  
Tel: (703) 668-0741  
[www.c4i.com](http://www.c4i.com)

CARLSON WIRELESS TECHNOLOGIES,  
INC.  
Tel: (707) 822-7000  
[www.carlsonwireless.com](http://www.carlsonwireless.com)

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

PRYME RADIO PRODUCTS  
Tel: (714) 257-0300  
[www.pryme.com](http://www.pryme.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

SUPERIOR COMMUNICATION SERVICES  
Tel: (508) 877-2080  
[www.scs08.com](http://www.scs08.com)

TAIT NORTH AMERICA  
Tel: (281) 829-3300  
[www.taitworld.com](http://www.taitworld.com)

TC COMMUNICATIONS  
Tel: (949) 852-1972 • 1-800-569-4736  
[www.tccomm.com](http://www.tccomm.com)

## COMMUNICATION SYSTEMS - PROTECTIVE RELAYS

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

H & L INSTRUMENTS  
Tel: (603) 964-1818  
[www.hlinstruments.com](http://www.hlinstruments.com)

## COMPOUNDS - SEALING

AMERICAN POLYWATER CORPORATION  
Tel: (651) 430-2270  
[www.polywater.com](http://www.polywater.com)

## COMPRESSION DIES

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

## COMPUTER CONTROLS AND AUTOMATION

OPEN SYSTEMS INTERNATIONAL, INC.  
Tel: (763) 551-0559  
[www.osii.com](http://www.osii.com)

SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

## PRODUCTS AND SERVICES

### COMPUTER CONTROLS AND AUTOMATION

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### COMPUTERS - EQUIPMENT

SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
www.selinc.com

### COMPUTERS - SOFTWARE

ENOSERV  
Tel: (918) 622-4530  
www.enoserv.com

TERRA SPECTRUM TECHNOLOGIES  
Tel: (866) 619-5444  
www.terra-spectrum.com

VANGUARD SYSTEMS  
Tel: (610) 891-7703 (8am - 5pm EST)  
www.vansystems.com

### CONCRETE - POLES

THE STRESSCRETE GROUP  
Tel: (905) 632-9301 • 1-800-268-7809  
www.stresscretegroup.com

### CONDITION ASSESMENT SYSTEMS

DOBLE ENGINEERING CO.  
Tel: (617) 926-4900  
www.doble.com

MORGAN SCHAFFER  
Tel: (514) 739-1967  
www.morganschaffer.com

WEIDMANN DIAGNOSTIC  
SOLUTIONS INC  
Tel: (800) 242-8106  
www.weidmann-electrical.com

### CONDITION MONITORING

WEIDMANN DIAGNOSTIC SOLUTIONS INC  
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### CONDITION MONITORING EQUIPMENT

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FLIR SYSTEMS, INC.  
Tel: (503) 498-3293 • (800) 464-6372  
www.flir.com/eetguide

LUMASENSE TECHNOLOGIES  
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www.lumasenseinc.com

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AMERICAN WIRE GROUP, INC.  
Tel: (954) 455-3050 • 800-342-7215  
www.buyawg.com

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## CONDUCTOR, STEEL - ALUMINUM - CLAD

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AMERICAN WIRE GROUP, INC.  
Tel: (954) 455-3050 • 800-342-7215  
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## CONDUCTOR, STEEL - COPPER-CLAD

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AMERICAN WIRE GROUP, INC.  
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## CONDUIT - ACCESSORIES

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CALBRITE  
Tel: (800) 225-7473  
www.calbrite.com

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www.championfiberglass.com

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

THOMAS & BETTS CANADA – UTILITY DIVISION  
Tel: (450) 466-1102, x234  
1-800-466-1102, x234  
www.tnb.ca

UNDERGROUND DEVICES INC.  
Tel: (847) 205-9000  
www.udevices.com

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## CONDUIT - PLASTIC

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CHAMPION FIBERGLASS, INC.  
Tel: (281) 655-8900  
www.championfiberglass.com

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

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## CONDUIT - POLYETHYLENE, CONTINUOUS

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DOW WIRE & CABLE  
Tel: 1-800-441-4DOW  
www.dowwireandcable.com

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## CONNECTORS - BOLTED - DISTRIBUTION

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CONNECTOR PRODUCTS INC.  
Tel: (856) 829-9190  
www.connectorproducts.com

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

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## CONNECTORS - COMPRESSION, DISTRIBUTION

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ASK PRODUCTS INC.  
Tel: (630) 896-4056  
www.asklug.com

HUBBELL POWER SYSTEMS INC.  
Tel: (573) 682-5521  
www.hubbellpowersystems.com

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

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## CONNECTORS - GROUNDING

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DMC POWER  
Tel: 888-swage-now  
www.dmcpower.com

THERMOWELD  
Tel: (918) 627-5210 • 1.800.558.1373  
www.thermoweld.com

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

THOMAS & BETTS CANADA – UTILITY DIVISION  
Tel: (450) 466-1102, x234  
1-800-466-1102, x234  
www.tnb.ca

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## CONNECTORS - HIGH AMPERAGE, QUICK-DISCONNECT

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SUPERIOR ELECTRIC  
Tel: (860) 507-2025  
www.superiorelectric.com

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## CONNECTORS - PLUG-IN

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THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

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## CONNECTORS - SUBSTATION

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AFL  
Tel: (864) 433-0333 • www.aflglobal.com

HUBBELL POWER SYSTEMS INC.  
Tel: (573) 682-5521  
www.hubbellpowersystems.com

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

THOMAS & BETTS CANADA – UTILITY DIVISION  
Tel: (450) 466-1102, x234  
1-800-466-1102, x234  
www.tnb.ca

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## CONNECTORS - TECK CABLE

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THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

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## CONNECTORS, UNDERGROUND - TERMINATING

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THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

THOMAS & BETTS CANADA – UTILITY DIVISION  
Tel: (450) 466-1102, x234  
1-800-466-1102, x234  
www.tnb.ca

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## CONNECTORS - WELDED

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THERMOWELD  
Tel: (918) 627-5210 • 1.800.558.1373  
www.thermoweld.com

# PRODUCTS AND SERVICES

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## CONSOLES - SCADA CONTROL CENTERS

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MILLENNIUM COMMUNICATIONS GROUP  
Tel: (800) 677-1919  
[www.millenniuminc.com](http://www.millenniuminc.com)

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## CONSTRUCTION AND PROJECT ENGINEERING

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CORELOGIC  
Tel: (800) 426-1466

INSULBOOT A DIV. OF PLASTIC DIP MOLDINGS  
Tel: (215) 766-2020  
[www.insulboot.com](http://www.insulboot.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

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## CONSTRUCTION SERVICES

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S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

UTILICON SOLUTIONS, LTD  
Tel: (215) 784-1406 • (877) 884-5426  
[www.utiliconltd.com](http://www.utiliconltd.com)

WISMAN ENTERPRISES  
Tel: 641-423-9501 / Cell: 641-425-2655

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## CONSTRUCTION SPECIALIZED

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CRUX SUBSURFACE, INC.  
Tel: (509) 892-9409  
[www.cruxsub.com](http://www.cruxsub.com)

METAL FOUNDATIONS  
Tel: (724) 266-1066  
[www.metalfoundationscorp.com](http://www.metalfoundationscorp.com)

NAES CORPORATION  
Tel: (425) 961-4700  
[www.naes.com](http://www.naes.com)

QUANTA SERVICES  
Tel: (713) 629-7600  
[www.quantaservices.com](http://www.quantaservices.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

WISMAN ENTERPRISES  
Tel: 641-423-9501 / Cell: 641-425-2655

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## CONSULTANTS - CABLE TESTING AND FAULT LOCATING

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IMCORP  
Tel: (860) 873-8000  
[www.imcorp.com](http://www.imcorp.com)

KINETRICS INC.  
Tel: (416) 207-6000  
[www.kinetrics.com](http://www.kinetrics.com)

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## CONSULTANTS - POWER QUALITY

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S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

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## CONSULTANTS - SCADA/EMS ENGINEERING

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AESI ACUMEN ENGINEERED SOLUTIONS INTL. INC.  
Tel: (905) 875-2075  
[www.aesi-inc.com](http://www.aesi-inc.com)

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## CONSULTANTS - SUBSTATION DESIGN & ENGINEERING

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AMPIRICAL SOLUTIONS, LLC  
Tel: (985) 809-5252  
[www.ampirical.com](http://www.ampirical.com)

COMMONWEALTH ASSOCIATES, INC.  
Tel: (517) 788-3000  
[www.cai-engr.com](http://www.cai-engr.com)

ESC ENGINEERING  
Tel: (970) 224-9100 • (877) 224-9101  
[www.thinkesc.com](http://www.thinkesc.com)

J & Y ENGINEERING SERVICES INC.  
Tel: (440) 891-1130  
[www.jyengineering.com](http://www.jyengineering.com)

PRIMARY POWER GROUP  
Tel: (905) 426-2952  
[www.primarypowergroup.com](http://www.primarypowergroup.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

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

STANLEY CONSULTANTS, INC.  
Tel: (800) 553-9694  
[www.stanleyconsultants.com](http://www.stanleyconsultants.com)

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## CONSULTANTS - T&D ENGINEERING

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AESI ACUMEN ENGINEERED SOLUTIONS INTL. INC.  
Tel: (905) 875-2075  
[www.aesi-inc.com](http://www.aesi-inc.com)

AMPIRICAL SOLUTIONS, LLC  
Tel: (985) 809-5252  
[www.ampirical.com](http://www.ampirical.com)

ESC ENGINEERING  
Tel: (970) 224-9100 • (877) 224-9101  
[www.thinkesc.com](http://www.thinkesc.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

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

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

W.I.R.E. SERVICES  
Tel: (204) 480-5800  
[www.wireservices.ca](http://www.wireservices.ca)

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## CONSULTANTS - UNDERGROUND AND UNDERWATER CABLE

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

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## CONSULTING

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AMPIRICAL SOLUTIONS, LLC  
Tel: (985) 809-5252  
[www.ampirical.com](http://www.ampirical.com)



# PRODUCTS AND SERVICES

CN UTILITY CONSULTING  
Tel: (707) 829-1018  
[www.cnutility.com](http://www.cnutility.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

## CONSULTING ENGINEERING

AMPIRICAL SOLUTIONS, LLC  
Tel: (985) 809-5252  
[www.ampirical.com](http://www.ampirical.com)

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

GDS ASSOCIATES, INC.  
Tel: (770) 425-8100  
[www.gdsassociates.com](http://www.gdsassociates.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

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

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

W.I.R.E. SERVICES  
Tel: (204) 480-5800  
[www.wireservices.ca](http://www.wireservices.ca)

## CONTACTORS - DC/AC

MERSEN CANADA  
Tel: (416) 252-9371  
[www.mersen.com](http://www.mersen.com)

## CONTRACT SERVICES - FIELD INVENTORY - AUDIT SERVICES

CN UTILITY CONSULTING  
Tel: (707) 829-1018  
[www.cnutility.com](http://www.cnutility.com)

## CONTRACTORS

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

WRIGHT TREE SERVICE  
Tel: (800) 882-1216  
[www.wrighttree.com](http://www.wrighttree.com)

## CONTRACTORS - CONSTRUCTION

UTILICON SOLUTIONS, LTD  
Tel: (215) 784-1406 • (877) 884-5426  
[www.utiliconltd.com](http://www.utiliconltd.com)

## CONTRACTORS - MECHANICAL

WINOLA INDUSTRIAL INC.  
Tel: (570) 378-3808  
[www.winolaindustrial.com](http://www.winolaindustrial.com)

## CONTROL CENTER DESIGN

MAUELL CORPORATION  
Tel: (717) 432-8686  
[www.mauell-us.com](http://www.mauell-us.com)

## CONTROL SYSTEMS - ELECTRIC/ELECTRONIC

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

## CONTROLLERS/CONTROLS - PROGRAMMABLE

SCHWEITZER ENGINEERING LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

## CONTROLS

BECKWITH ELECTRIC COMPANY  
Tel: (727) 544-2326  
[www.beckwithelectric.com](http://www.beckwithelectric.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

## CONTROLS - CAPACITORS

BECKWITH ELECTRIC COMPANY  
Tel: (727) 544-2326  
[www.beckwithelectric.com](http://www.beckwithelectric.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

## CONTROLS - CONTROL BOXES FOR TRANSFORMER COOLING FANS - SINGLE OR MULTI STAGES / EXPLOSION PROOF

CALIFORNIA TURBO, INC.  
Tel: (909) 854-2800  
[www.californiaturbo.com](http://www.californiaturbo.com)

## CONTROLS - LTC TRANSFORMER

BECKWITH ELECTRIC COMPANY  
Tel: (727) 544-2326  
[www.beckwithelectric.com](http://www.beckwithelectric.com)

## CONTROLS - PEAK DEMAND

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
[www.neoptix.com](http://www.neoptix.com)

## CONTROLS - REGULATOR TAP CHANGER

BECKWITH ELECTRIC COMPANY  
Tel: (727) 544-2326  
[www.beckwithelectric.com](http://www.beckwithelectric.com)

## CONTROLS - SUPERVISORY

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

## CONTROLS - TAP CHANGER

BECKWITH ELECTRIC COMPANY  
Tel: (727) 544-2326  
[www.beckwithelectric.com](http://www.beckwithelectric.com)

## CONTROLS - TEMPERATURE

CALIFORNIA TURBO, INC.  
Tel: (909) 854-2800  
[www.californiaturbo.com](http://www.californiaturbo.com)

KRENZ & COMPANY INCORPORATED  
Tel: (262) 255-2310  
[www.krenzvent.com](http://www.krenzvent.com)

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
[www.neoptix.com](http://www.neoptix.com)

# PRODUCTS AND SERVICES

## CONTROLS - VAR

BECKWITH ELECTRIC COMPANY  
Tel: (727) 544-2326  
[www.beckwithelectric.com](http://www.beckwithelectric.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
[www.utilitytnb.com](http://www.utilitytnb.com)

THOMAS & BETTS CANADA – UTILITY  
DIVISION  
Tel: (450) 466-1102, x234  
1-800-466-1102, x234  
[www.tnb.ca](http://www.tnb.ca)

## COOLERS - TRANSFORMER OIL

TRANTECH RADIATOR PRODUCTS INC.  
Tel: (803) 637-3166  
[www.trantechradiators.com](http://www.trantechradiators.com)

## CORONA EQUIPMENT - SALES

OFIL  
Tel: 972-8-9407953  
[www.ofilsystems.com](http://www.ofilsystems.com)

OX CREEK ENERGY ASSOC INC -  
SPECIALIZED CAMERA SALES  
Tel: (800) 531-6232  
[www.specialcamera.com](http://www.specialcamera.com)

## CRANES

AIR TECHNICAL INDUSTRIES  
Tel: (440) 951-5191 • 800-321-9680  
[www.airtechnical.com](http://www.airtechnical.com)

## CRANES - HYDRAULIC

AIR TECHNICAL INDUSTRIES  
Tel: (440) 951-5191 • 800-321-9680  
[www.airtechnical.com](http://www.airtechnical.com)

ALTEC INDUSTRIES, INC.  
Tel: (800) 958-2555  
[www.altec.com](http://www.altec.com)

## CRANES - MANUFACTURERS/ DISTRIBUTORS

AIR TECHNICAL INDUSTRIES  
Tel: (440) 951-5191 • 800-321-9680  
[www.airtechnical.com](http://www.airtechnical.com)

ELLIOTT EQUIPMENT COMPANY  
Tel: (402) 592-4500  
[www.elliottequip.com](http://www.elliottequip.com)

NESCO SALES AND RENTALS  
Tel: (260) 824-6340 • 1-800-252-0043  
[www.nescosales.com](http://www.nescosales.com)

## CRIMPING TOOLS - ELECTRICAL

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

## CROSSARMS

DIS-TRAN STEEL, LLC  
Tel: (318) 448-0274  
[www.distran.com](http://www.distran.com)

DIS-TRAN WOOD PRODUCTS, LLC  
Tel: (318) 448-0274  
[www.distran.com](http://www.distran.com)

HUGHES BROTHERS INC.  
Tel: (402) 643-2991  
[www.hughesbros.com](http://www.hughesbros.com)

LOCWELD INC.  
Tel: (450) 659-9661  
[www.locweld.com](http://www.locweld.com)

THOMAS & BETTS - STEEL STRUCTURES  
DIVISION  
Tel: 1-877-2TB-MEYER  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

THOMAS & BETTS CANADA – STEEL  
STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

## CROSSARMS - FIBERGLASS - REINFORCED

ALUMA-FORM INC  
Tel: (901) 362-0100  
[www.alumaform.com](http://www.alumaform.com)

HUGHES BROTHERS INC.  
Tel: (402) 643-2991  
[www.hughesbros.com](http://www.hughesbros.com)

## CROSSARMS, WOOD - LAMINATED

DIS-TRAN WOOD PRODUCTS, LLC  
Tel: (318) 448-0274  
[www.distran.com](http://www.distran.com)

HUGHES BROTHERS INC.  
Tel: (402) 643-2991  
[www.hughesbros.com](http://www.hughesbros.com)

## CROSSARMS, WOOD - SOLID

DIS-TRAN WOOD PRODUCTS, LLC  
Tel: (318) 448-0274  
[www.distran.com](http://www.distran.com)

HUGHES BROTHERS INC.  
Tel: (402) 643-2991  
[www.hughesbros.com](http://www.hughesbros.com)

## CSA 2010 SERVICES

NECS  
Tel: (800) 348-3242  
[www.necssolutions.com](http://www.necssolutions.com)

NECS-NATIONAL ENERGY CONTROL  
SERVICES  
Tel: (812) 634-1413  
[www.necssolutions.com](http://www.necssolutions.com)

## CURRENT SENSORS

ION PHYSICS CORP.  
Tel: (603) 895-5100  
[www.ionphysics.com](http://www.ionphysics.com)

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)

# PRODUCTS AND SERVICES

## CUTOUTS, LOADBREAK

HUBBELL POWER SYSTEMS INC.  
Tel: (573) 682-5521  
[www.hubbellpowersystems.com](http://www.hubbellpowersystems.com)

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

LOCKHEED MARTIN  
Tel: (610) 354-2538  
[www.lockheedmartin.com](http://www.lockheedmartin.com)

## D

## DAMPERS - VIBRATION

HUBBELL POWER SYSTEMS INC.  
Tel: (573) 682-5521  
[www.hubbellpowersystems.com](http://www.hubbellpowersystems.com)

## DATA ACQUISITION SYSTEMS

COOPER POWER SYSTEMS - ENERGY  
AUTOMATION SOLUTIONS  
Tel: (418) 834-0009  
[www.cooperpowereas.com](http://www.cooperpowereas.com)

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

LIVEDATA, INC.  
Tel: (617) 576-6900  
[www.livedata.com](http://www.livedata.com)

OLAMETER INC.  
Tel: (800) 903-7003  
[www.olameter.com](http://www.olameter.com)

## DATA CONVERSION

ELSYS INSTRUMENTS, LLC  
Tel: (845) 238-5419  
[www.elsys-instruments.com](http://www.elsys-instruments.com)

## DEADENDS WOOD, LAMINATED

HUGHES BROTHERS INC.  
Tel: (402) 643-2991  
[www.hughesbros.com](http://www.hughesbros.com)

## DETECTORS - CABLE FAULT LOCATING

INNOVATIVE UTILITY PRODUCTS CORP.  
Tel: (479) 410-2098  
[www.iupcorp.com](http://www.iupcorp.com)

## DETECTORS - FAULT

SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

## DETECTORS - INFRARED

FLIR SYSTEMS, INC.  
Tel: (503) 498-3293 • (800) 464-6372  
[www.flir.com/eetdguide](http://www.flir.com/eetdguide)

## DETECTORS - LEAK

MISTRAS GROUP  
[www.mistrasgroup.com](http://www.mistrasgroup.com)

## DETECTORS - PARTIAL DISCHARGE

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

MISTRAS GROUP  
[www.mistrasgroup.com](http://www.mistrasgroup.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)

MORGAN SCHAFFER  
Tel: (514) 739-1967  
[www.morganschaffer.com](http://www.morganschaffer.com)

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
[www.neoptix.com](http://www.neoptix.com)

## DISPATCH SYSTEMS - COMPUTER-AIDED

LEWIS TREE SERVICE, INC.  
Tel: (800) 333-1593  
[www.lewistree.com](http://www.lewistree.com)

## DISTRIBUTED CONTROL SYSTEMS

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

## DISTRIBUTION AUTOMATION - COMMUNICATIONS

BECKWITH ELECTRIC COMPANY  
Tel: (727) 544-2326  
[www.beckwithelectric.com](http://www.beckwithelectric.com)

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

LIVEDATA, INC.  
Tel: (617) 576-6900  
[www.livedata.com](http://www.livedata.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

TAIT NORTH AMERICA  
Tel: (281) 829-3300  
[www.taitworld.com](http://www.taitworld.com)

## DISTRIBUTION AUTOMATION SYSTEMS

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

EFACEC ADVANCED CONTROL SYSTEMS  
Tel: (770) 446-8854  
[www.efacec-ac.com](http://www.efacec-ac.com)



## PRODUCTS AND SERVICES

OPEN SYSTEMS INTERNATIONAL, INC.  
Tel: (763) 551-0559  
[www.osii.com](http://www.osii.com)

SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
[www.utilitytnb.com](http://www.utilitytnb.com)

THOMAS & BETTS CANADA - UTILITY  
DIVISION  
Tel: (450) 466-1102, x234  
1-800-466-1102, x234  
[www.tnb.ca](http://www.tnb.ca)

### DISTRIBUTION MANAGEMENT SYSTEMS

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

EFACEC ADVANCED CONTROL SYSTEMS  
Tel: (770) 446-8854  
[www.efacec-accs.com](http://www.efacec-accs.com)

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)

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

### DOCUMENT MANAGEMENT & WORKFLOW SOLUTIONS

COMSQUARED SYSTEMS  
Tel: (800) 592-3766  
[www.comsquared.com](http://www.comsquared.com)

VANGUARD SYSTEMS  
Tel: (610) 891-7703 (8am - 5pm EST)  
[www.vansystems.com](http://www.vansystems.com)

### DUCT - FITTINGS

CHAMPION FIBERGLASS, INC.  
Tel: (281) 655-8900  
[www.championfiberglass.com](http://www.championfiberglass.com)

UNDERGROUND DEVICES INC.  
Tel: (847) 205-9000  
[www.udevices.com](http://www.udevices.com)

### DUCT - PLASTIC

CHAMPION FIBERGLASS, INC.  
Tel: (281) 655-8900  
[www.championfiberglass.com](http://www.championfiberglass.com)

## E

### EMERGENCY & HAZARDOUS LOCATION LIGHTS

LARSON ELECTRONICS LLC  
Tel: (800) 369-6671  
[www.magnalight.com](http://www.magnalight.com)

### ENCLOSURES - CABINETS

SABRE BUILDING SYSTEMS BY CELLXION  
Tel: (318) 213-2900 • 877-213-2900  
[www.sabrebuildingsystems.com](http://www.sabrebuildingsystems.com)

### ENCLOSURES - FIBERGLASS- REINFORCED

CONCAST INC.  
Tel: (507) 732-4095  
[www.concastinc.com](http://www.concastinc.com)

MERSEN CANADA  
Tel: (416) 252-9371  
[www.mersen.com](http://www.mersen.com)

OLDCASTLE ENCLOSURE SOLUTIONS  
Tel: (303) 209-8000 • 888-868-5214  
[www.oldcastleprecast.com](http://www.oldcastleprecast.com)

### ENCLOSURES - METAL

SABRE BUILDING SYSTEMS BY CELLXION  
Tel: (318) 213-2900 • 877-213-2900  
[www.sabrebuildingsystems.com](http://www.sabrebuildingsystems.com)

### ENCLOSURES - POLYMER CONCRETE

HUBBELL POWER SYSTEMS INC.  
Tel: (573) 682-5521  
[www.hubbellpowersystems.com](http://www.hubbellpowersystems.com)

OLDCASTLE ENCLOSURE SOLUTIONS  
Tel: (303) 209-8000 • 888-868-5214  
[www.oldcastleprecast.com](http://www.oldcastleprecast.com)

### ENERGY MANAGEMENT SYSTEMS

BLUE PILLAR  
Tel: (888) 234-3212  
[www.bluepillar.com](http://www.bluepillar.com)

EFACEC ADVANCED CONTROL SYSTEMS  
Tel: (770) 446-8854  
[www.efacec-accs.com](http://www.efacec-accs.com)

OPEN SYSTEMS INTERNATIONAL, INC.  
Tel: (763) 551-0559  
[www.osii.com](http://www.osii.com)

### ENGINEERING

AMPIRICAL SOLUTIONS, LLC  
Tel: (985) 809-5252  
[www.ampirical.com](http://www.ampirical.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

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

TAIT NORTH AMERICA  
Tel: (281) 829-3300  
[www.taitworld.com](http://www.taitworld.com)

### ENGINEERING - CONSULTANTS

AESI ACUMEN ENGINEERED SOLUTIONS  
INTL. INC.  
Tel: (905) 875-2075  
[www.aesi-inc.com](http://www.aesi-inc.com)

AMPIRICAL SOLUTIONS, LLC  
Tel: (985) 809-5252  
[www.ampirical.com](http://www.ampirical.com)

IEC & ASSOCIATES  
Tel: (919) 828-6755  
[www.ieca-inc.com](http://www.ieca-inc.com)

# PRODUCTS AND SERVICES

J & Y ENGINEERING SERVICES INC.  
Tel: (440) 891-1130  
www.jyengineering.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

SARGENT & LUNDY LLC  
Tel: (312) 269-2000  
www.sargentlundy.com

SURVEYING AND MAPPING, INC. (SAM, INC.)  
Tel: (512) 447-0575  
www.saminc.biz

TESHMONT CONSULTANTS LP  
Tel: (204) 284-8100  
www.teshmont.com

## ENGINEERING - CONSULTANTS - CONSTRUCTION

AMPIRICAL SOLUTIONS, LLC  
Tel: (985) 809-5252  
www.ampirical.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

## ENGINEERING - DESIGN

A.I. ORLOFF ELECTRICAL ENGINEER  
Tel: (949) 232-4023  
www.ocsoft.us

AMPIRICAL SOLUTIONS, LLC  
Tel: (985) 809-5252  
www.ampirical.com

AUTOMATED SOLUTIONS INT'L INC.  
Tel: (519) 220-0071 • 1 888.384.1212  
www.goasi.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

SARGENT & LUNDY LLC  
Tel: (312) 269-2000  
www.sargentlundy.com

SCHNEIDER ELECTRIC  
www.schneider-electric.com/ca

TAIT NORTH AMERICA  
Tel: (281) 829-3300  
www.taitworld.com

W.I.R.E. SERVICES  
Tel: (204) 480-5800  
www.wireservices.ca

## ENGINEERING - EQUIPMENT

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

## ENGINEERING - PROCUREMENT - CONSTRUCTION (EPC) SUBSTATIONS

AMPIRICAL SOLUTIONS, LLC  
Tel: (985) 809-5252  
www.ampirical.com

## ENGINEERING - PROCUREMENT - CONSTRUCTION (EPC) TRANSMISSION LINES

AMPIRICAL SOLUTIONS, LLC  
Tel: (985) 809-5252  
www.ampirical.com

## ENGINEERING - PROFESSIONAL SERVICES

AESI ACUMEN ENGINEERED SOLUTIONS INTL. INC.  
Tel: (905) 875-2075  
www.aesi-inc.com

AMPIRICAL SOLUTIONS, LLC  
Tel: (985) 809-5252  
www.ampirical.com

SARGENT & LUNDY LLC  
Tel: (312) 269-2000  
www.sargentlundy.com

SCHLESINGER CONSULTING  
Tel: (949) 376-4960  
www.schlesingerconsulting.com

TAIT NORTH AMERICA  
Tel: (281) 829-3300  
www.taitworld.com

W.I.R.E. SERVICES  
Tel: (204) 480-5800  
www.wireservices.ca

## ENGINEERING - SERVICES

AESI ACUMEN ENGINEERED SOLUTIONS INTL. INC.  
Tel: (905) 875-2075  
www.aesi-inc.com

AMPIRICAL SOLUTIONS, LLC  
Tel: (985) 809-5252  
www.ampirical.com

DOBLE ENGINEERING CO.  
Tel: (617) 926-4900  
www.doble.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

W.I.R.E. SERVICES  
Tel: (204) 480-5800  
www.wireservices.ca

## ENGINEERING - SERVICES - T & D

AESI ACUMEN ENGINEERED SOLUTIONS INTL. INC.  
Tel: (905) 875-2075  
www.aesi-inc.com

AMPIRICAL SOLUTIONS, LLC  
Tel: (985) 809-5252  
www.ampirical.com

ESC ENGINEERING  
Tel: (970) 224-9100 • (877) 224-9101  
www.thinkesc.com

QUANTA SERVICES  
Tel: (713) 629-7600  
www.quantaservices.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

SABRE TUBULAR STRUCTURES  
Tel: (817) 852-1700 • 866-254-3707  
www.sabretubularstructures.com

SARGENT & LUNDY LLC  
Tel: (312) 269-2000  
www.sargentlundy.com

SCHNEIDER ELECTRIC  
www.schneider-electric.com/ca

## PRODUCTS AND SERVICES

SOUTHERN STATES, LLC.  
Tel: (770) 946-4562  
[www.southernstatesllc.com](http://www.southernstatesllc.com)

TOWER DRAFTING SERVICES, INC.  
Tel: (412) 682-7618  
[www.towerdraft.com](http://www.towerdraft.com)

URS CORPORATION  
Tel: (609) 720-2000  
[www.urs.com](http://www.urs.com)

W.I.R.E. SERVICES  
Tel: (204) 480-5800  
[www.wireservices.ca](http://www.wireservices.ca)

### ENGINEERING - STRUCTURAL

AMPIRICAL SOLUTIONS, LLC  
Tel: (985) 809-5252  
[www.ampirical.com](http://www.ampirical.com)

AUTOMATED SOLUTIONS INT'L INC.  
Tel: (519) 220-0071 • 1 888.384.1212  
[www.goasi.com](http://www.goasi.com)

J & Y ENGINEERING SERVICES INC.  
Tel: (440) 891-1130  
[www.jyengineering.com](http://www.jyengineering.com)

### ETHERNET

GARRETTCOM INC.  
Tel: (510) 438-9071  
[www.garrettcom.com](http://www.garrettcom.com)

### EXIT SIGNS

AMERICAN PERMALIGHT INC  
Tel: (310) 891-0924  
[www.americanpermalight.com](http://www.americanpermalight.com)

## F

### FALL PROTECTION TRAINING

GENERAL PHYSICS (GP)  
Tel: (410) 290-2446  
[www.gpworldwide.com](http://www.gpworldwide.com)

### FANS

KRENZ & COMPANY INCORPORATED  
Tel: (262) 255-2310  
[www.krenzvent.com](http://www.krenzvent.com)

### FANS - BUILDING VAULT VENTILATION

CALIFORNIA TURBO, INC.  
Tel: (909) 854-2800  
[www.californiaturbo.com](http://www.californiaturbo.com)

### FANS - INSPECTION, REPAIRS & PARTS

CALIFORNIA TURBO, INC.  
Tel: (909) 854-2800  
[www.californiaturbo.com](http://www.californiaturbo.com)

KRENZ & COMPANY INCORPORATED  
Tel: (262) 255-2310  
[www.krenzvent.com](http://www.krenzvent.com)

### FANS - PORTABLE UTILITY

CALIFORNIA TURBO, INC.  
Tel: (909) 854-2800  
[www.californiaturbo.com](http://www.californiaturbo.com)

### FANS - TRANSFORMER - COOLING - PARTS & ACCESSORIES

CALIFORNIA TURBO, INC.  
Tel: (909) 854-2800  
[www.californiaturbo.com](http://www.californiaturbo.com)

### FANS - TRANSFORMER-COOLING

CALIFORNIA TURBO, INC.  
Tel: (909) 854-2800  
[www.californiaturbo.com](http://www.californiaturbo.com)

KRENZ & COMPANY INCORPORATED  
Tel: (262) 255-2310  
[www.krenzvent.com](http://www.krenzvent.com)

### FASTENERS

WINOLA INDUSTRIAL INC.  
Tel: (570) 378-3808  
[www.winolaindustrial.com](http://www.winolaindustrial.com)

### FASTENERS - SPECIAL

DENDOFF SPRINGS  
Tel: (604) 580-3400  
[www.dendoff.com](http://www.dendoff.com)

WINOLA INDUSTRIAL INC.  
Tel: (570) 378-3808  
[www.winolaindustrial.com](http://www.winolaindustrial.com)

### FAULT ANALYSIS

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

MORGAN SCHAFFER  
Tel: (514) 739-1967  
[www.morganschaffer.com](http://www.morganschaffer.com)

### FIBER OPTIC - SENSORS

FISO TECHNOLOGIES  
Tel: (418) 688-8065 X 241  
[www.fiso.com](http://www.fiso.com)

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
[www.neoptix.com](http://www.neoptix.com)

WEIDMANN DIAGNOSTIC SOLUTIONS INC  
Tel: (800) 242-8106  
[www.weidmann-electrical.com](http://www.weidmann-electrical.com)

### FIBER OPTIC C & A - CABLE PULLERS

GLOBAL MACHINERY / CABLE PLACING EQUIPMENT  
Tel: (800) 430-7130  
[www.gmilt.com](http://www.gmilt.com)

### FIBER OPTIC COMMUNICATIONS

EFACEC ADVANCED CONTROL SYSTEMS  
Tel: (770) 446-8854  
[www.efacec-ac.com](http://www.efacec-ac.com)

FIBER OPTICS FOR SALE CO.  
Tel: (408) 890-6299  
[www.fiberoptics4sale.com](http://www.fiberoptics4sale.com)

FIBER SAVVY  
Tel: (951) 801-5780  
[www.fibersavvy.com](http://www.fibersavvy.com)

MATRIX DESIGN GROUP/ MILLENNIUM COMMUNICATIONS GROUP  
Tel: (800) 677-1919  
[www.matrixdg.com/experience](http://www.matrixdg.com/experience)



# PRODUCTS AND SERVICES

## TRANSMODE

Tel: (214) 576-9881  
www.transmode.com

## FIBER OPTICS

### DOW WIRE & CABLE

Tel: 1-800-441-4DOW  
www.dowwireandcable.com

### NEOPTIX FIBER OPTIC SENSORS

Tel: (418) 687-2500  
www.neoptix.com

## FIBERGLASS - PIPE, TANK

### HASTINGS FIBERGLASS PRODUCTS INC.

Tel: (269) 945-9541  
www.hfgp.com

## FIELD AUTOMATION

### LEWIS TREE SERVICE, INC.

Tel: (800) 333-1593  
www.lewistree.com

### S&C ELECTRIC COMPANY

Tel: (773) 338-1000  
www.sandc.com

## FIELD INSTALLATION SERVICES

### EFACEC ADVANCED CONTROL SYSTEMS

Tel: (770) 446-8854  
www.efacec-acsc.com

### NAES CORPORATION

Tel: (425) 961-4700  
www.naes.com

### S&C ELECTRIC COMPANY

Tel: (773) 338-1000  
www.sandc.com

### SOUTHERN STATES, LLC.

Tel: (770) 946-4562  
www.southernstatesllc.com

## FILTRATION - LIQUID SYSTEMS

### FILMAX INC

Tel: (865) 408-0030  
www.filmaxinc.com

### VELCON FILTERS, LLC.

Tel: (719) 531-5855 • 1-800-531-0180  
www.velcon.com/systems

## FILTRATION EQUIPMENT

### FILMAX INC

Tel: (865) 408-0030  
www.filmaxinc.com

### VELCON FILTERS, LLC.

Tel: (719) 531-5855 • 1-800-531-0180  
www.velcon.com/systems

## FILTRATION SYSTEMS - OIL

### BARON USA

Tel: (931) 528-8476  
www.baronusa.com

### FILMAX INC

Tel: (865) 408-0030  
www.filmaxinc.com

### TRANSFLUID SERVICES, INC.

Tel: (800) 442-8077  
www.transfluidservices.com

### VELCON FILTERS, LLC.

Tel: (719) 531-5855 • 1-800-531-0180  
www.velcon.com/systems

## FIRE PROTECTION EQUIPMENT

### OLDCASTLE ENCLOSURE SOLUTIONS

Tel: (303) 209-8000 • 888-868-5214  
www.oldcastleprecast.com

### OLDCASTLE PRECAST FOR TRUFIRE WALL

## FLAME RESISTANT CLOTHING

### SALISBURY BY HONEYWELL

Tel: (630) 343-3800  
www.salisburybyhoneywell.com

## FLOODLIGHTS (SEE ALSO LIGHTS)

### GOLIGHT INC

Tel: (308) 278-3131  
www.golight.com

## FLUID MANAGEMENT - OIL RECYCLING

### BARON USA

Tel: (931) 528-8476  
www.baronusa.com

## FUSELINK - CUTOUTS

### HUBBELL POWER SYSTEMS INC.

Tel: (573) 682-5521  
www.hubbellpowersystems.com

### S&C ELECTRIC COMPANY

Tel: (773) 338-1000  
www.sandc.com

### SCHNEIDER ELECTRIC

www.schneider-electric.com/ca

## FUSES

### MERSEN CANADA

Tel: (416) 252-9371  
www.mersen.com

### S&C ELECTRIC COMPANY

Tel: (773) 338-1000  
www.sandc.com

### THOMAS & BETTS - UTILITY GROUP

Tel: (800) 326-5282  
www.utilitytnb.com

### THOMAS & BETTS CANADA - UTILITY DIVISION

Tel: (450) 466-1102, x234  
1-800-466-1102, x234  
www.tnb.ca

## G

## GAS DETECTION - SF6

### FLIR SYSTEMS, INC.

Tel: (503) 498-3293 • (800) 464-6372  
www.flir.com/eetdguide

### MORGAN SCHAFFER

Tel: (514) 739-1967  
www.morganschaffer.com

## GAS MONITORS - PORTABLE

### MORGAN SCHAFFER

Tel: (514) 739-1967  
www.morganschaffer.com

# PRODUCTS AND SERVICES

## GAUGES - PRESSURE

REINHAUSEN MANUFACTURING INC.  
ATT: CHRISTY CRAWFORD  
Tel: (731) 562-4127  
www.reinhausen.com

## GAUGES - TEMPERATURE

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
www.neoptix.com

## GENERAL CONTRACTORS

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

## GENERAL CONTRACTORS - CONSTRUCTION

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

## GIS - ENGINEERING SERVICES

AUTOMATED SOLUTIONS INT'L INC.  
Tel: (519) 220-0071 • 1 888.384.1212  
www.goasi.com

ESC ENGINEERING  
Tel: (970) 224-9100 • (877) 224-9101  
www.thinkesc.com

## GIS - SOFTWARE

3-GIS  
Tel: (256) 560-0744  
www.3-gis.com

LEWIS TREE SERVICE, INC.  
Tel: (800) 333-1593  
www.lewistree.com

## GLOBAL POSITIONING SYSTEMS (GPS)

AUTOVISION WIRELESS INC  
Tel: (416) 700-2673  
autovisionwireless.com

LONGVIEW ADVANTAGE CORPORATION  
Tel: 866-514-8030, ext 7576  
www.longviewadvantage.com

## GLOVES

RONCO  
Tel: (905) 660-6700  
www.ronco.ca

## GLOVES - RUBBER

HI-LINE UTILITY SUPPLY CO.  
Tel: (800) 323-6606  
www.hilineco.com

## GLOVES - TESTING

HI-LINE UTILITY SUPPLY CO.  
Tel: (800) 323-6606  
www.hilineco.com

PHENIX TECHNOLOGIES INC.  
Tel: (301) 746-8118  
www.phenixtech.com

## GRIPS - CABLE-PULLING

HASTINGS FIBERGLASS PRODUCTS INC.  
Tel: (269) 945-9541  
www.hfgp.com

## GROUND RODS - COPPERWELD

GALVAN INDUSTRIES, INC.  
Tel: (704) 455-5102  
www.galvanelectrical.com

THERMOWELD  
Tel: (918) 627-5210 • 1.800.558.1373  
www.thermoweld.com

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

## GROUNDING - EQUIPMENT

HASTINGS FIBERGLASS PRODUCTS INC.  
Tel: (269) 945-9541  
www.hfgp.com

HI-LINE UTILITY SUPPLY CO.  
Tel: (800) 323-6606  
www.hilineco.com

HUBBELL POWER SYSTEMS INC.  
Tel: (573) 682-5521  
www.hubbellpowersystems.com

## GROUNDING - TRAVELING

MABEY BRIDGE & SHORE INC  
Tel: 410-567-1946.  
www.mabey.com

TALLMAN EQUIPMENT CO  
Tel: (630) 860-5666  
www.tallmanequipment.com

## GUARDS - ANIMAL AND BIRDS

VANQUISH FENCING INCORPORATED  
Tel: (215) 295-2863  
www.vanquishfencing.com

## H

## HANDLING EQUIPMENT

AIR TECHNICAL INDUSTRIES  
Tel: (440) 951-5191 • 800-321-9680  
www.airtechnical.com

## HARDWARE - POLELINE

HUGHES BROTHERS INC.  
Tel: (402) 643-2991  
www.hughesbros.com

## HARDWARE - TRANSMISSION LINE

BBCFASTENERS  
Tel: (708) 597-9100  
www.bbcfasteners.com

HELIX UNIFORMED LTD  
Tel: (514) 828-0057  
www.helix-uni.ca

HUGHES BROTHERS INC.  
Tel: (402) 643-2991  
www.hughesbros.com

RUMSEY ELECTRIC COMPANY -  
UTILITY SALES  
Tel: (484) 686-7216  
www.rumseyus.com

WINOLA INDUSTRIAL INC.  
Tel: (570) 378-3808  
www.winolaindustrial.com

# PRODUCTS AND SERVICES

## HEAT EXCHANGERS

TECHSOURCE THERMAL SOLUTIONS, INC.  
Tel: (781) 939-9988  
www.techsource.net

## HOISTS

HUBBELL POWER SYSTEMS INC.  
Tel: (573) 682-5521  
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TALLMAN EQUIPMENT CO  
Tel: (630) 860-5666  
www.tallmanequipment.com

## I

## INDICATORS - FAULT

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

THOMAS & BETTS CANADA - UTILITY DIVISION  
Tel: (450) 466-1102, x234  
1-800-466-1102, x234  
www.tnb.ca

## INDICATORS - TEMPERATURE

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
www.neoptix.com

## INDICATORS, PORTABLE - FAULT

MORGAN SCHAFFER  
Tel: (514) 739-1967  
www.morganschaffer.com

## INDICATORS, PORTABLE - TEMPERATURE

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
www.neoptix.com

## INFRARED - IMAGING

FLIR SYSTEMS, INC.  
Tel: (503) 498-3293 • (800) 464-6372  
www.flir.com/eetguide

MAGNETECH INDUSTRIAL SERVICES  
Tel: (330) 830-3500 • 800-837-1614  
www.magnetech.com

## INSPECTION - FIELD SERVICES

MAGNETECH INDUSTRIAL SERVICES  
Tel: (330) 830-3500 • 800-837-1614  
www.magnetech.com

MISTRAS GROUP  
www.mistrasgroup.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

## INSPECTION SERVICES

ARBORMETRICS SOLUTIONS LTD  
Tel: (407) 339-1733 • (866) 685-1880  
www.arbormetricssolutions.com

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Tel: (418) 687-2500  
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REINHAUSEN MANUFACTURING INC.  
ATT: CHRISTY CRAWFORD  
Tel: (731) 562-4127  
www.reinhausen.com

## INSTRUMENTS - ON LINE MEASURING

DOBLE ENGINEERING CO.  
Tel: (617) 926-4900  
www.doble.com

ELSYS INSTRUMENTS, LLC  
Tel: (845) 238-5419  
www.elsys-instruments.com

MORGAN SCHAFFER  
Tel: (514) 739-1967  
www.morganschaffer.com

NOVA ANALYTICAL SYSTEMS  
Tel: (800) 295-3771  
www.nova-gas.com

OPTISENSE NETWORK, LLC  
Tel: (866) 530-4698  
www.optisense.net

## INSTRUMENTS TRANSFORMERS - CURRENT AND VOLTAGE FOR ANALOGUE METERS

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www.itec-ctvt.com

PLITRON MANUFACTURING INC.  
Tel: (416) 667-9914 • 1-800-754-8766  
www.plitron.com

## INSULATED HAND TOOLS

HUBBELL POWER SYSTEMS INC.  
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www.hubbellpowersystems.com

TALLMAN EQUIPMENT CO  
Tel: (630) 860-5666  
www.tallmanequipment.com

## INSULATING OIL

BARON USA  
Tel: (931) 528-8476  
www.baronusa.com

PETRO-CANADA LUBRICANTS INC.  
Tel: 1-800-268-5850  
www.lubricants.petro-canada.ca

POWERTECH LABS INC  
Tel: (604) 590-7446  
www.powertechlabs.com

## INSULATOR - WASHERS, HOT LINE, TRUCK & TRAILER MOUNTED

ALTEC INDUSTRIES, INC.  
Tel: (800) 958-2555  
www.altec.com

## INSULATORS - GUY STRAIN - FIBERGLASS - REINFORCED

ALUMA-FORM INC  
Tel: (901) 362-0100  
www.alumaform.com

HUBBELL POWER SYSTEMS INC.  
Tel: (573) 682-5521  
www.hubbellpowersystems.com



# PRODUCTS AND SERVICES

HUGHES BROTHERS INC.  
Tel: (402) 643-2991  
[www.hughesbros.com](http://www.hughesbros.com)

## INSULATORS - PLASTIC REPLACEMENT

EMC PACIFIC HOLDINGS  
Tel: (250) 752-5051  
[www.emcpacific.com.au](http://www.emcpacific.com.au)

## INSULATORS - POLYMER

DOW WIRE & CABLE  
Tel: 1-800-441-4DOW  
[www.dowwireandcable.com](http://www.dowwireandcable.com)

HUBBELL POWER SYSTEMS INC.  
Tel: (573) 682-5521  
[www.hubbellpowersystems.com](http://www.hubbellpowersystems.com)

POLYCAST INTERNATIONAL  
Tel: (204) 632-5428  
[www.polycastinternational.com](http://www.polycastinternational.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

## INSULATORS - SWITCH AND BUS

POLYCAST INTERNATIONAL  
Tel: (204) 632-5428  
[www.polycastinternational.com](http://www.polycastinternational.com)

## IRON - METAL FABRICATION

WINOLA INDUSTRIAL INC.  
Tel: (570) 378-3808  
[www.winolaindustrial.com](http://www.winolaindustrial.com)

## L

## LABELS

CAMCODE  
Tel: (800) 627-3917  
[www.camcode.com](http://www.camcode.com)

LEM PRODUCTS INC.  
Tel: (215) 348-9900  
[www.lemproductsinc.com](http://www.lemproductsinc.com)

## LABORATORIES

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

MORGAN SCHAFFER  
Tel: (514) 739-1967  
[www.morganschaffer.com](http://www.morganschaffer.com)

UTILITY TESTING LABORATORY  
Tel: (801) 485-8941  
[www.ut-labs.com](http://www.ut-labs.com)

WEIDMANN DIAGNOSTIC SOLUTIONS INC  
Tel: (800) 242-8106  
[www.weidmann-electrical.com](http://www.weidmann-electrical.com)

## LABORATORY EQUIPMENT AND SUPPLIES

ELSYS INSTRUMENTS, LLC  
Tel: (845) 238-5419  
[www.elsys-instruments.com](http://www.elsys-instruments.com)

RTDS TECHNOLOGIES, INC.  
Tel: (204) 989-9700  
[www.rtds.com](http://www.rtds.com)

## LADDERS

WINOLA INDUSTRIAL INC.  
Tel: (570) 378-3808  
[www.winolaindustrial.com](http://www.winolaindustrial.com)

## LADDERS - INDUSTRIAL

HASTINGS FIBERGLASS PRODUCTS INC.  
Tel: (269) 945-9541  
[www.hfgp.com](http://www.hfgp.com)

WINOLA INDUSTRIAL INC.  
Tel: (570) 378-3808  
[www.winolaindustrial.com](http://www.winolaindustrial.com)

## LADDERS - MANHOLE

WINOLA INDUSTRIAL INC.  
Tel: (570) 378-3808  
[www.winolaindustrial.com](http://www.winolaindustrial.com)

## LADDERS - TOWERS

WINOLA INDUSTRIAL INC.  
Tel: (570) 378-3808  
[www.winolaindustrial.com](http://www.winolaindustrial.com)

## LANYARDS, SHOCK ABSORBING

HASTINGS FIBERGLASS PRODUCTS INC.  
Tel: (269) 945-9541  
[www.hfgp.com](http://www.hfgp.com)

## LED PRODUCTS

ARANI SYSTEMS CORP.  
Tel: (888) 992-7264  
[www.arani.ca](http://www.arani.ca)

THE STRESSCRETE GROUP  
Tel: (905) 632-9301 • 1-800-268-7809  
[www.stresscretegroup.com](http://www.stresscretegroup.com)

## LEVEL, DENSITY, WEIGHT, MOISTURE

MORGAN SCHAFFER  
Tel: (514) 739-1967  
[www.morganschaffer.com](http://www.morganschaffer.com)

## LIDAR - INSPECTION

ARBORMETRICS SOLUTIONS LTD  
Tel: (407) 339-1733 • (866) 685-1880  
[www.arbormetricssolutions.com](http://www.arbormetricssolutions.com)

CN UTILITY CONSULTING  
Tel: (707) 829-1018  
[www.cnutility.com](http://www.cnutility.com)

W.I.R.E. SERVICES  
Tel: (204) 480-5800  
[www.wireservices.ca](http://www.wireservices.ca)

## LIDAR - SURVEY

LIDAR SERVICES INTERNATIONAL INC.  
Tel: (403) 517-3132  
[www.lidarservices.ca](http://www.lidarservices.ca)

W.I.R.E. SERVICES  
Tel: (204) 480-5800  
[www.wireservices.ca](http://www.wireservices.ca)

# PRODUCTS AND SERVICES

## LIFTS - AERIAL BUCKET

BRONTO SKYLIFT  
Tel: (352) 895-1109  
www.bronto.fi

I-80 EQUIPMENT  
Tel: (888) 949-3701  
www.i80equipment.com

## LIFTS - AERIAL, PLATFORM -TYPE

BRONTO SKYLIFT  
Tel: (352) 895-1109  
www.bronto.fi

## LIGHTING - CONTROLS - INCANDESCENT DIMMER

SUPERIOR ELECTRIC  
Tel: (860) 507-2025  
www.superiorelectric.com

## LIGHTING - OUTDOOR

THE STRESSCRETE GROUP  
Tel: (905) 632-9301 • 1-800-268-7809  
www.stresscretegroup.com

## LIGHTNING PROTECTION SYSTEM

DEHN INC.  
Tel: (772) 460-9315  
www.dehn-usa.com

THERMOWELD  
Tel: (918) 627-5210 • 1.800.558.1373  
www.thermoweld.com

## LIGHTS

THE STRESSCRETE GROUP  
Tel: (905) 632-9301 • 1-800-268-7809  
www.stresscretegroup.com

## LIMITERS - CURRENT

SUPERPOWER INC.  
Tel: (518) 346-1414  
www.superpower-inc.com

## LINESMEN - EQUIPMENT

J.L. MATTHEWS CO. INC.  
Tel: (817) 924-3360  
www.jlmatthews.com

TALLMAN EQUIPMENT CO  
Tel: (630) 860-5666  
www.tallmanequipment.com

## LOAD MANAGEMENT - COMMUNICATIONS

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

## LOCATORS - CABLE

SCHONSTEDT INSTRUMENT COMPANY  
Tel: (304) 725-1050  
www.schonstedt.com

## LOCATORS - FAULT

INNOVATIVE UTILITY PRODUCTS CORP.  
Tel: (479) 410-2098  
www.iupcorp.com

## LOCATORS - RADIO INTERFERENCE

RADAR ENGINEERS  
Tel: (503) 256-3417  
www.radarengineers.com

## LOCKING DEVICES

HERCULES INDUSTRIES INC.  
Tel: (800) 345-2590  
www.herculock.com

INNER-TITE CORP.  
Tel: (508) 829-6361  
www.inner-tite.com

## LOCKOUT SYSTEMS

TECH PRODUCTS, INC.  
Tel: (718) 442-4900 • 1-800-221-1311  
www.techproducts.com

## LUBE OIL

PETRO-CANADA LUBRICANTS INC.  
Tel: 1-800-268-5850  
www.lubricants.petro-canada.ca

## LUBRICANTS

BRONTO SKYLIFT  
Tel: (352) 895-1109  
www.bronto.fi

PETRO-CANADA LUBRICANTS INC.  
Tel: 1-800-268-5850  
www.lubricants.petro-canada.ca

## LUBRICANTS - ENVIRONMENT FRIENDLY

BALLANTINE INC  
www.ballantineinc.com

PETRO-CANADA LUBRICANTS INC.  
Tel: 1-800-268-5850  
www.lubricants.petro-canada.ca

## M

## MACHINE SHOPS - WELDING, MANUFACTURING, MAINTENANCE

WINOLA INDUSTRIAL INC.  
Tel: (570) 378-3808  
www.winolaindustrial.com

## MAINTENANCE - BATTERIES

ALBERCORP  
Tel: (954) 623-6660 • 800-851-4632  
www.alber.com

## MAINTENANCE - PREVENTIVE MAINTENANCE EQUIPMENT

BARON USA  
Tel: (931) 528-8476  
www.baronusa.com

MORGAN SCHAFFER  
Tel: (514) 739-1967  
www.morganschaffer.com

# PRODUCTS AND SERVICES

WISMAN ENTERPRISES  
Tel: 641-423-9501 / Cell: 641-425-2655

## MAINTENANCE - SERVICES AND PRODUCTS

DIVERSIFIED PRODUCTS  
Tel: (254) 757-1177  
[www.diversifiedproduct.com](http://www.diversifiedproduct.com)

NOVINIUM CABLE LIFE EXTENSION  
Tel: (206) 529-4828  
[www.novinium.com](http://www.novinium.com)

OSMOSE UTILITIES SERVICES, INC.  
Tel: (716) 319-3423  
[www.osmoseutilities.com](http://www.osmoseutilities.com)

PENTA INDUSTRIAL CORP.  
Tel: (314) 878-0143  
[www.penta.net](http://www.penta.net)

WISMAN ENTERPRISES  
Tel: 641-423-9501 / Cell: 641-425-2655

## MANAGEMENT CONSULTING

AESI ACUMEN ENGINEERED SOLUTIONS  
INTL. INC.  
Tel: (905) 875-2075  
[www.aesi-inc.com](http://www.aesi-inc.com)

NAVIGANT  
Tel: (202) 481-7336  
[www.navigant.com](http://www.navigant.com)

## MAPPING SYSTEMS - MOBILE

ARBORMETRICS SOLUTIONS LTD  
Tel: (407) 339-1733 • (866) 685-1880  
[www.arbormetricssolutions.com](http://www.arbormetricssolutions.com)

LEWIS TREE SERVICE, INC.  
Tel: (800) 333-1593  
[www.lewistree.com](http://www.lewistree.com)

POWEL INC.  
Tel: (651) 251-3005  
[www.powelinc.com](http://www.powelinc.com)

## MARKERS

TECH PRODUCTS, INC.  
Tel: (718) 442-4900 • 1-800-221-1311  
[www.techproducts.com](http://www.techproducts.com)

## MARKERS - CABLE

TECH PRODUCTS, INC.  
Tel: (718) 442-4900 • 1-800-221-1311  
[www.techproducts.com](http://www.techproducts.com)

## MARKERS - FIBER OPTIC

TECH PRODUCTS, INC.  
Tel: (718) 442-4900 • 1-800-221-1311  
[www.techproducts.com](http://www.techproducts.com)

## MARKERS - POLES

ELECTROMARK  
Tel: (800) 295-8247  
[www.electromark.com](http://www.electromark.com)

TECH PRODUCTS, INC.  
Tel: (718) 442-4900 • 1-800-221-1311  
[www.techproducts.com](http://www.techproducts.com)

## MARKERS - TRANSMISSION POLES

TECH PRODUCTS, INC.  
Tel: (718) 442-4900 • 1-800-221-1311  
[www.techproducts.com](http://www.techproducts.com)

## MATS - COMPOSITE

MABEY BRIDGE & SHORE INC  
Tel: : 410-567-1946.  
[www.mabey.com](http://www.mabey.com)

## MATS - GROUND COVER

MABEY BRIDGE & SHORE INC  
Tel: : 410-567-1946.  
[www.mabey.com](http://www.mabey.com)

## MATS - GROUND PROTECTION

MABEY BRIDGE & SHORE INC  
Tel: : 410-567-1946.  
[www.mabey.com](http://www.mabey.com)

## MATS - ROADS

MABEY BRIDGE & SHORE INC  
Tel: : 410-567-1946.  
[www.mabey.com](http://www.mabey.com)

## MATERIAL HANDLING EQUIPMENT

AIR TECHNICAL INDUSTRIES  
Tel: (440) 951-5191 • 800-321-9680  
[www.airtechnical.com](http://www.airtechnical.com)

## MEASURE INSTRUMENTS

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
[www.neoptix.com](http://www.neoptix.com)

## METAL - CUSTOM FABRICATION

WINOLA INDUSTRIAL INC.  
Tel: (570) 378-3808  
[www.winolaindustrial.com](http://www.winolaindustrial.com)

## METAL - CUSTOM MADE PARTS

WINOLA INDUSTRIAL INC.  
Tel: (570) 378-3808  
[www.winolaindustrial.com](http://www.winolaindustrial.com)

## METER READING EQUIPMENT (AMR) - AUTOMATIC

TSTM  
Tel: (605) 334-2924

## METER SERVICES

CORIX UTILITIES  
Tel: (877) 678-3842  
[www.corix.com](http://www.corix.com)

UTILICON SOLUTIONS, LTD  
Tel: (215) 784-1406 • (877) 884-5426  
[www.utiliconltd.com](http://www.utiliconltd.com)

## METERING ACCESSORIES

INNER-TITE CORP.  
Tel: (508) 829-6361  
[www.inner-tite.com](http://www.inner-tite.com)

## METERS - ADAPTERS

AE PRODUCTS, INC.  
Tel: (866) 848-7756  
[www.aeproducts.net](http://www.aeproducts.net)

## METERS - BATTERIES AND ACCESSORIES

ALBERCORP  
Tel: (954) 623-6660 • 800-851-4632  
[www.alber.com](http://www.alber.com)



# PRODUCTS AND SERVICES

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## METERS - ENCLOSURES

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TSTM  
Tel: (605) 334-2924

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## METERS - GROUND RESISTANCE

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AEMC INSTRUMENTS  
Tel: (508) 698-2115

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## METERS - KILOWATTHOUR

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SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
www.selinc.com

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## METERS - MICRO-OHMMETER

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PHENIX TECHNOLOGIES INC.  
Tel: (301) 746-8118  
www.phenixtech.com

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## METERS - PHASE

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HASTINGS FIBERGLASS PRODUCTS INC.  
Tel: (269) 945-9541  
www.hfgp.com

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## METERS - POWER FACTOR

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AEMC INSTRUMENTS  
Tel: (508) 698-2115

HIPOTRONICS INC.  
Tel: (845) 279-3644  
www.hipotronics.com

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## METERS - POWER QUALITY

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SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
www.selinc.com

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## METERS - RATIO

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HIPOTRONICS INC.  
Tel: (845) 279-3644  
www.hipotronics.com

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## METERS - TEST SETS - TEST EQUIPMENT

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ALBERCORP  
Tel: (954) 623-6660 • 800-851-4632  
www.alber.com

HIPOTRONICS INC.  
Tel: (845) 279-3644  
www.hipotronics.com

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## METERS - TIME-OF-USE

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SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
www.selinc.com

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## METERS - VOLT

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HASTINGS FIBERGLASS PRODUCTS INC.  
Tel: (269) 945-9541  
www.hfgp.com

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## METERS/SUBMETERING SYSTEMS - ELECTRICAL

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DENT INSTRUMENTS  
Tel: (800) 388-0770  
www.dentinstruments.com

ELECTRO INDUSTRIES/GAUGETECH  
Tel: (516) 334-0870  
www.electroind.com

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## METROLOGY

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NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
www.neoptix.com

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## MINERAL OIL RECYCLING

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BARON USA  
Tel: (931) 528-8476  
www.baronusa.com

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## MOBILE COMMUNICATION

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TAIT NORTH AMERICA  
Tel: (281) 829-3300  
www.taitworld.com

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## MOBILE WORKFORCE MANAGEMENT

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LEWIS TREE SERVICE, INC.  
Tel: (800) 333-1593  
www.lewistree.com

MENTOR ENGINEERING  
Tel: (403) 777-3760  
www.mentoreng.com

TAIT NORTH AMERICA  
Tel: (281) 829-3300  
www.taitworld.com

WIRELESS MATRIX  
Tel: (888) 843-8554  
www.wirelessmatrix.com

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## MONITORING - COMMUNICATIONS

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DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
www.digitalgridinc.com

REINHAUSEN MANUFACTURING INC.  
ATT: CHRISTY CRAWFORD  
Tel: (731) 562-4127  
www.reinhausen.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

TAIT NORTH AMERICA  
Tel: (281) 829-3300  
www.taitworld.com

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## MONITORING - EQUIPMENT

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ALBERCORP  
Tel: (954) 623-6660 • 800-851-4632  
www.alber.com

MORGAN SCHAFFER  
Tel: (514) 739-1967  
www.morganschaffer.com

OPTISENSE NETWORK, LLC  
Tel: (866) 530-4698  
www.optisense.net

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## MONITORING - GENERATORS

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DYNAMIC RATINGS, INC.  
Tel: (262) 746-1230  
www.dynamicratings.com

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## MONITORING - TRANSFORMERS

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DYNAMIC RATINGS, INC.  
Tel: (262) 746-1230  
www.dynamicratings.com

# PRODUCTS AND SERVICES

INCON POWER RELIABILITY PRODUCTS  
Tel: (207) 283-0156 • 1-800-872-3455  
[www.incon.com](http://www.incon.com)

MORGAN SCHAFFER  
Tel: (514) 739-1967  
[www.morganschaffer.com](http://www.morganschaffer.com)

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
[www.neoptix.com](http://www.neoptix.com)

WEIDMANN DIAGNOSTIC SOLUTIONS INC  
Tel: (800) 242-8106  
[www.weidmann-electrical.com](http://www.weidmann-electrical.com)

## MONITORING SECURITY SYSTEMS

SYSTEMS WITH INTELLIGENCE INC.  
Tel: (289) 562-0126  
[www.systemswithintelligence.com](http://www.systemswithintelligence.com)

## MONITORS - FAULT GAS (TRANSFORMERS, CIRCUIT BREAKERS)

MORGAN SCHAFFER  
Tel: (514) 739-1967  
[www.morganschaffer.com](http://www.morganschaffer.com)

WEIDMANN DIAGNOSTIC SOLUTIONS INC  
Tel: (800) 242-8106  
[www.weidmann-electrical.com](http://www.weidmann-electrical.com)

## MONITORS - TEMPERATURE

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
[www.neoptix.com](http://www.neoptix.com)

## MULTIPLEXERS - FIBER OPTICS

AMETEK POWER INSTRUMENTS  
Tel: (954) 344-9822  
[www.ametekpower.com](http://www.ametekpower.com)

## N

## NONDESTRUCTIVE - TESTING

ALBERCORP  
Tel: (954) 623-6660 • 800-851-4632  
[www.alber.com](http://www.alber.com)

MISTRAS GROUP  
[www.mistrasgroup.com](http://www.mistrasgroup.com)

## O

## OIL - CONTAINMENT EQUIPMENT

C.I.AGENT SOLUTIONS  
Tel: (502) 267-0101  
[www.ciagent.com](http://www.ciagent.com)

IMBIBITIVE TECHNOLOGIES  
Tel: (888) 843-2323  
[www.imbiberbeads.com](http://www.imbiberbeads.com)

## OIL - LUBRICATION

PETRO-CANADA LUBRICANTS INC.  
Tel: 1-800-268-5850  
[www.lubricants.petro-canada.ca](http://www.lubricants.petro-canada.ca)

## OIL - SOLIDIFIERS

C.I.AGENT SOLUTIONS  
Tel: (502) 267-0101  
[www.ciagent.com](http://www.ciagent.com)

## OIL ABSORBANTS - PADS, ROLLS, BOOMS, SOCKS

C.I.AGENT SOLUTIONS  
Tel: (502) 267-0101  
[www.ciagent.com](http://www.ciagent.com)

## OIL PURIFYING - RECLAIMING SYSTEMS

BARON USA  
Tel: (931) 528-8476  
[www.baronusa.com](http://www.baronusa.com)

FILMAX INC  
Tel: (865) 408-0030  
[www.filmmaxinc.com](http://www.filmmaxinc.com)

VELCON FILTERS, LLC.  
Tel: (719) 531-5855 • 1-800-531-0180  
[www.velcon.com/systems](http://www.velcon.com/systems)

## OIL SPILL EQUIPMENT

C.I.AGENT SOLUTIONS  
Tel: (502) 267-0101  
[www.ciagent.com](http://www.ciagent.com)

## OIL TESTING - DISSOLVED GAS ANALYSIS

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

MORGAN SCHAFFER  
Tel: (514) 739-1967  
[www.morganschaffer.com](http://www.morganschaffer.com)

## ON-LINE MONITORING

DYNAMIC RATINGS, INC.  
Tel: (262) 746-1230  
[www.dynamicratings.com](http://www.dynamicratings.com)

MORGAN SCHAFFER  
Tel: (514) 739-1967  
[www.morganschaffer.com](http://www.morganschaffer.com)

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
[www.neoptix.com](http://www.neoptix.com)

OPTISENSE NETWORK, LLC  
Tel: (866) 530-4698  
[www.optisense.net](http://www.optisense.net)

## OPERATION AND MAINTENANCE SERVICES

NAES CORPORATION  
Tel: (425) 961-4700  
[www.naes.com](http://www.naes.com)

QUANTA SERVICES  
Tel: (713) 629-7600  
[www.quantaservices.com](http://www.quantaservices.com)

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)

## OPERATION SUPPORT SYSTEMS

CANARY LABS, INC.  
Tel: (814) 793-3770  
[www.canarylabs.com](http://www.canarylabs.com)

# PRODUCTS AND SERVICES

LEWIS TREE SERVICE, INC.  
Tel: (800) 333-1593  
www.lewistree.com

NAES CORPORATION  
Tel: (425) 961-4700  
www.naes.com

## OUTAGE MANAGEMENT SYSTEMS

AUTOMATED SOLUTIONS INT'L INC.  
Tel: (519) 220-0071 • 1 888.384.1212  
www.goasi.com

EFACEC ADVANCED CONTROL SYSTEMS  
Tel: (770) 446-8854  
www.efacec-acsc.com

OPEN SYSTEMS INTERNATIONAL, INC.  
Tel: (763) 551-0559  
www.osii.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

W.I.R.E. SERVICES  
Tel: (204) 480-5800  
www.wireservices.ca

## P

## PADLOCKS

ENGINEERING UNLIMITED, INC.  
Tel: (612) 522-4040 • 1-800-515-4040  
sterlingpadlocks.com

## PADS - BOX

CONCAST INC.  
Tel: (507) 732-4095  
www.concastinc.com

## PADS - MATTING - COMPOSITE

MABEY BRIDGE & SHORE INC  
Tel: 410-567-1946.  
www.mabey.com

## PADS - OUTRIGGER

MABEY BRIDGE & SHORE INC  
Tel: 410-567-1946.  
www.mabey.com

## PADS - PADMOUNTED TRANSFORMERS

GULF CONNECTORS, INC.  
Tel: (239) 657-2986  
www.cytolok.com

MVA POWER INC.  
Tel: (450) 589-0445  
www.mvapower.com

## PADS, FLAT - POLYMER CONCRETE

MABEY BRIDGE & SHORE INC  
Tel: 410-567-1946.  
www.mabey.com

## PANELS (POWER DISTRIBUTION)

MERSEN CANADA  
Tel: (416) 252-9371  
www.mersen.com

## PAPER INSULATING MATERIALS

ANACOM MATERIALS, LLC  
Tel: (713) 694-5700  
www.anacommaterials.com

## PARTIAL DISCHARGE ANALYSIS, DETECTION

DOBLE ENGINEERING CO.  
Tel: (617) 926-4900  
www.doble.com

DYNAMIC RATINGS, INC.  
Tel: (262) 746-1230  
www.dynamicratings.com

IMCORP  
Tel: (860) 873-8000  
www.imcorp.com

MISTRAS GROUP  
www.mistrasgroup.com

NDB TECHNOLOGIES INC.  
Tel: (418) 877-7701  
www.ndbtech.com

OMICRON ELECTRONICS CORP. USA  
(HOUSTON)  
Tel: (781) 672-6200 • 1-800-omicron  
www.omicronusa.com/en/training/academy/

OMICRON ELECTRONICS CORP. USA  
(WALTHAM)  
Tel: (781) 672-6200 • 1-800-OMICRON  
www.omicronusa.com

PHENIX TECHNOLOGIES INC.  
Tel: (301) 746-8118  
www.phenixtech.com

## PLATFORMS - LINEMAN'S

CONDUX TESMEC INC.  
Tel: (507) 387-8069 • 1-877-854-1750  
www.conduxtesmec.com

HASTINGS FIBERGLASS PRODUCTS INC.  
Tel: (269) 945-9541  
www.hfgp.com

TALLMAN EQUIPMENT CO  
Tel: (630) 860-5666  
www.tallmanequipment.com

## PLATFORMS - TRANSFORMERS

ALUMA-FORM INC  
Tel: (901) 362-0100  
www.alumaform.com

HUGHES BROTHERS INC.  
Tel: (402) 643-2991  
www.hughesbros.com

## POLE - WOOD/PRESERVATIVES

CROSSLINK TECHNOLOGY INC.  
Tel: (800) 563-3769  
www.crosslinktech.com

PACIFIC WOOD PRESERVING  
Tel: 775-577-9045  
www.pacificwood.com

## POLE LINE HARDWARE

ENERSCAN ENGINEERING INC.  
Tel: (902) 445-4433  
www.enerscanengineering.com

HAMBY YOUNG  
Tel: (330) 562-8444 • (800) 726-8444  
www.hambyyoung.com

HUBBELL POWER SYSTEMS INC.  
Tel: (573) 682-5521  
www.hubbellpowersystems.com



## PRODUCTS AND SERVICES

HUGHES BROTHERS INC.  
Tel: (402) 643-2991  
[www.hughesbros.com](http://www.hughesbros.com)

WINOLA INDUSTRIAL INC.  
Tel: (570) 378-3808  
[www.winolaindustrial.com](http://www.winolaindustrial.com)

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### POLE MAINTENANCE

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CROSSLINK TECHNOLOGY INC.  
Tel: (800) 563-3769  
[www.crosslinktech.com](http://www.crosslinktech.com)

IML, INC.  
Tel: (904) 375-0161  
[www.imlusa.com](http://www.imlusa.com)

UTILICON SOLUTIONS, LTD  
Tel: (215) 784-1406 • (877) 884-5426  
[www.utiliconltd.com](http://www.utiliconltd.com)

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### POLE-HOLE FILLER

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CROSSLINK TECHNOLOGY INC.  
Tel: (800) 563-3769  
[www.crosslinktech.com](http://www.crosslinktech.com)

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### POLES - DISTRIBUTION - CONCRETE

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THE STRESSCRETE GROUP  
Tel: (905) 632-9301 • 1-800-268-7809  
[www.stresscretegroup.com](http://www.stresscretegroup.com)

VALMONT NEWMARK  
Tel: (205) 968-7200  
[www.valmont-newmark.com](http://www.valmont-newmark.com)

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### POLES - DISTRIBUTION - STEEL

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BRIDGEWELL RESOURCES  
Tel: (503) 872-3566  
[www.bridgewellresources.com/utility-construction/poles.aspx](http://www.bridgewellresources.com/utility-construction/poles.aspx)

DIS-TRAN STEEL, LLC  
Tel: (318) 448-0274  
[www.distran.com](http://www.distran.com)

SABRE TUBULAR STRUCTURES  
Tel: (817) 852-1700 • 866-254-3707  
[www.sabretubularstructures.com](http://www.sabretubularstructures.com)

THOMAS & BETTS - STEEL STRUCTURES DIVISION  
Tel: 1-877-2TB-MEYER  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

THOMAS & BETTS CANADA – STEEL STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

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### POLES - LIGHTING - ALUMINUM

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THE STRESSCRETE GROUP  
Tel: (905) 632-9301 • 1-800-268-7809  
[www.stresscretegroup.com](http://www.stresscretegroup.com)

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### POLES - LIGHTING - CONCRETE

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THE STRESSCRETE GROUP  
Tel: (905) 632-9301 • 1-800-268-7809  
[www.stresscretegroup.com](http://www.stresscretegroup.com)

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### POLES - LIGHTING - STEEL

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THOMAS & BETTS - STEEL STRUCTURES DIVISION  
Tel: 1-877-2TB-MEYER  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

THOMAS & BETTS CANADA – STEEL STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

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### POLES - LIGHTING - WOOD, LAMINATED

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HUGHES BROTHERS INC.  
Tel: (402) 643-2991  
[www.hughesbros.com](http://www.hughesbros.com)

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### POLES - TRANSMISSION

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BRIDGEWELL RESOURCES  
Tel: (503) 872-3566  
[www.bridgewellresources.com/utility-construction/poles.aspx](http://www.bridgewellresources.com/utility-construction/poles.aspx)

DIS-TRAN STEEL, LLC  
Tel: (318) 448-0274  
[www.distran.com](http://www.distran.com)

RS TECHNOLOGIES INC.  
Tel: (403) 219-8000  
[www.grouparsi.com](http://www.grouparsi.com)

SABRE TUBULAR STRUCTURES  
Tel: (817) 852-1700 • 866-254-3707  
[www.sabretubularstructures.com](http://www.sabretubularstructures.com)

THE STRESSCRETE GROUP  
Tel: (905) 632-9301 • 1-800-268-7809  
[www.stresscretegroup.com](http://www.stresscretegroup.com)

THOMAS & BETTS - STEEL STRUCTURES DIVISION  
Tel: 1-877-2TB-MEYER  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

THOMAS & BETTS CANADA – STEEL STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

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### POLES - TRANSMISSION - CONCRETE

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THE STRESSCRETE GROUP  
Tel: (905) 632-9301 • 1-800-268-7809  
[www.stresscretegroup.com](http://www.stresscretegroup.com)

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### POLES - TRANSMISSION - STEEL

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BRIDGEWELL RESOURCES  
Tel: (503) 872-3566  
[www.bridgewellresources.com/utility-construction/poles.aspx](http://www.bridgewellresources.com/utility-construction/poles.aspx)

DIS-TRAN STEEL, LLC  
Tel: (318) 448-0274  
[www.distran.com](http://www.distran.com)

LOCWELD INC.  
Tel: (450) 659-9661  
[www.locweld.com](http://www.locweld.com)

SABRE TUBULAR STRUCTURES  
Tel: (817) 852-1700 • 866-254-3707  
[www.sabretubularstructures.com](http://www.sabretubularstructures.com)

THOMAS & BETTS - STEEL STRUCTURES DIVISION  
Tel: 1-877-2TB-MEYER  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

THOMAS & BETTS CANADA – STEEL STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

# PRODUCTS AND SERVICES

## POLES - UTILITY

BRIDGEWELL RESOURCES  
Tel: (503) 872-3566  
[www.bridgewellresources.com/utility-construction/poles.aspx](http://www.bridgewellresources.com/utility-construction/poles.aspx)

DIS-TRAN STEEL, LLC  
Tel: (318) 448-0274  
[www.distran.com](http://www.distran.com)

SABRE TUBULAR STRUCTURES  
Tel: (817) 852-1700 • 866-254-3707  
[www.sabretubularstructures.com](http://www.sabretubularstructures.com)

THE STRESSCRETE GROUP  
Tel: (905) 632-9301 • 1-800-268-7809  
[www.stresscretegroup.com](http://www.stresscretegroup.com)

THOMAS & BETTS - STEEL STRUCTURES DIVISION  
Tel: 1-877-2TB-MEYER  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

THOMAS & BETTS CANADA – STEEL STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

## POWER - LINE CARRIER EQUIPMENT - SYSTEMS

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

## POWER - MANAGEMENT SYSTEM

E / SYSTEMS  
Tel: (313) 882-1133  
[www.enxex.com](http://www.enxex.com)

## POWER CONDITIONING EQUIPMENT

SUPERIOR ELECTRIC  
Tel: (860) 507-2025  
[www.superiorelectric.com](http://www.superiorelectric.com)

## POWER DISTRIBUTION AND/OR TRANSMISSION POLES

DIS-TRAN STEEL, LLC  
Tel: (318) 448-0274  
[www.distran.com](http://www.distran.com)

LOCWELD INC.  
Tel: (450) 659-9661  
[www.locweld.com](http://www.locweld.com)

SABRE TUBULAR STRUCTURES  
Tel: (817) 852-1700 • 866-254-3707  
[www.sabretubularstructures.com](http://www.sabretubularstructures.com)

THOMAS & BETTS - STEEL STRUCTURES DIVISION  
Tel: 1-877-2TB-MEYER  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

THOMAS & BETTS CANADA – STEEL STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

## POWER QUALITY - ANALYZERS

TECHNICAL SYSTEMS 2002 INC.  
Tel: (866) 327-8731  
[www.technical-sys.com](http://www.technical-sys.com)

## POWER QUALITY - TEST EQUIPMENT

ALBERCORP  
Tel: (954) 623-6660 • 800-851-4632  
[www.alber.com](http://www.alber.com)

## POWER QUALITY EQUIPMENT

AMERICAN SUPERCONDUCTOR (AMSC)  
Tel: (978) 843-3000  
[www.amscc.com](http://www.amscc.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

## POWER SUPPLIES - UNINTERRUPTIBLE

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

SUPERIOR ELECTRIC  
Tel: (860) 507-2025  
[www.superiorelectric.com](http://www.superiorelectric.com)

## POWERLINE - CONSTRUCTION

R G C STAFFING SOLUTIONS  
Tel: (905) 455-4952  
[www.rgcstaffing.com](http://www.rgcstaffing.com)

## PROJECT ENGINEERING

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

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

## PROJECT MANAGEMENT AND CONSULTING

NAES CORPORATION  
Tel: (425) 961-4700  
[www.naes.com](http://www.naes.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

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

TAIT NORTH AMERICA  
Tel: (281) 829-3300  
[www.taitworld.com](http://www.taitworld.com)

W.I.R.E. SERVICES  
Tel: (204) 480-5800  
[www.wireservices.ca](http://www.wireservices.ca)

## PROTECTION AND CONTROL

OLDCASTLE ENCLOSURE SOLUTIONS  
Tel: (303) 209-8000 • 888-868-5214  
[www.oldcastleprecast.com](http://www.oldcastleprecast.com)

RTDS TECHNOLOGIES, INC.  
Tel: (204) 989-9700  
[www.rtds.com](http://www.rtds.com)

SCHWEITZER ENGINEERING LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

## PULLERS - CABLE

CONDUX TESMEC INC.  
Tel: (507) 387-8069 • 1-877-854-1750  
[www.conduxtesmec.com](http://www.conduxtesmec.com)

# PRODUCTS AND SERVICES

## PULLERS - CABLE, AERIAL

ALTEC INDUSTRIES, INC.  
Tel: (800) 958-2555  
www.altec.com

CONDUX TESMEC INC.  
Tel: (507) 387-8069 • 1-877-854-1750  
www.conduxtesmec.com

NESCO SALES AND RENTALS  
Tel: (260) 824-6340 • 1-800-252-0043  
www.nescosales.com

## PULLERS - CABLE, UNDERGROUND

CONDUX TESMEC INC.  
Tel: (507) 387-8069 • 1-877-854-1750  
www.conduxtesmec.com

## PULLERS - CONDUCTOR

CONDUX TESMEC INC.  
Tel: (507) 387-8069 • 1-877-854-1750  
www.conduxtesmec.com

SHERMAN & REILLY, INC.  
Tel: (423) 756-5300  
www.sherman-reilly.com

## PULLERS - ROPE

CONDUX TESMEC INC.  
Tel: (507) 387-8069 • 1-877-854-1750  
www.conduxtesmec.com

## PUMPS - DEWATERING

TALLMAN EQUIPMENT CO  
Tel: (630) 860-5666  
www.tallmanequipment.com

## R

## RADIO COMMUNICATIONS

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

TAIT NORTH AMERICA  
Tel: (281) 829-3300  
www.taitworld.com

## RADIO SWITCHES - VHF & UHF

TAIT NORTH AMERICA  
Tel: (281) 829-3300  
www.taitworld.com

## RADIO TWO-WAY - FIXED

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

TAIT NORTH AMERICA  
Tel: (281) 829-3300  
www.taitworld.com

## RADIO TWO-WAY - MOBILE

TAIT NORTH AMERICA  
Tel: (281) 829-3300  
www.taitworld.com

## RADIO TWO-WAY - PORTABLE - ACCESSORIES

TAIT NORTH AMERICA  
Tel: (281) 829-3300  
www.taitworld.com

## RECLOSERS

HUBBELL POWER SYSTEMS INC.  
Tel: (573) 682-5521  
www.hubbellpowersystems.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

THOMAS & BETTS CANADA - UTILITY DIVISION  
Tel: (450) 466-1102, x234  
1-800-466-1102, x234  
www.tnb.ca

## RECLOSERS - CONTROLS

SCHWEITZER ENGINEERING LABORATORIES INC.  
Tel: (509) 332-1890  
www.selinc.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

## RECLOSERS - SINGLE-PHASE

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

## RECLOSERS - THREE-PHASE

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

## RECORDERS - TEMPERATURE

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
www.neoptix.com

## RECORDERS - TRANSIENT FAULT

APP ENGINEERING, INC.  
Tel: (317) 536-5300  
www.appengineering.com

## REELS

REELCRAFT INDUSTRIES, INC.  
Tel: (260) 248-8188  
www.reelcraft.com

## REELS - CONDUCTOR STRINGING

CONDUX TESMEC INC.  
Tel: (507) 387-8069 • 1-877-854-1750  
www.conduxtesmec.com

## REELS - HANDLING EQUIPMENT

CONDUX TESMEC INC.  
Tel: (507) 387-8069 • 1-877-854-1750  
www.conduxtesmec.com

## REELS - WIRE, GROUNDING

HASTINGS FIBERGLASS PRODUCTS INC.  
Tel: (269) 945-9541  
www.hfgp.com

## RELAYS

BECKWITH ELECTRIC COMPANY  
Tel: (727) 544-2326  
www.beckwithelectric.com



## PRODUCTS AND SERVICES

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

### RELAYS - FEEDER PROTECTION

BECKWITH ELECTRIC COMPANY  
Tel: (727) 544-2326  
[www.beckwithelectric.com](http://www.beckwithelectric.com)

SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

### RELAYS - GENERATOR PROTECTION

BECKWITH ELECTRIC COMPANY  
Tel: (727) 544-2326  
[www.beckwithelectric.com](http://www.beckwithelectric.com)

SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

### RELAYS - LINE PROTECTION

BECKWITH ELECTRIC COMPANY  
Tel: (727) 544-2326  
[www.beckwithelectric.com](http://www.beckwithelectric.com)

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

### RELAYS - MOTOR PROTECTION

BECKWITH ELECTRIC COMPANY  
Tel: (727) 544-2326  
[www.beckwithelectric.com](http://www.beckwithelectric.com)

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

### RELAYS - PROTECTION

BECKWITH ELECTRIC COMPANY  
Tel: (727) 544-2326  
[www.beckwithelectric.com](http://www.beckwithelectric.com)

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

EFACEC ADVANCED CONTROL SYSTEMS  
Tel: (770) 446-8854  
[www.efacec-ac.com](http://www.efacec-ac.com)

ERLPHASE POWER TECHNOLOGIES  
Tel: (204) 477-0591  
[www.erlphase.com](http://www.erlphase.com)

RONDAR INC.  
Tel: (905) 561-2808  
[www.rondar.com](http://www.rondar.com)

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

### RELAYS - SUBSTATION AUTOMATION

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

EFACEC ADVANCED CONTROL SYSTEMS  
Tel: (770) 446-8854  
[www.efacec-ac.com](http://www.efacec-ac.com)

I.C.M.I (INDUCTIVE COMPONENTS  
MFG., INC)  
Tel: (513) 752-4731  
[www.icmiinc.com](http://www.icmiinc.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

### RELAYS - TRANSFORMER DIFFERENTIAL

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

### RELAYS - TRANSFORMER OVERLOAD

SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

### RELAYS - TRANSFORMER PROTECTION

BECKWITH ELECTRIC COMPANY  
Tel: (727) 544-2326  
[www.beckwithelectric.com](http://www.beckwithelectric.com)

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

### REMOTE - SITE MONITORING

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

TAIT NORTH AMERICA  
Tel: (281) 829-3300  
[www.taitworld.com](http://www.taitworld.com)

### REMOTE CONTROL - EQUIPMENT

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

LOR MANUFACTURING CO., INC.  
Tel: (989) 644-2581  
[www.lormfg.com](http://www.lormfg.com)

# PRODUCTS AND SERVICES

## REMOTE INFORMATION SYSTEMS - AUTOMATIC

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
www.digitalgridinc.com

OPEN SYSTEMS INTERNATIONAL, INC.  
Tel: (763) 551-0559  
www.osii.com

## REMOTE TERMINAL UNITS

EFACEC ADVANCED CONTROL SYSTEMS  
Tel: (770) 446-8854  
www.efacec-accs.com

OPEN SYSTEMS INTERNATIONAL, INC.  
Tel: (763) 551-0559  
www.osii.com

SCHNEIDER ELECTRIC  
www.schneider-electric.com/ca

SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
www.selinc.com

## REMOTE VIDEO INSPECTION SYSTEMS

SYSTEMS WITH INTELLIGENCE INC.  
Tel: (289) 562-0126  
www.systemswithintelligence.com

## RISK MANAGEMENT

EARTH NETWORKS  
Tel: (978) 897-7705  
www.earthnetworks.com

## RODS GROUND

THERMOWELD  
Tel: (918) 627-5210 • 1.800.558.1373  
www.thermoweld.com

## ROPE - WIRE

CONDUX TESMEC INC.  
Tel: (507) 387-8069 • 1-877-854-1750  
www.conduxtesmec.com

## S

### SAFETY - EQUIPMENT

INOLECT, LLC  
Tel: (225) 751-7535  
www.inolect.com

### SAFETY - LINEMEN EQUIPMENT

HASTINGS FIBERGLASS PRODUCTS INC.  
Tel: (269) 945-9541  
www.hfgp.com

TALLMAN EQUIPMENT CO  
Tel: (630) 860-5666  
www.tallmanequipment.com

### SAFETY - SUPPLIES

TECH PRODUCTS, INC.  
Tel: (718) 442-4900 • 1-800-221-1311  
www.techproducts.com

### SAFETY - TOOLS

HI-LINE UTILITY SUPPLY CO.  
Tel: (800) 323-6606  
www.hilineco.com

### SAFETY ATTACHMENT DEVICES

WINOLA INDUSTRIAL INC.  
Tel: (570) 378-3808  
www.winolaindustrial.com

### SCADA - COMMUNICATIONS

BECKWITH ELECTRIC COMPANY  
Tel: (727) 544-2326  
www.beckwithelectric.com

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
www.digitalgridinc.com

ENCORE NETWORKS  
Tel: (703) 318-7750  
www.encorenetworks.com

LIVEDATA, INC.  
Tel: (617) 576-6900  
www.livedata.com

SCHNEIDER ELECTRIC  
www.schneider-electric.com/ca

### SCADA - EMS ENGINEERING

AESI ACUMEN ENGINEERED SOLUTIONS  
INTL. INC.  
Tel: (905) 875-2075  
www.aesi-inc.com

ESC ENGINEERING  
Tel: (970) 224-9100 • (877) 224-9101  
www.thinkesc.com

### SCADA - ENERGY CONTROL SYSTEMS

OPEN SYSTEMS INTERNATIONAL, INC.  
Tel: (763) 551-0559  
www.osii.com

### SCADA - INSTALLATION SERVICES

EFACEC ADVANCED CONTROL SYSTEMS  
Tel: (770) 446-8854  
www.efacec-accs.com

NAES CORPORATION  
Tel: (425) 961-4700  
www.naes.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

### SCADA MAINTENANCE

EFACEC ADVANCED CONTROL SYSTEMS  
Tel: (770) 446-8854  
www.efacec-accs.com

### SCADA SYSTEMS

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
www.digitalgridinc.com

EFACEC ADVANCED CONTROL SYSTEMS  
Tel: (770) 446-8854  
www.efacec-accs.com

OPEN SYSTEMS INTERNATIONAL, INC.  
Tel: (763) 551-0559  
www.osii.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

# PRODUCTS AND SERVICES

SYSTEMS WITH INTELLIGENCE INC.  
Tel: (289) 562-0126  
[www.systemswithintelligence.com](http://www.systemswithintelligence.com)

## SEALS - METERS

INNER-TITE CORP.  
Tel: (508) 829-6361  
[www.inner-tite.com](http://www.inner-tite.com)

## SEALS - SECURITY

INNER-TITE CORP.  
Tel: (508) 829-6361  
[www.inner-tite.com](http://www.inner-tite.com)

## SECONDARY CONTAINMENT SYSTEM

ANDAX INDUSTRIES LLC  
Tel: (800) 999-1358  
[www.andax.com](http://www.andax.com)

SOLIDIFICATION PRODUCTS INTERNATIONAL, INC.  
Tel: (203) 484-9494  
[www.oilbarriers.com](http://www.oilbarriers.com)

## SECURITY - EQUIPMENT

INNER-TITE CORP.  
Tel: (508) 829-6361  
[www.inner-tite.com](http://www.inner-tite.com)

SCHWEITZER ENGINEERING LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

SMARTER SECURITY, INC.  
Tel: (512) 328-7277  
[www.smartersecurity.com](http://www.smartersecurity.com)

SOUTHWEST MICROWAVE, INC.  
Tel: (480) 783-0201  
[www.southwestmicrowave.com/ssd](http://www.southwestmicrowave.com/ssd)

SYSTEMS WITH INTELLIGENCE INC.  
Tel: (289) 562-0126  
[www.systemswithintelligence.com](http://www.systemswithintelligence.com)

## SENSORS - CURRENT

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

GRID SENTRY LLC.  
Tel: (937) 490-2101  
[www.gridsentry.us](http://www.gridsentry.us)

## SENSORS - CURRENT + VOLTAGE

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

OPTISENSE NETWORK, LLC  
Tel: (866) 530-4698  
[www.optisense.net](http://www.optisense.net)

## SENSORS - FIBER OPTIC

FISO TECHNOLOGIES  
Tel: (418) 688-8065 X 241  
[www.fiso.com](http://www.fiso.com)

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
[www.neoptix.com](http://www.neoptix.com)

OPTISENSE NETWORK, LLC  
Tel: (866) 530-4698  
[www.optisense.net](http://www.optisense.net)

## SENSORS - TEMPERATURE

DIGITALGRID, INC.  
Tel: 919-844-4866 extn 224  
[www.digitalgridinc.com](http://www.digitalgridinc.com)

FISO TECHNOLOGIES  
Tel: (418) 688-8065 X 241  
[www.fiso.com](http://www.fiso.com)

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
[www.neoptix.com](http://www.neoptix.com)

## SF6 GAS INSULATED SWITCHGEAR

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

## SHEAVES - CONDUCTOR - STRINGING

CONDUX TESMEC INC.  
Tel: (507) 387-8069 • 1-877-854-1750  
[www.conduxtesmec.com](http://www.conduxtesmec.com)

WAGNER-SMITH EQUIPMENT COMPANY  
Tel: (800) 666-6567  
[www.wagnersmithequipment.com](http://www.wagnersmithequipment.com)

## SIGNS

TECH PRODUCTS, INC.  
Tel: (718) 442-4900 • 1-800-221-1311  
[www.techproducts.com](http://www.techproducts.com)

## SIGNS - WARNING

TECH PRODUCTS, INC.  
Tel: (718) 442-4900 • 1-800-221-1311  
[www.techproducts.com](http://www.techproducts.com)

## SILICONES GREASE AND COMPOUNDS

FIRSTPOWER GROUP LLC  
Tel: (330) 963-2050  
[www.firstpowergroupllc.com](http://www.firstpowergroupllc.com)

## SOFTWARE

MANITOBA HVDC RESEARCH CENTRE  
Tel: (204) 989-1240  
[www.pscad.com](http://www.pscad.com)

## SOFTWARE - APPLICATION

ACCENT BUSINESS SERVICES, INC.  
Tel: (360) 882-4002  
[www.varasset.com](http://www.varasset.com)

OPEN SYSTEMS INTERNATIONAL, INC.  
Tel: (763) 551-0559  
[www.osii.com](http://www.osii.com)

## SOFTWARE - DOCUMENT MANAGEMENT

AUTOMATED SOLUTIONS INT'L INC.  
Tel: (519) 220-0071 • 1-888-384.1212  
[www.goasi.com](http://www.goasi.com)

VANGUARD SYSTEMS  
Tel: (610) 891-7703 (8am - 5pm EST)  
[www.vansystems.com](http://www.vansystems.com)

## SOFTWARE - T&D LINE DESIGN

POWER LINE SYSTEMS, INC.  
Tel: (608) 238-2171  
[www.powline.com](http://www.powline.com)



# PRODUCTS AND SERVICES

## SOFTWARE INTEGRATION

COHESIVE INFORMATION SOLUTIONS  
Tel: (678) 233-1280  
[www.cohesivesolutions.com](http://www.cohesivesolutions.com)

LIVEDATA, INC.  
Tel: (617) 576-6900  
[www.livedata.com](http://www.livedata.com)

## SOFTWARE SOLUTIONS

LIVEDATA, INC.  
Tel: (617) 576-6900  
[www.livedata.com](http://www.livedata.com)

VANGUARD SYSTEMS  
Tel: (610) 891-7703 (8am - 5pm EST)  
[www.vansystems.com](http://www.vansystems.com)

## SPACERS - DUCT

UNDERGROUND DEVICES INC.  
Tel: (847) 205-9000  
[www.udevices.com](http://www.udevices.com)

## SPACERS - UNDERGROUND CABLE AND CONDUIT

DOW WIRE & CABLE  
Tel: 1-800-441-4DOW  
[www.dowwireandcable.com](http://www.dowwireandcable.com)

UNDERGROUND DEVICES INC.  
Tel: (847) 205-9000  
[www.udevices.com](http://www.udevices.com)

## SPACERS, OVERHEAD SPACED CABLE - PLASTIC

DOW WIRE & CABLE  
Tel: 1-800-441-4DOW  
[www.dowwireandcable.com](http://www.dowwireandcable.com)

## SPILLS RESPONSE KIT

C.I.AGENT SOLUTIONS  
Tel: (502) 267-0101  
[www.ciagent.com](http://www.ciagent.com)

## SPICES & ACCESSORIES - TENSION

HUBBELL POWER SYSTEMS INC.  
Tel: (573) 682-5521  
[www.hubbellpowersystems.com](http://www.hubbellpowersystems.com)

## SPlicing PRODUCTS

DSG-CANUSA  
Tel: (416) 743-7111  
[www.dsghanusa.com](http://www.dsghanusa.com)

## STEEL - MANUFACTURERS

DIS-TRAN STEEL, LLC  
Tel: (318) 448-0274  
[www.distran.com](http://www.distran.com)

LOCWELD INC.  
Tel: (450) 659-9661  
[www.locweld.com](http://www.locweld.com)

SABRE TUBULAR STRUCTURES  
Tel: (817) 852-1700 • 866-254-3707  
[www.sabretubularstructures.com](http://www.sabretubularstructures.com)

SBB TOWERS  
Tel: (450) 968-0800  
[www.sbb.ca](http://www.sbb.ca)

## STEEL - STRUCTURAL

DIS-TRAN STEEL, LLC  
Tel: (318) 448-0274  
[www.distran.com](http://www.distran.com)

HAMBY YOUNG  
Tel: (330) 562-8444 • (800) 726-8444  
[www.hambyyoung.com](http://www.hambyyoung.com)

SABRE TUBULAR STRUCTURES  
Tel: (817) 852-1700 • 866-254-3707  
[www.sabretubularstructures.com](http://www.sabretubularstructures.com)

THOMAS & BETTS - STEEL STRUCTURES DIVISION  
Tel: 1-877-2TB-MEYER  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

THOMAS & BETTS CANADA - STEEL STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

## STEEL PRODUCTS - CUSTOM FABRICATION

DIS-TRAN STEEL, LLC  
Tel: (318) 448-0274  
[www.distran.com](http://www.distran.com)

LOCWELD INC.  
Tel: (450) 659-9661  
[www.locweld.com](http://www.locweld.com)

WINOLA INDUSTRIAL INC.  
Tel: (570) 378-3808  
[www.winolaindustrial.com](http://www.winolaindustrial.com)

## STICKS - DISCONNECT

HASTINGS FIBERGLASS PRODUCTS INC.  
Tel: (269) 945-9541  
[www.hfgp.com](http://www.hfgp.com)

## STICKS - HOT

HASTINGS FIBERGLASS 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)

## STORAGE - BINS, STEEL

LISTA INTL  
Tel: (800) 722-3020  
[www.listaintl.com](http://www.listaintl.com)

## STREETLIGHTING EQUIPMENT

MERSEN CANADA  
Tel: (416) 252-9371  
[www.mersen.com](http://www.mersen.com)

## STRUCTURE - PREFABRICATED

OLDCASTLE ENCLOSURE SOLUTIONS  
Tel: (303) 209-8000 • 888-868-5214  
[www.oldcastleprecast.com](http://www.oldcastleprecast.com)

THOMAS & BETTS - STEEL STRUCTURES DIVISION  
Tel: 1-877-2TB-MEYER  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

THOMAS & BETTS CANADA - STEEL STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

## SUBSTATION

HAMBY YOUNG  
Tel: (330) 562-8444 • (800) 726-8444  
[www.hambyyoung.com](http://www.hambyyoung.com)

# PRODUCTS AND SERVICES

INCON POWER RELIABILITY PRODUCTS  
Tel: (207) 283-0156 • 1-800-872-3455  
[www.incon.com](http://www.incon.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

SABRE TUBULAR STRUCTURES  
Tel: (817) 852-1700 • 866-254-3707  
[www.sabretubularstructures.com](http://www.sabretubularstructures.com)

VANQUISH FENCING INCORPORATED  
Tel: (215) 295-2863  
[www.vanquishfencing.com](http://www.vanquishfencing.com)

## SUBSTATION - CAD DRAFTING SUPPORT

J & Y ENGINEERING SERVICES INC.  
Tel: (440) 891-1130  
[www.jyengineering.com](http://www.jyengineering.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

## SUBSTATION - COMMUNICATION EQUIPMENT

BELDEN  
Tel: (510) 438-9071  
[www.belden.com](http://www.belden.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

## SUBSTATION - COMMUNICATIONS

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

## SUBSTATION - GAS-INSULATED

INCON POWER RELIABILITY PRODUCTS  
Tel: (207) 283-0156 • 1-800-872-3455  
[www.incon.com](http://www.incon.com)

MISTRAS GROUP  
[www.mistrasgroup.com](http://www.mistrasgroup.com)

## SUBSTATION - METAL-ENCLOSED

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

## SUBSTATION - MOBILE

DELTA STAR, INC. (LYNCHBURG)  
Tel: (800) 368-3017  
[www.deltastar.com](http://www.deltastar.com)

DELTA STAR, INC. (SAN CARLOS)  
Tel: (800) 892-8673  
[www.deltastar.com](http://www.deltastar.com)

## SUBSTATION - PACKAGED ASSEMBLIES

HAMBY YOUNG  
Tel: (330) 562-8444 • (800) 726-8444  
[www.hambyyoung.com](http://www.hambyyoung.com)

## SUBSTATION - STEEL, STRUCTURE

DIS-TRAN STEEL, LLC  
Tel: (318) 448-0274  
[www.distran.com](http://www.distran.com)

HAMBY YOUNG  
Tel: (330) 562-8444 • (800) 726-8444  
[www.hambyyoung.com](http://www.hambyyoung.com)

LOCWELD INC.  
Tel: (450) 659-9661  
[www.locweld.com](http://www.locweld.com)

SABRE TUBULAR STRUCTURES  
Tel: (817) 852-1700 • 866-254-3707  
[www.sabretubularstructures.com](http://www.sabretubularstructures.com)

THOMAS & BETTS - STEEL STRUCTURES  
DIVISION  
Tel: 1-877-2TB-MEYER  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

THOMAS & BETTS CANADA - STEEL  
STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

## SUBSTATION - WOOD, TREATED

HUGHES BROTHERS INC.  
Tel: (402) 643-2991  
[www.hughesbros.com](http://www.hughesbros.com)

## SUBSTATION AUTOMATION

EFACEC ADVANCED CONTROL SYSTEMS  
Tel: (770) 446-8854  
[www.efacec-ac.com](http://www.efacec-ac.com)

FLIR SYSTEMS, INC.  
Tel: (503) 498-3293 • (800) 464-6372  
[www.flir.com/eetdguide](http://www.flir.com/eetdguide)

MORGAN SCHAFFER  
Tel: (514) 739-1967  
[www.morganschaffer.com](http://www.morganschaffer.com)

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)

SCHNEIDER ELECTRIC  
[www.schneider-electric.com/ca](http://www.schneider-electric.com/ca)

SCHWEITZER ENGINEERING  
LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

## SUBSTATION CONTROL BUILDINGS

PARKLINE, INC.  
Tel: (304) 586-2113  
[www.parkline.com](http://www.parkline.com)

SABRE BUILDING SYSTEMS BY CELLXION  
Tel: (318) 213-2900 • 877-213-2900  
[www.sabrebuildingsystems.com](http://www.sabrebuildingsystems.com)

## SUBSTATION DESIGN & CONSTRUCTION

AMPIRICAL SOLUTIONS, LLC  
Tel: (985) 809-5252  
[www.ampirical.com](http://www.ampirical.com)

## PRODUCTS AND SERVICES

J & Y ENGINEERING SERVICES INC.  
Tel: (440) 891-1130  
[www.jyengineering.com](http://www.jyengineering.com)

NAES CORPORATION  
Tel: (425) 961-4700  
[www.naes.com](http://www.naes.com)

POWERSECURE, INC  
Tel: (919) 604-7646  
[www.powersecure.com](http://www.powersecure.com)

QUANTA SERVICES  
Tel: (713) 629-7600  
[www.quantaservices.com](http://www.quantaservices.com)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

### SUBSTATION FENCING: ANIMAL DETERRENT

VANQUISH FENCING INCORPORATED  
Tel: (215) 295-2863  
[www.vanquishfencing.com](http://www.vanquishfencing.com)

### SUBSTATION FENCING: SECURITY

VANQUISH FENCING INCORPORATED  
Tel: (215) 295-2863  
[www.vanquishfencing.com](http://www.vanquishfencing.com)

### SUPPRESSORS - SURGE

DEHN INC.  
Tel: (772) 460-9315  
[www.dehn-usa.com](http://www.dehn-usa.com)

MERSEN CANADA  
Tel: (416) 252-9371  
[www.mersen.com](http://www.mersen.com)

### SUPPRESSORS - SURGE - TRANSIENT VOLTAGE

DEHN INC.  
Tel: (772) 460-9315  
[www.dehn-usa.com](http://www.dehn-usa.com)

MERSEN CANADA  
Tel: (416) 252-9371  
[www.mersen.com](http://www.mersen.com)

### SURGE PROTECTION DEVICES

DEHN INC.  
Tel: (772) 460-9315  
[www.dehn-usa.com](http://www.dehn-usa.com)

### SURGE PROTECTORS

DEHN INC.  
Tel: (772) 460-9315  
[www.dehn-usa.com](http://www.dehn-usa.com)

MERSEN CANADA  
Tel: (416) 252-9371  
[www.mersen.com](http://www.mersen.com)

SUPERIOR ELECTRIC  
Tel: (860) 507-2025  
[www.superiorelectric.com](http://www.superiorelectric.com)

### SUSPENSION ARMS, POLE - STEEL

DIS-TRAN STEEL, LLC  
Tel: (318) 448-0274  
[www.distran.com](http://www.distran.com)

HUGHES BROTHERS INC.  
Tel: (402) 643-2991  
[www.hughesbros.com](http://www.hughesbros.com)

THOMAS & BETTS - STEEL STRUCTURES DIVISION  
Tel: 1-877-2TB-MEYER  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

THOMAS & BETTS CANADA - STEEL STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

### SWITCHES

HUBBELL POWER SYSTEMS INC.  
Tel: (573) 682-5521  
[www.hubbellpowersystems.com](http://www.hubbellpowersystems.com)

MERSEN CANADA  
Tel: (416) 252-9371  
[www.mersen.com](http://www.mersen.com)

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)

### SWITCHES - AIR, GROUP-OPERATED

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)

### SWITCHES - CAPACITORS

SOUTHERN STATES, LLC.  
Tel: (770) 946-4562  
[www.southernstatesllc.com](http://www.southernstatesllc.com)

### SWITCHES - DISCONNECT

MERSEN CANADA  
Tel: (416) 252-9371  
[www.mersen.com](http://www.mersen.com)

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)

### SWITCHES - DISCONNECT 25 TO 800KV

MERSEN CANADA  
Tel: (416) 252-9371  
[www.mersen.com](http://www.mersen.com)

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)

### SWITCHES - HOOKSTICK, DISCONNECTING

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)



# PRODUCTS AND SERVICES

SOUTHERN STATES, LLC.  
Tel: (770) 946-4562  
www.southernstatesllc.com

## SWITCHES - ISOLATION

MERSEN CANADA  
Tel: (416) 252-9371  
www.mersen.com

## SWITCHES - LOAD BREAK

MERSEN CANADA  
Tel: (416) 252-9371  
www.mersen.com

## SWITCHES - MOTOR-OPERATED

MERSEN CANADA  
Tel: (416) 252-9371  
www.mersen.com

## SWITCHES - PADMOUNTED

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

## SWITCHES - REGULATOR, BYPASS

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

## SWITCHES - SAFETY, DISCONNECT DEVICES

MERSEN CANADA  
Tel: (416) 252-9371  
www.mersen.com

## SWITCHES - SUBMERSIBLE

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

## SWITCHES - SUBSTATION, DISCONNECTING

HUBBELL POWER SYSTEMS INC.  
Tel: (573) 682-5521  
www.hubbellpowersystems.com

MERSEN CANADA  
Tel: (416) 252-9371  
www.mersen.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

SOUTHERN STATES, LLC.  
Tel: (770) 946-4562  
www.southernstatesllc.com

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

THOMAS & BETTS CANADA – UTILITY DIVISION  
Tel: (450) 466-1102, x234  
1-800-466-1102, x234  
www.tnb.ca

## SWITCHES - TEST

MERSEN CANADA  
Tel: (416) 252-9371  
www.mersen.com

## SWITCHES - THROWOVER, AUTOMATIC

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

THOMAS & BETTS CANADA – UTILITY DIVISION  
Tel: (450) 466-1102, x234  
1-800-466-1102, x234  
www.tnb.ca

## SWITCHES - TRANSFER

MERSEN CANADA  
Tel: (416) 252-9371  
www.mersen.com

## SWITCHGEAR - ARC RESISTANT - MEDIUM VOLTAGE

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

## SWITCHGEAR - DC TRACTION

MERSEN CANADA  
Tel: (416) 252-9371  
www.mersen.com

## SWITCHGEAR - HIGH VOLTAGE

MERSEN CANADA  
Tel: (416) 252-9371  
www.mersen.com

## SWITCHGEAR - MEDIUM VOLTAGE RANGE UP TO 44 KV

MERSEN CANADA  
Tel: (416) 252-9371  
www.mersen.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

THOMAS & BETTS CANADA – UTILITY DIVISION  
Tel: (450) 466-1102, x234  
1-800-466-1102, x234  
www.tnb.ca

## SWITCHGEAR - METAL ENCLOSED

MERSEN CANADA  
Tel: (416) 252-9371  
www.mersen.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

## SWITCHGEAR - REBUILDING AND REPAIR SERVICE

INSULBOOT A DIV. OF PLASTIC DIP MOLDINGS  
Tel: (215) 766-2020  
www.insulboot.com

MAGNETECH INDUSTRIAL SERVICES  
Tel: (330) 830-3500 • 800-837-1614  
www.magnetech.com

NAES CORPORATION  
Tel: (425) 961-4700  
www.naes.com

# PRODUCTS AND SERVICES

## SWITCHGEAR - SF6

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

THOMAS & BETTS CANADA - UTILITY  
DIVISION  
Tel: (450) 466-1102, x234  
1-800-466-1102, x234  
www.tnb.ca

## SWITCHGEAR - VACUUM

THOMAS & BETTS - UTILITY GROUP  
Tel: (800) 326-5282  
www.utilitytnb.com

THOMAS & BETTS CANADA - UTILITY  
DIVISION  
Tel: (450) 466-1102, x234  
1-800-466-1102, x234  
www.tnb.ca

## SYSTEMS INTEGRATOR

AUTOMATED SOLUTIONS INT'L INC.  
Tel: (519) 220-0071 • 1 888.384.1212  
www.goasi.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

SISCO, INC.  
Tel: (586) 254-0020  
www.sisco.net

VANGUARD SYSTEMS  
Tel: (610) 891-7703 (8am - 5pm EST)  
www.vansystems.com

## T

## TAP CHANGERS

INCON POWER RELIABILITY PRODUCTS  
Tel: (207) 283-0156 • 1-800-872-3455  
www.incon.com

## TAP CHANGERS - CONTROLS

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
www.neoptix.com

REINHAUSEN MANUFACTURING INC.  
ATT: CHRISTY CRAWFORD  
Tel: (731) 562-4127  
www.reinhausen.com

## TAP CHANGERS - TRANSFORMERS - LOAD, NO- LOAD

INCON POWER RELIABILITY PRODUCTS  
Tel: (207) 283-0156 • 1-800-872-3455  
www.incon.com

MESSERSTROM, INC.  
Tel: (636) 680-5978  
www.messerstrom.com

POWER CORE ENGINEERING, INC.  
Tel: (414) 263-3455  
www.pce.com

REINHAUSEN MANUFACTURING INC.  
ATT: CHRISTY CRAWFORD  
Tel: (731) 562-4127  
www.reinhausen.com

SPX TRANSFORMER SOLUTIONS, INC.  
FKA WAUKESHA ELECTRIC SYSTEMS, INC.  
Tel: (800) 835-2732  
www.spxwaukesha.com

## TAPE - MARKING

EMPIRE LEVEL MFG. CORP.  
Tel: (262) 368-2000  
www.empirelevel.com

TECH PRODUCTS, INC.  
Tel: (718) 442-4900 • 1-800-221-1311  
www.techproducts.com

## TAPE - UNDERGROUND MARKING

TECH PRODUCTS, INC.  
Tel: (718) 442-4900 • 1-800-221-1311  
www.techproducts.com

## TELECOMMUNICATIONS

DOW WIRE & CABLE  
Tel: 1-800-441-4DOW  
www.dowwireandcable.com

OLDCASTLE ENCLOSURE SOLUTIONS  
Tel: (303) 209-8000 • 888-868-5214  
www.oldcastleprecast.com

## TEMPERATURE MONITORING

FISO TECHNOLOGIES  
Tel: (418) 688-8065 X 241  
www.fiso.com

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
www.neoptix.com

## TEST - MEASURING EQUIPMENT

ALBERCORP  
Tel: (954) 623-6660 • 800-851-4632  
www.alber.com

ELSYS INSTRUMENTS, LLC  
Tel: (845) 238-5419  
www.elsys-instruments.com

MORGAN SCHAFFER  
Tel: (514) 739-1967  
www.morganschaffer.com

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
www.neoptix.com

OPTIMUM ENERGY PRODUCTS LTD.  
Tel: (877) 766-5412  
www.optimumenergy.com

PHENIX TECHNOLOGIES INC.  
Tel: (301) 746-8118  
www.phenixtech.com

ROTEK INSTRUMENT CORP  
Tel: (781) 899-4611  
www.rotek.com

STRIDER-RESOURCE  
Tel: (905) 859-3901  
www.strider-resource.com

# PRODUCTS AND SERVICES

## TEST EQUIPMENT

### ALBERCORP

Tel: (954) 623-6660 • 800-851-4632

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

### DOBLE ENGINEERING CO.

Tel: (617) 926-4900

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

### OMICRON ELECTRONICS CORP. USA (HOUSTON)

Tel: (781) 672-6200 • 1-800-omicron

[www.omicronusa.com/en/training/academy/](http://www.omicronusa.com/en/training/academy/)

### PCORE ELECTRIC COMPANY, INC.

Tel: (585) 768-1200

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

### PHENIX TECHNOLOGIES INC.

Tel: (301) 746-8118

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

### RTDS TECHNOLOGIES, INC.

Tel: (204) 989-9700

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

## TEST EQUIPMENT - AERIAL LIFT

### PHENIX TECHNOLOGIES INC.

Tel: (301) 746-8118

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

## TEST EQUIPMENT - BATTERIES

### ALBERCORP

Tel: (954) 623-6660 • 800-851-4632

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

## TEST EQUIPMENT - BLANKET

### PHENIX TECHNOLOGIES INC.

Tel: (301) 746-8118

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

## TEST EQUIPMENT - CIRCUIT BREAKER

### DILO COMPANY, INC.

Tel: (727) 376-5593

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

### DOBLE ENGINEERING CO.

Tel: (617) 926-4900

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

### 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)

## TEST EQUIPMENT - CURRENT TRANSFORMER TESTERS

### NDB TECHNOLOGIES INC.

Tel: (418) 877-7701

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

## TEST EQUIPMENT - ELECTRICAL

### 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)

## TEST EQUIPMENT - FAULT

### HIGH VOLTAGE INC.

Tel: (518) 329-3275

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

### INNOVATIVE UTILITY PRODUCTS CORP.

Tel: (479) 410-2098

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

### MORGAN SCHAFFER

Tel: (514) 739-1967

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

## TEST EQUIPMENT - GLOVE

### PHENIX TECHNOLOGIES INC.

Tel: (301) 746-8118

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

## TEST EQUIPMENT - HIGH VOLTAGE

### DOBLE ENGINEERING CO.

Tel: (617) 926-4900

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

### HASTINGS FIBERGLASS PRODUCTS INC.

Tel: (269) 945-9541

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

### HD ELECTRIC COMPANY

Tel: (847) 473-4980

[hdelectriccompany.com](http://hdelectriccompany.com)

### HIGH VOLTAGE INC.

Tel: (518) 329-3275

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

### HV TECHNOLOGIES INC.

Tel: (703) 365-2330

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

### PHENIX TECHNOLOGIES INC.

Tel: (301) 746-8118

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

### ROSS ENGINEERING CORPORATION

Tel: (408) 377-4621

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

## TEST EQUIPMENT - HV IMPULSE

### PHENIX TECHNOLOGIES INC.

Tel: (301) 746-8118

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

## TEST EQUIPMENT - HV TEST SETS, PORTABLE

### HASTINGS FIBERGLASS PRODUCTS INC.

Tel: (269) 945-9541

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

### 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)

## TEST EQUIPMENT - INSULATION

### AEMC INSTRUMENTS

Tel: (508) 698-2115

### 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)



# PRODUCTS AND SERVICES

## TEST EQUIPMENT - LIGHTNING ARRESTERS

HIGH VOLTAGE INC.  
Tel: (518) 329-3275  
www.hvinc.com

## TEST EQUIPMENT - METER TEST SETS

OMICRON ELECTRONICS CORP. USA  
(HOUSTON)  
Tel: (781) 672-6200 • 1-800-omicron  
www.omicronusa.com/en/training/academy/

## TEST EQUIPMENT - MICRO-OHMMETER

AEMC INSTRUMENTS  
Tel: (508) 698-2115

NDB TECHNOLOGIES INC.  
Tel: (418) 877-7701  
www.ndbtech.com

## TEST EQUIPMENT - MOISTURE

MORGAN SCHAFFER  
Tel: (514) 739-1967  
www.morganschaffer.com

## TEST EQUIPMENT - OIL

HIGH VOLTAGE INC.  
Tel: (518) 329-3275  
www.hvinc.com

MORGAN SCHAFFER  
Tel: (514) 739-1967  
www.morganschaffer.com

## TEST EQUIPMENT - RECLOSERS

HIGH VOLTAGE INC.  
Tel: (518) 329-3275  
www.hvinc.com

PHENIX TECHNOLOGIES INC.  
Tel: (301) 746-8118  
www.phenixtech.com

## TEST EQUIPMENT - RELAY

DOBLE ENGINEERING CO.  
Tel: (617) 926-4900  
www.doble.com

OMICRON ELECTRONICS CORP. USA  
(HOUSTON)  
Tel: (781) 672-6200 • 1-800-omicron  
www.omicronusa.com/en/training/academy/

RTDS TECHNOLOGIES, INC.  
Tel: (204) 989-9700  
www.rtds.com

## TEST EQUIPMENT - RENTAL

DOBLE ENGINEERING CO.  
Tel: (617) 926-4900  
www.doble.com

## TEST EQUIPMENT - SLEEVE, RUBBER

PHENIX TECHNOLOGIES INC.  
Tel: (301) 746-8118  
www.phenixtech.com

## TEST EQUIPMENT - TRANSFORMERS

DOBLE ENGINEERING CO.  
Tel: (617) 926-4900  
www.doble.com

HIGH VOLTAGE INC.  
Tel: (518) 329-3275  
www.hvinc.com

MISTRAS GROUP  
www.mistrasgroup.com

NDB TECHNOLOGIES INC.  
Tel: (418) 877-7701  
www.ndbtech.com

OMICRON ELECTRONICS CORP. USA  
(HOUSTON)  
Tel: (781) 672-6200 • 1-800-omicron  
www.omicronusa.com/en/training/academy/

PHENIX TECHNOLOGIES INC.  
Tel: (301) 746-8118  
www.phenixtech.com

## TEST SYSTEMS/COMPONENTS - HIGH VOLTAGE, HIGH CURRENT, HIGH POWER

INNOVATIVE UTILITY PRODUCTS CORP.  
Tel: (479) 410-2098  
www.iupcorp.com

PHENIX TECHNOLOGIES INC.  
Tel: (301) 746-8118  
www.phenixtech.com

## TESTING - REGULATORS

RTDS TECHNOLOGIES, INC.  
Tel: (204) 989-9700  
www.rtds.com

## TESTING - TRANSFORMERS, LIQUID

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
www.neoptix.com

## TESTING SERVICES

DOBLE ENGINEERING CO.  
Tel: (617) 926-4900  
www.doble.com

IMCORP  
Tel: (860) 873-8000  
www.imcorp.com

RTDS TECHNOLOGIES, INC.  
Tel: (204) 989-9700  
www.rtds.com

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

## TESTING SERVICES - BATTERIES

ALBERCORP  
Tel: (954) 623-6660 • 800-851-4632  
www.alber.com

ANCONA CONTROLS  
Tel: (248) 624-5600  
www.anconacontrols.com

## TESTING SERVICES - ELECTRICAL

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
www.sandc.com

## TESTING SERVICES - OIL

WEIDMANN DIAGNOSTIC SOLUTIONS INC  
Tel: (800) 242-8106  
www.weidmann-electrical.com

# PRODUCTS AND SERVICES

## THERMOCOUPLES

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
www.neoptix.com

## THERMOMETERS - DIGITAL

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
www.neoptix.com

## TOOLS

BALLANTINE INC  
www.ballantineinc.com

CERTIFIED ELECTRICAL SAFETYGEAR  
Tel: (855) 284-6800  
www.cesg-inc.com

HI-LINE UTILITY SUPPLY CO.  
Tel: (800) 323-6606  
www.hilineco.com

TALLMAN EQUIPMENT CO  
Tel: (630) 860-5666  
www.tallmanequipment.com

## TOOLS - EQUIPMENT/RENTAL

AZTEC BOLTING SERVICES.COM  
Tel: (281) 228-2112  
www.aztecbolting.com

TALLMAN EQUIPMENT CO  
Tel: (630) 860-5666  
www.tallmanequipment.com

## TOOLS - WIRE & CABLE

SEATEK COMPANY  
Tel: (203) 324-0067  
www.seatekco.com

TALLMAN EQUIPMENT CO  
Tel: (630) 860-5666  
www.tallmanequipment.com

WAGNER-SMITH EQUIPMENT COMPANY  
Tel: (800) 666-6567  
www.wagnersmithequipment.com

## TOOLS CABLE - UNDERGROUND CABLE INSTALLATION

BALLANTINE INC  
www.ballantineinc.com

DCD DESIGN & MANUFACTURING LTD.  
Tel: (888) 794-8357  
www.dcdesign.com

## TOWER - TRELLIS AND TUBULAR

FABRIMET INC  
Tel: (819) 472-1164  
www.fabrimet.com

LOCWELD INC.  
Tel: (450) 659-9661  
www.locweld.com

THOMAS & BETTS - STEEL STRUCTURES DIVISION  
Tel: 1-877-2TB-MEYER  
www.meyersteelstructures.com

THOMAS & BETTS CANADA - STEEL STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
www.meyersteelstructures.com

## TOWERS - ANTENNA

SABRE TOWERS AND POLES  
Tel: (712) 258-6690 • 800-369-6690  
www.sabretowersandpoles.com

THOMAS & BETTS - STEEL STRUCTURES DIVISION  
Tel: 1-877-2TB-MEYER  
www.meyersteelstructures.com

THOMAS & BETTS CANADA - STEEL STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
www.meyersteelstructures.com

## TOWERS - EMERGENCY T & D

QUANTA SERVICES  
Tel: (713) 629-7600  
www.quantaservices.com

THOMAS & BETTS - STEEL STRUCTURES DIVISION  
Tel: 1-877-2TB-MEYER  
www.meyersteelstructures.com

THOMAS & BETTS CANADA - STEEL STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
www.meyersteelstructures.com

## TOWERS - POLES

BRIDGEWELL RESOURCES  
Tel: (503) 872-3566  
www.bridgewellresources.com/utility-construction/poles.aspx

DIS-TRAN STEEL, LLC  
Tel: (318) 448-0274  
www.distran.com

SABRE TOWERS AND POLES  
Tel: (712) 258-6690 • 800-369-6690  
www.sabretowersandpoles.com

THOMAS & BETTS - STEEL STRUCTURES DIVISION  
Tel: 1-877-2TB-MEYER  
www.meyersteelstructures.com

THOMAS & BETTS CANADA - STEEL STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
www.meyersteelstructures.com

## TOWERS - TELECOMMUNICATION

SABRE TOWERS AND POLES  
Tel: (712) 258-6690 • 800-369-6690  
www.sabretowersandpoles.com

THOMAS & BETTS - STEEL STRUCTURES DIVISION  
Tel: 1-877-2TB-MEYER  
www.meyersteelstructures.com

THOMAS & BETTS CANADA - STEEL STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
www.meyersteelstructures.com

## TOWERS - WIRELESS

SABRE TOWERS AND POLES  
Tel: (712) 258-6690 • 800-369-6690  
www.sabretowersandpoles.com

THOMAS & BETTS - STEEL STRUCTURES DIVISION  
Tel: 1-877-2TB-MEYER  
www.meyersteelstructures.com

## PRODUCTS AND SERVICES

THOMAS & BETTS CANADA – STEEL  
STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

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### TOWERS, TRANSMISSION - RETROFIT

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HUGHES BROTHERS INC.  
Tel: (402) 643-2991  
[www.hughesbros.com](http://www.hughesbros.com)

THOMAS & BETTS - STEEL STRUCTURES  
DIVISION  
Tel: 1-877-2TB-MEYER  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

THOMAS & BETTS CANADA – STEEL  
STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

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### TOWERS, TRANSMISSION - STEEL

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LOCWELD INC.  
Tel: (450) 659-9661  
[www.locweld.com](http://www.locweld.com)

SABRE TUBULAR STRUCTURES  
Tel: (817) 852-1700 • 866-254-3707  
[www.sabretubularstructures.com](http://www.sabretubularstructures.com)

THOMAS & BETTS - STEEL STRUCTURES  
DIVISION  
Tel: 1-877-2TB-MEYER  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

THOMAS & BETTS CANADA – STEEL  
STRUCTURES DIVISION  
Tel: 905-858-1010, x3782  
[www.meyersteelstructures.com](http://www.meyersteelstructures.com)

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### TOWERS, TRANSMISSION - WOOD, LAMINATED

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HUGHES BROTHERS INC.  
Tel: (402) 643-2991  
[www.hughesbros.com](http://www.hughesbros.com)

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### TOWERS, TRANSMISSION - WOOD, SOLID

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DIS-TRAN WOOD PRODUCTS, LLC  
Tel: (318) 448-0274  
[www.distran.com](http://www.distran.com)

HUGHES BROTHERS INC.  
Tel: (402) 643-2991  
[www.hughesbros.com](http://www.hughesbros.com)

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### TRACKED VEHICLES

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ASPLUNDH TREE EXPERT CO.  
Tel: (800) 248-8733  
[www.asplundh.com](http://www.asplundh.com)

PRINOTH  
Tel: (450) 776-3600  
[www.prinoth.com](http://www.prinoth.com)

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### TRAILERS - CABLE REEL

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MOBILE TECH TRAILERS INC.  
Tel: (574) 892-5653  
[www.mobiletechtrailers.com](http://www.mobiletechtrailers.com)

REDI HAUL TRAILERS  
Tel: (800) 233-0382  
[www.redihaul.com](http://www.redihaul.com)

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### TRAILERS - POLE

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FELLING TRAILERS, INC.  
Tel: (800) 245-2809  
[www.felling.com](http://www.felling.com)

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### TRAILERS - RENTAL AND LEASING

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WAGNER-SMITH EQUIPMENT COMPANY  
Tel: (800) 666-6567  
[www.wagnersmithequipment.com](http://www.wagnersmithequipment.com)

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### TRAINING

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DAVID CHILDRESS ENTERPRISES  
Tel: (678) 386-9132  
[www.davidchildressenterprises.com](http://www.davidchildressenterprises.com)

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

OMICRON ELECTRONICS CORP. USA  
(HOUSTON)  
Tel: (781) 672-6200 • 1-800-omicron  
[www.omicronusa.com/en/training/academy/](http://www.omicronusa.com/en/training/academy/)

S&C ELECTRIC COMPANY  
Tel: (773) 338-1000  
[www.sandc.com](http://www.sandc.com)

SPX TRANSFORMER SOLUTIONS, INC.  
FKA WAUKESHA ELECTRIC SYSTEMS, INC.  
Tel: (800) 835-2732  
[www.spxwaukesha.com](http://www.spxwaukesha.com)

WEIDMANN DIAGNOSTIC  
SOLUTIONS INC  
Tel: (800) 242-8106  
[www.weidmann-electrical.com](http://www.weidmann-electrical.com)

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### TRAINING - CORONA

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CITI-CORONA INSPECTION TRAINING  
INSTITUTE  
Tel: (888) 950-5557  
[www.citi-training.com](http://www.citi-training.com)

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### TRAINING - REGULATORY COMPLIANCE

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CN UTILITY CONSULTING  
Tel: (707) 829-1018  
[www.cnutility.com](http://www.cnutility.com)

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### TRANSDUCERS - ELECTRIC

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FLEX-CORE DIV.  
Tel: (614) 889-6152  
[www.flex-core.com](http://www.flex-core.com)

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### TRANSFORMER - OIL

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PETRO-CANADA LUBRICANTS INC.  
Tel: 1-800-268-5850  
[www.lubricants.petro-canada.ca](http://www.lubricants.petro-canada.ca)

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### TRANSFORMER - VACUUM DRY- OUT SYSTEMS

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Tel: (931) 528-8476  
[www.baronusa.com](http://www.baronusa.com)

SPX TRANSFORMER SOLUTIONS, INC.  
FKA WAUKESHA ELECTRIC SYSTEMS, INC.  
Tel: (800) 835-2732  
[www.spxwaukesha.com](http://www.spxwaukesha.com)

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### TRANSFORMER COMPONENTS

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SPX TRANSFORMER SOLUTIONS, INC.  
FKA WAUKESHA ELECTRIC SYSTEMS, INC.  
Tel: (800) 835-2732  
[www.spxwaukesha.com](http://www.spxwaukesha.com)



# PRODUCTS AND SERVICES

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MORGAN SCHAFFER  
Tel: (514) 739-1967  
[www.morganschaffer.com](http://www.morganschaffer.com)

NDB TECHNOLOGIES INC.  
Tel: (418) 877-7701  
[www.ndbtech.com](http://www.ndbtech.com)

WEIDMANN DIAGNOSTIC  
SOLUTIONS INC  
Tel: (800) 242-8106  
[www.weidmann-electrical.com](http://www.weidmann-electrical.com)

## TRANSFORMER MONITORING

ADVANCED POWER TECHNOLOGIES  
Tel: (973) 328-3300  
[www.advpowertech.com](http://www.advpowertech.com)

DYNAMIC RATINGS, INC.  
Tel: (262) 746-1230  
[www.dynamicratings.com](http://www.dynamicratings.com)

MISTRAS GROUP  
[www.mistrasgroup.com](http://www.mistrasgroup.com)

NEOPTIX FIBER OPTIC SENSORS  
Tel: (418) 687-2500  
[www.neoptix.com](http://www.neoptix.com)

WESCHLER INSTRUMENTS  
Tel: (440) 238-2550  
[www.weschler.com](http://www.weschler.com)

## TRANSFORMER MOUNTING PADS

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Tel: (507) 732-4095  
[www.concastinc.com](http://www.concastinc.com)

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Tel: (800) 368-3017  
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DELTA STAR, INC. (SAN CARLOS)  
Tel: (800) 892-8673  
[www.deltastar.com](http://www.deltastar.com)

DOW WIRE & CABLE  
Tel: 1-800-441-4DOW  
[www.dowwireandcable.com](http://www.dowwireandcable.com)

MOLONEY ELECTRIC, INC.  
Tel: (416) 534-9226  
[www.moloneytx.com](http://www.moloneytx.com)

PARTNER TECHNOLOGIES  
INCORPORATED  
Tel: (306) 721-3114  
[www.partnertechnologies.net](http://www.partnertechnologies.net)

PLITRON MANUFACTURING INC.  
Tel: (416) 667-9914 • 1-800-754-8766  
[www.plitron.com](http://www.plitron.com)

SPX TRANSFORMER SOLUTIONS, INC.  
FKA WAUKESHA ELECTRIC SYSTEMS, INC.  
Tel: (800) 835-2732  
[www.spxwaukesha.com](http://www.spxwaukesha.com)

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

## TRANSFORMERS - AUTO TRANSFORMERS

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Tel: (800) 835-2732  
[www.spxwaukesha.com](http://www.spxwaukesha.com)

## TRANSFORMERS - CONTROLS

NEOPTIX FIBER OPTIC SENSORS  
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NOMOS SYSTEMS  
Tel: (418) 681-0909  
[www.nomosystemes.com](http://www.nomosystemes.com)

## TRANSFORMERS - DISTRIBUTION

MOLONEY ELECTRIC, INC.  
Tel: (416) 534-9226  
[www.moloneytx.com](http://www.moloneytx.com)

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Tel: (800) 368-3017  
[www.deltastar.com](http://www.deltastar.com)

DELTA STAR, INC. (SAN CARLOS)  
Tel: (800) 892-8673  
[www.deltastar.com](http://www.deltastar.com)

INCON POWER RELIABILITY PRODUCTS  
Tel: (207) 283-0156 • 1-800-872-3455  
[www.incon.com](http://www.incon.com)

MOLONEY ELECTRIC, INC.  
Tel: (416) 534-9226  
[www.moloneytx.com](http://www.moloneytx.com)

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

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Tel: (865) 408-0030  
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VELCON FILTERS, LLC.  
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www.spxwaukesha.com

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## TRANSFORMERS - INSTRUMENT

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### TSTM

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www.polycastinternational.com

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www.magnetech.com

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www.spxwaukesha.com

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Tel: (800) 892-8673  
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Tel: (912) 754-5435  
www.efacecusa.com

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Tel: (800) 835-2732  
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Tel: (800) 892-8673  
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www.deltastar.com

### DELTA STAR, INC. (SAN CARLOS)

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www.plitron.com

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[www.flex-core.com](http://www.flex-core.com)

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LABORATORIES INC.  
Tel: (509) 332-1890  
[www.selinc.com](http://www.selinc.com)

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

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

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

DOW WIRE & CABLE  
Tel: 1-800-441-4DOW  
[www.dowwireandcable.com](http://www.dowwireandcable.com)

LEWIS TREE SERVICE, INC.  
Tel: (800) 333-1593  
[www.lewistree.com](http://www.lewistree.com)

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DIGITALGRID, INC.  
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[www.digitalgridinc.com](http://www.digitalgridinc.com)

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

TALLMAN EQUIPMENT CO  
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[www.tallmanequipment.com](http://www.tallmanequipment.com)

WAGNER-SMITH EQUIPMENT COMPANY  
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[www.wagnersmithequipment.com](http://www.wagnersmithequipment.com)

## TREATING SERVICES - CROSSARMS

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

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Tel: (402) 643-2991  
[www.hughesbros.com](http://www.hughesbros.com)

LEWIS TREE SERVICE, INC.  
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[www.lewistree.com](http://www.lewistree.com)

WRIGHT TREE SERVICE  
Tel: (800) 882-1216  
[www.wrighttree.com](http://www.wrighttree.com)

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

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

## TRENCH - CONCRETE

CONCAST INC.  
Tel: (507) 732-4095  
[www.concastinc.com](http://www.concastinc.com)

TRENWA, INC.  
Tel: (859) 781-0831  
[www.trenwa.com](http://www.trenwa.com)



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

UNDERGROUND DEVICES INC.  
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[www.sandc.com](http://www.sandc.com)

SOLIS ENERGY  
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[www.solisenergy.com](http://www.solisenergy.com)

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## UPS SYSTEMS AND SUPPLIES

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

## UTILITY AUTOMATION

EFACEC ADVANCED CONTROL SYSTEMS  
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OPEN SYSTEMS INTERNATIONAL, INC.  
Tel: (763) 551-0559  
[www.osii.com](http://www.osii.com)

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## V

## VACUUM DEHYDRATION - OIL PURIFICATION SYSTEMS

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

CN UTILITY CONSULTING  
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[www.cnutility.com](http://www.cnutility.com)

LEWIS TREE SERVICE, INC.  
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[www.lewistree.com](http://www.lewistree.com)

TREES, INC.  
Tel: (866) 865-9617  
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W.I.R.E. SERVICES  
Tel: (204) 480-5800  
[www.wireservices.ca](http://www.wireservices.ca)

WRIGHT TREE SERVICE  
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## VENTILATION - CONFINED SPACE

CALIFORNIA TURBO, INC.  
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[www.origocorp.com](http://www.origocorp.com)

## W

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

## WIRE - SEALS

INNER-TITE CORP.  
Tel: (508) 829-6361  
[www.inner-tite.com](http://www.inner-tite.com)

# PRODUCTS AND SERVICES

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## WIRE, COPPER GROUNDING

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

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Tel: (800) 563-3769  
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# ADVERTISERS INDEX

COMPANY .....	WEB SITE .....	PAGE #
ALBERCORP.....	www.alber.com .....	52
AMERICAN WIRE GROUP INC. ....	www.buyawg.com.....	40
AMPIRICAL SOLUTIONS .....	www.ampirical.com .....	76
BARON USA INC.....	www.baronusa.com .....	16
BECKWITH ELECTRIC COMPANY .....	www.beckwithelectric.com .....	54
BRONTO SKYLIFT .....	www.bronto.fi .....	55
CALIFORNIA TURBO, INC. ....	www.californiaturbo.com .....	57
CIGRÉ CANADA CONFERENCE - 2012.....	www.cigre.ca .....	25
CIGRÉ SESSION 44 .....	www.cigre.org.....	31
CONDUX TESMEC INC.....	www.conduxtesmec.com .....	20
CROSSLINK TECHNOLOGY INC.....	www.crosslinktech.com .....	59
DIGITALGRID INC. ....	www.digitalgridinc.com .....	60
DOBLE ENGINEERING CO. ....	www.doble.com.....	3-7
DOW ELECTRICAL & TELECOMMUNICATIONS.....	www.dowinside.com.....	1
FLIR SYSTEMS .....	www.flir.com.....	10
HAMBY YOUNG.....	www.hambyyoung.com.....	42
HASTINGS FIBERGLASS PRODUCTS INC. ....	www.hfgp.com.....	9
HIGH VOLTAGE INC. ....	www.hvinc.com .....	INSIDE FRONT COVER
HIPOTRONICS.....	www.hipotronics.com .....	63
HUGHES BROTHERS INC.....	www.hughesbros.com .....	64
INNER-TITE CORP.....	www.inner-tite.com .....	66
INSULBOOT a div. of PLASTIC DEP MOLDINGS .....	www.insulboot.com .....	47
LEWIS TREE SERVICE, INC.....	www.lewistree.com .....	69
LOCWELD INC. ....	www.locweld.com .....	70
MABEY BRIDGE & SHORE, INC.....	www.mabey.com.....	86
MISTRAS GROUP .....	www.mistrasgroup.com .....	6
MORGAN SCHAFFER SYSTEMS, INC. ....	www.morganschaffer.com .....	INSIDE BACK COVER
NEOPTIX FIBER OPTIC SENSORS .....	www.neoptix.com .....	FRONT COVER
NESCO SALES & RENTALS .....	www.nescosales.com .....	73
OPEN SYSTEMS INTERNATIONAL INC.....	www.osii.com .....	BACK COVER
PHENIX TECHNOLOGIES INC. ....	www.phenixtech.com .....	11
RTDS TECHNOLOGIES, INC. ....	www.rtds.com.....	45
S & C ELECTRIC COMPANY.....	www.sandc.com.....	23
SABRE TUBULAR STRUCTURES .....	www.sabreindustries.com.....	17
SCHNEIDER ELECTRIC.....	www.schneider-electric.com .....	21
SCHWEITZER ENGINEERING LABORATORIES INC.....	www.selinc.com.....	13
SMART GRID ROADSHOW .....	www.smartgridroadshow.com .....	27
TALLMAN EQUIPMENT CO.....	www.tallmanequipment.com .....	15
TECHCON, TJH2B ANALYTICAL SERVICES .....	www.techcon.info .....	29
THE STRESSCRETE GROUP .....	www.stresscretegroup.com .....	77
THOMAS & BETTS .....	www.tnb.com.....	19
TSTM.....	www.ts-tm.com .....	5
UNDERGROUND DEVICES INC.....	www.udevices.com .....	80
UTILIMETRICS.....	www.utilimetrics.org .....	33
W.I.R.E. SERVICES .....	www.wireservices.ca.....	81
WINOLA INDUSTRIAL INC. ....	www.winolaindustrial.com.....	50

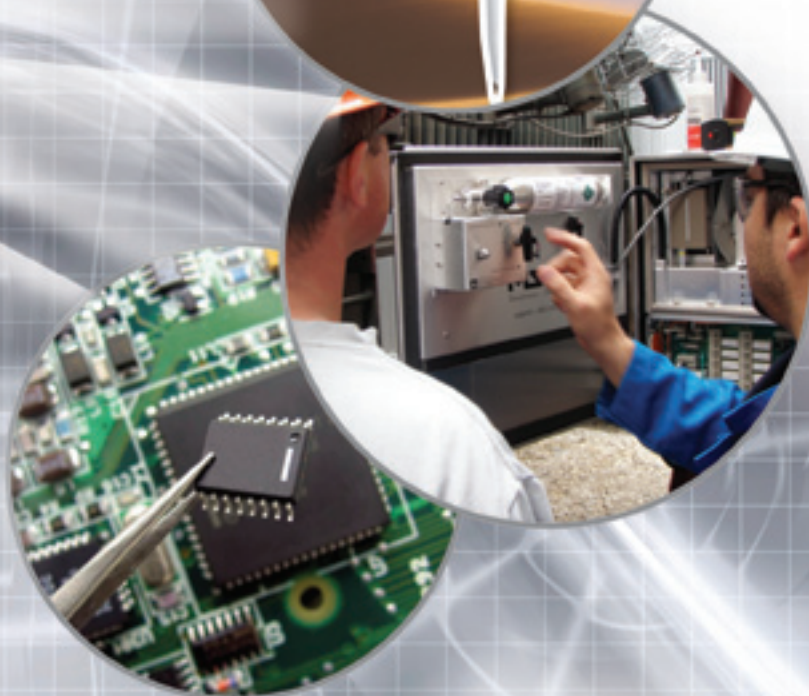


# Calisto

DGA Family



## More than Meets the Eye



### World Leading DGA Expertise within Every Calisto

We understand that our clients depend on our measurements to make important and potentially costly maintenance decisions. As such, we deliver best-in-market precision, accuracy, reliability and support; all packed into the Calisto DGA Family of transformer monitoring equipment.

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*Transformers - The Inside View*



## Smart grid projects can be deceiving.

The ultimate Smart Grid vision portrayed by many still remains nothing but a panacea. If you are interested in a practical, pragmatic vision of the Smart Grid and need your vision successfully realized, make us your partner. If you want results instead of reports or marketing campaigns and want a Smart Grid strategy which is sustainable both post implementation and year after year, make us your partner. We'll help you plan and execute a realistic yet sensible vision of your Smart Grid strategy beyond smart meters and data warehouses, articles, press releases, commercials, speeches and odd partnerships.

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