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Electrical Business

NOVEMBER 2011

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- Delta to wye conversions
- Community power fuels renewable energy

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CANADA'S 50 BEST MANAGED COMPANIES

The EV industry is doing everything it can to keep this juggernaut going...

Rise of the electric vehicle

This seems to be the year of the electric vehicle (EV)... at least, that's the impression I get when I consider how many EV-related news items we've written, or EV events we've attended.

Consider this: in just the past several months, we've written up news items such as:

- Hydro-Quebec and partners roll out The Electric Circuit network for plug-in electric vehicles
- First North American-produced Toyota Electric Vehicle to utilize existing RAV4 plant
- Legrand/Pass & Seymour introduces electric vehicle chargers for residential and light commercial applications
- Leviton announces UL Listing for Evr-Green 120 Level 1 Portable Charger
- General cable launches CarolGrene Ultra Flex electric vehicle cables at Plug-in 2011
- Chevrolet Volts begin shipping to Canadian Dealerships
- GE Electric Vehicle Experience Tour 2011 (Toronto *and* Vancouver)

(These are all actual news items at EBMag.com, and these are just scratching the surface. There are plenty more!)

CSA's upcoming 2012 Canadian Electrical Code conferences will also include updated installation requirements in *electric vehicle* technologies. And, by the time you read this, we will have also attended Electric Mobility Canada's EV 2011 Conference & Tradeshow.

Not unlike renewables technologies, EV charging components are now quite expensive, but their costs will come down as the production efficiencies are found, governments provide suitable incentives, and so forth.

Meantime, the EV industry is doing everything it can to keep this juggernaut going, so a lot of qualified manpower is going to be required in the coming years to help build out the residential, private commercial, public and pay-per-use charging infrastructure that will pop up all over Canada—in our homes, outside our public buildings, in parking garages, etc.

And this infrastructure aims to be intelligent and smart grid-compatible. This means that owners of EVs will be able to schedule appointments with a charging station from their mobile phone, and pay for the privilege with an established account somewhere... or maybe a *charge card for a car charge*. Hah!

It means that, right now, good charging stations communicate seamlessly with an EV to determine exact charging requirements, whether it is safe to do so, etc. And all those batteries floating around out there in those EVs still present a great solution to the problem of excess energy production from renewable sources... one of the promises of a truly smart grid.

Yes, there is a lot of buzz around EVs, which is why we've included them in this issue... not because we're tree-huggers, but because EVs—or, more specifically, the charging infrastructure EVs require—represent yet another new, fantastic revenue stream for the electrical installer. I encourage you to keep reading EBMag and keep visiting EBMag.com for the latest info on EVs, and consider attending an EV event to find out what you need to know to get in on the action. EB

On the cover and page 14

Technology and economics are in wind's favour

Wind turbines throughout history have taken many forms. Today's focus, the electrical generator, eclipses older usages and, despite a rocky start over 100 years ago, large-scale wind turbines are here to stay.

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Get ready for 2012 Canadian Electrical Code with CSA conferences

This two-day, four-city conference series reviews important changes to the new 2012 Canadian Electrical Code Part I and the updated Z462 Workplace Electrical Safety standard.

Don't miss your opportunity to learn from industry experts and CSA Standards' committee members about the numerous changes to these two important standards and their impact on your business and your workers.

Focused on national and regional issues, the conference will highlight the need for adopting best practices and safer work procedures, with an emphasis on the legal & ethical responsibilities employers have to their workers. Updated installation requirements in the emerging areas of solar, photovoltaic and electric vehicle technologies will also be covered.

The last conference series sold out, so register now. Visit shop.csa.ca.

Electrical Business

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We acknowledge the financial support of the Government of Canada through the Canada Periodical Fund (CPF) for our publishing activities.

Canada

Solar panel certification program for Canadian construction electricians from CSA and NETCO

CSA Standards—a standards-based solutions organization (www.csa.ca)—and the National Electrical Trade Council (NETCO, www.ceca.org/netco)—the joint training arm of the Canadian Electrical Contractors Association (CECA) and the International Brotherhood of Electrical Workers (IBEW), 1st District Canada—officially announced the launch of a national, third-party, independent personnel certification program for construction electricians (NOC 7241) installing solar photovoltaic (PV) systems in Canada.

At a special ceremony during the IBEW International Convention & Exposition in Vancouver, B.C., the first certifications were awarded to qualifying IBEW electricians working with United Power Ltd.: Peter Curtis, Martin Kugler, Raymond Moffat and Dustin Thomas. Certifications were also issued to John Salmon of A.R. Milne Electric and Endre "Andy" Cleven of the Electrical Joint Training Committee, IBEW Local 213 and Electrical Contractors Association of British Columbia (ECABC).

"CSA applauds the first construction electricians certified in solar photovoltaic systems in this program that is designed to help ensure the safe and effective installation of solar equipment while reducing the risk of serious accident and injury," said Stephen Brown, director, Energy, CSA Standards. "Today's certified candidates have demonstrated measurable knowledge within the PV area by passing an assessment against objectively identified criteria. We hope this program will increase public confidence in PV installations and in turn promote energy efficiency."

Presenting the certification awards were Rob Rashotte, director, Learning Services, for CSA Standards; Phil Flemming, IBEW international VP, 1st District Canada; and John Salmon, director, Canadian Electrical Contractors Association. These IBEW electricians recently participated in a beta test round of the certification to establish an acceptable pass mark. The personnel certification is now available in Canada to all eligible construction electricians.

CSA Standards' PV certification program will examine an individual's measurable knowledge and skill, rather than qualification-based programs that consider an individual's education and general credentials.

"The personnel certification program for Construction Electricians-Solar PV Systems was sponsored by NETCO on behalf of the electrical industry," said Eryl Roberts, executive secretary, CECA and NETCO Treasurer. "It is the first program in Canada to offer a certification based on the tasks that qualified journeyperson construction electricians carry out in applying their skills to the installation and maintenance of solar PV systems."

"Through this new program, construction electricians will document their training in the installation of PV technology in its various applications," said Flemming. "We are confident that training providers will see the value of CSA Standards' personnel certification program and will align their curriculum in this area with CSA to best foster success."

CSA developing Z463-Guideline on Maintenance of Electrical Systems

Canada currently does not have a Canadian national standard or guideline for electrical equipment maintenance. So, back in March, the first Z463 Technical Committee meeting was held to officially begin the process to develop CSA's new Guideline on Maintenance of Electrical Systems. A second meeting was held in Edmonton in June.

When complete, this guideline will provide information to help employers develop an electrical maintenance program or to improve their existing programs. In addition, employers will be able to use it to find the necessary information and resources to carry out these activities.

The first revision release of the document will be available in 2013. A draft version for stakeholder and public input should be available by late 2012. Once published in both French and English, CSA-Z463 will be submitted to the Standards Council of Canada for approval as a nationally accepted guideline. As with any other CSA standard or guideline, the first edition of Z463 will initially be recognized as a voluntary best practices guideline for use anywhere in Canada. In the future, as Z463 gains acceptance, each province and the federal government may chose to reference it in regulations.

Note: a special Z463 information site has been set up on LINKED IN (or search "CSAZ463"), which has been set up as an Open Forum, meaning you can go online and provide input, or acquire information regarding this document.

Meantime, please contact chair Kerry Heid kheid@magnaelectric.com in Western Canada and vice-chair John Salmon jsalmon@armilne.com in Eastern Canada for sponsorship, membership and guest opportunities with this very important new CSA document.

IEEE announces milestone for smart grid interoperability standard-2030

IEEE (standards.ieee.org), a global professional association "advancing technology for humanity", today announced that IEEE 2030 "IEEE Guide for Smart Grid Interoperability of Energy Technology and Information Technology Operation with the Electric Power System (EPS), End-Use Applications, and Loads" has been approved and published.

"This is the world's first system-of-systems, foundational standard that has been created from the ground up to inform smart grid interconnection and interoperability, and it happened in a rapidly paced, two-year development environment that demanded the integrated contributions of hundreds and hundreds of people from across the smart grid's three primary disciplines: power systems, communications and IT (information technology)," said Dick DeBlasio, IEEE 2030 Working Group chair.

IEEE 2030 establishes a "globally relevant smart grid interoperability reference model and knowledge base" says IEEE that can be used by: utilities who are developing their infrastructure roadmaps; manufacturers who are planning smart grid systems and applications; scientists who are conducting research; governments who are crafting regulations; and

standards-development organizations (SDOs) who are writing additional standards for the smart grid.

"IEEE 2030 is poised to support the accelerated rollout of the smart grid and realization of the revolutionary benefits—greater consumer choice, improved electric-system reliability and increased reliance on renewable sources of energy—that it promises for people worldwide," added DeBlasio.

IEEE 2030 provides alternative approaches and best practices for smart grid work worldwide and defines terminology, characteristics, functional performance and evaluation criteria and the application of engineering principles for smart grid interoperability of the EPS with end-use applications and loads. Additionally, it defines design tables and the classification of data-flow characteristics necessary for interoperability, with emphasis on functional interface identification, logical connections and data flows, communications and linkages, digital information management, cybersecurity and power generation usage.

Work has already commenced on three IEEE 2030 extensions:

- IEEE P2030.1 "Guide for Electric-Sourced Transportation Infrastructure" is intended to establish guidelines that can be used by utilities, manufacturers, transportation providers, infrastructure developers and end users of electric-sourced vehicles and related support infrastructure in addressing applications for road-based personal and mass transportation.
- IEEE P2030.2 "Guide for the Interoperability of Energy Storage Systems Integrated with the Electric Power Infrastructure" is intended to help users achieve greater understanding of energy storage systems by defining interoperability characteristics of various system topologies, and to illustrate how discrete and hybrid systems may be successfully integrated with and used compatibly as part of the electric power infrastructure.
- IEEE P2030.3 "Standard for Test Procedures for Electric Energy Storage Equipment and Systems for Electric Power Systems Applications" is intended to establish a standard for test procedures around verifying conformance of storage equipment and systems to storage-interconnection standards.

Okanagan College electricians to learn from new solar energy system

When students in the Centre of Excellence at the Penticton campus of Okanagan College plug in their laptops this fall, they'll only have to look outside to see the source of their energy. Just in time for the new school year, the British Columbia college is debuting its new solar energy system: the largest in Western Canada, it claims.

Among other benefits, the college says the system will serve as a learning tool for students in the trades and technology classes. Apprentice and entry-level electricians will be able to learn how the system functions, monitor energy production, and see how the system integrates into the rest of the building's infrastructure and with the municipal power grid.

The hope is that the system will help the Centre of Excellence in Sustainable Building Technologies and Renewable Energy Conservation meet the goal of being energy-neutral over the course of an annual operating cycle.

"In the Okanagan's sunny summer months, the solar energy system will at times exceed the building's needs and the energy will be fed into the grid. In the winter, the college will draw from the grid to meet the campus's energy needs," it explained.

The 260kW solar energy system, which uses 1106 Conergy P solar modules on the rooftop of the building. Canadian solar EPC contractor, SkyFire Energy, was the project developer.

"Installations of this size and profile built in Western Canada really showcase the diversity of the Canadian photovoltaic market," said Jared Donald, president of Conergy Canada. "The solar potential in Western Canada is exceptional. We applaud Okanagan College for its environmental leadership and innovative education programs."

Check out a Distributor Counter Day near you

We get flooded with information here at Electrical Business... and we love it! To help keep things a bit better organized, we've launched a new webpage, Counter Days, which is a calendar devoted solely to special distributor events, like counter days, BBQs, special road show stops, etc. Distributors! Help us help you get the word out for your next special event! Send the event details to EBMag's editor, Anthony Capkun, at acapkun@annexweb.com.

Nova Scotia seeks world's best Clean Technology Start-Ups

The search is on for the world's best clean technology start-ups, and the goal is to bring them to Nova Scotia. Through Innovacorp, the province launched the Nova Scotia CleanTech Open this week. The international competition is designed to find and fund high-potential, early-stage clean technology companies. It will also put a spotlight on Nova Scotia as an ideal location for these companies to grow.

"Clean technology is one of the world's fastest growing industries. Knowledge-based companies like those in the clean technology sectors create good jobs and are vital to Nova Scotia's future prosperity," said Percy Paris, minister of economic and rural development and tourism.

The winner receives $100,000 in cash, a $200,000 negotiable seed investment, mentoring and in-kind business building services, including one-year free rent of turnkey space at the Innovacorp Enterprise Centre in Halifax. At the time the prize is awarded, the company is to be incorporated in Nova Scotia, with the intent to build the business there.

"Nova Scotia has a lot to offer emerging clean technology ventures, from clean energy resources to a supportive business and policy environment," said Clifford Gross, president and CEO of Innovacorp. "Now we're adding venture capital coupled with business support services to help accelerate growth and market success for these companies."

Entrepreneurs have until 5 p.m., December 1, to submit their entries. The judging panel will select a short list that will be invited to move on to Round Two of the competition. The short list will be announced on December 15. The winner will be announced in April 2012.

Submissions can be made online at www.novascotiacleantech.com.

Acklands-Grainger acquires assets of Baie-Comeau's Fercomat

Acklands-Grainger Inc.—a distributor of industrial, safety and fastener supplies (www.acklandsgrainger.com)—has acquired the assets of industrial distributor Fercomat Inc. (Baie-Comeau, Que.) effective today. Acklands-Grainger expects an incremental sales contribution of about $3 million from this acquisition over the next 12 months. Terms of the deal were not disclosed.

"Fercomat has a strong track record of service and, by working together, we will leverage our combined expertise to offer local customers—such as mining, hydroelectricity and aluminum industries—access to the broad array of products and services they need to help keep their facilities running and their employees safe," said Sean O'Brien, president, Acklands-Grainger. "We're committed to serving the needs of Quebec businesses and this acquisition helps ensure we're in the best position to do so."

"Fercomat has worked hard since 1957 to provide businesses and institutions in Quebec with quality products and strong technical expertise," said Pierre Dassylva, president, Fercomat. "We are thrilled to be joining Canada's leading industrial, safety and fastener distributor and know our customers will benefit from Acklands-Grainger's broad product offering, industry-leading supply chain and commitment to service."

Acklands-Grainger has served Quebec for more than 74 years through 14 branch locations. The acquisition of Fercomat is the company's third in Quebec in the past three years.

Cat Rental Power responds to those impacted by Hurricane Irene

The Cat Rental Power Dealer Network has mobilized more than 500MW's of temporary power to restore electricity to hundreds of locations along the East Coast which were left without power as a result of last month's Hurricane Irene.

The integration and movement of equipment from across Canada and the United States provided many facilities with power both before and after the storms had passed, it said. According to Cat Rental Power (www.catelectricpowerinfo.com/rental), the numbers are still growing but over 1,000 generators and 100 miles of cabling have been installed in the past few days to turn the lights back on for many of those left in the dark.

"Hurricane Irene was a devastating storm that will have a lasting impact for years to come. Cat Dealers across North America began developing contingency plans and moving equipment and manpower into place long before the first rains reached the East Coast," said William J. Rohner, VP of Caterpillar's Electric Power Division. "Hundreds of thousands of families and businesses have the power they need thanks to the quick response from the entire Cat Dealer network and the deployment of reliable Cat Rental Power solutions that will help them return to their normal lives."

He continued: "Many businesses and Caterpillar major accounts were proactively engaged in contingency planning with their local Cat Dealers long before the storms arrived and had equipment installed in preparation that allowed them to maintain business continuity throughout."

Eaton Corp acquires IE Power Inc. assets

Eaton Corp. (www.eaton.com) has acquired the assets of Mississauga, Ont.-based IE Power Inc., a provider of high-power inverters for a variety of applications, including solar, wind and battery energy storage, with sizes from 100kW to 5MW. IE Power employs 24 people, and was founded in 1985. Terms of the transaction were not disclosed.

"This acquisition provides Eaton with strong design capabilities for high-power inverters, an established product platform, and access to the rapidly growing utility solar inverter market," said Eaton's Matt Lorenz, vice-president and general manager, Electrical Components Organization, Industrial Control Division.

Electrical Business—busier than ever to get you the news!

Electrical Business

Our editorial team has been out of the office for most of the last two months... and that's how we like it! Editor Anthony Capkun and associate editor Alyssa Dalton have been busy attending different events across North America, including the IEEE PCIC 2011 Conference and Electric Mobility Canada's (EMC's) EV 2011-Electric Vehicles Conference & Tradeshow in Toronto; Torbram Electric Open House in Calgary; and GE Electric Vehicle (EV) Experience Tour in Vancouver. Be sure to visit the Videos and Galleries pages at EBMag.com and see what they've been up to.

PEI's Summerside wind farm now complete

Bruce MacDougall, councillor for St. Eleanors-Bayview (left) and P.E.I. transportation and infrastructure renewal minister Ron MacKinley at the Summerside wind farm site in North St. Eleanors. Photo Brian Simpson.

Families in Prince Edward Island now have greater access to clean, renewable energy, thanks to the Summerside Wind Farm, which recently celebrated its official opening.

The project was completed in two phases of construction: Phase One consisted of the purchase and installation of one wind turbine; Phase Two saw the purchase and installation of three wind turbines at the North St. Eleanors site. Together, the wind farm has the potential to meet more than 25% of the energy needs of the community of Summerside.

The total estimated cost of Phase One is over $5.7 million (with the Feds providing $1.9 million from the Municipal Rural Infrastructure Fund and $952,116 from the Gas Tax Fund). P.E.I. contributed $1.9 million to Phase One, with the City of Summerside providing $952,116. The project cost for Phase Two was $24.3 million, with the Feds providing $4.5 million from the Major Infrastructure Component of the Building Canada Fund. Phase Two also received $7.6 million from the federal Gas Tax Fund. The province provided $4.5 million with Summerside contributing the balance.

GE and Canada to invest in LED lighting technology for greenhouses

GE and the Government of Canada have announced they are each investing $1.3 million for a research project with Les Serres St-Laurent (Savoura) and McGill University to develop "innovative LED lighting technology" for commercial greenhouses to help improve growing efficiency while reducing business operational costs.

"Today's announcement exemplifies successful collaboration driving technology innovation," said Elyse Allan, president & CEO, GE Canada. "The application of GE's LED technology will significantly enhance commercial greenhouse operations, not just in Canada, but around the world."

The joint investment is expected to develop technologies that will enable Canadian greenhouse growers to become more profitable and competitive in the global marketplace. Anticipated benefits to Canadian greenhouse operators may include reduced energy consumption, year-round production, lower operating costs and new job development for the greenhouse industry.

GE Lighting Solutions (www.gelightingsolutions.com) selected McGill University's Mark Lefsrud to conduct research on plant-specific photosynthetic active radiation (PAR) curves (the specific light wavelength plants require for optimum growth) that plays a key role in the advancement of this significant new lighting option for the horticultural industry.

Savoura, one of the largest greenhouse tomato growers under supplemental lighting in the world, will receive trial testing of GE's LED lighting fixtures to help increase energy efficiency and lower production costs. Since Savoura has the technical growing expertise of tomatoes under artificial light, they will provide leadership, expertise and technical support for planning the experiments.

"This forward-looking program will allow Savoura—as well as the entire Canadian greenhouse industry—to continue to offer fresh, healthy and tasty vegetables year-round, while maintaining operating costs at acceptable levels by using energy more efficiently," said Marie Gosselin, president and director general of Savoura.

Electrical Safety Foundation International-Canada (ESFI-Canada) launches!

EBMag was there for the official launch of Electrical Safety Foundation International Canada (ESFI-Canada, www.esfi.ca), a new non-profit Canadian organization dedicated exclusively to promoting electrical safety. ESFI-Canada plans to leverage the achievements of ESFI over the last sixteen years in the States, including sponsorship of National Electrical Safety Month each May.

The organization also plans to engage in public education campaigns to prevent electrical fires, injuries, and fatalities, with its first campaign planned for later this fall.

"By uniting the efforts of many Canadian organizations interested in improving electrical safety, we can speed advancements and achievements nationally," said Peter Marcucci, chair, ESFI-Canada and chief public safety officer of Ontario's Electrical Safety Authority (ESA). "What we can do together will always be more powerful than what any of us can achieve individually."

ESFI-Canada's founding organizations are: CSA, ESA, Electro-Federation Canada (EFC), Howe Brand Communications, Sonepar Canada, Thomas & Betts Ltd., Underwriters Laboratories of Canada, British Columbia Safety Authority (BCSA) and Electrical Contractors Association of British Columbia (ECABC).

"In 2009, ESFI Mexico was launched so, with today's launch of ESFI-Canada, we now have the ability to directly impact the safety of all residents of North America," said David Tallman, ESFI board chair and VP marketing, Americas for Eaton Corp.

Visit bit.ly/qA9AXu for Video.

E.B. Horsman & Son relocates corporate head office and central distribution centre

E.B. Horsman & Son (www.ebhorsman.com)—a 2009 and 2010 winner of Canada's 50 Best Managed Companies Award—has recently relocated its head office and central distribution centre to 19295 25 Avenue, Surrey, BC V3S 3X1.

Also making the move to the new facility are the Process, Automation & Controls and Data Communications groups, formerly housed at the company's 80 Ave Surrey facility, as well as Derek Knight, E.B. Horsman's new lighting specialist.

"The new facility in the expanding Campbell Heights area of Surrey will allow our staff to better serve our customers and partners while creating a more efficient and modern work environment for our staff," says the distributor.

Contact information for the office has also changed. The new phone number is (778) 545-9916 and fax (778) 545-3099. The toll-free number will remain the same at (888) 467-7626.

Money4Meters promotion pays YOU for your old multimeter

Ideal Industries says it wants you to take full advantage of the very latest multimeter technology with its first ever Money4Meters sales promotion, which kicks off today through November 30, 2011.

Money4Meters rewards electricians who purchase select Ideal multimeters with cash back for their old one—whether it is from Ideal or a competing brand. For more information, visit www.idealindustries.com ands click on "What's New". EB

Visit EBMag.com and click Calendar to see an extensive list of upcoming events.

SMMA Fall Technical Conference
The Motor & Motion Association
November 8-10, Charlotte, N.C.
Visit www.smma.org

InfraMation 2011
November 9-11, Las Vegas, Nevada
Visit www.inframation.org

3rd Community Power Conference
Ontario Sustainable Energy Association
November 14-15, Toronto, Ont.
Visit www.cpconference.ca

23rd Canadian Power Conference & Networking Centre
Association of Power Producers of Ontario
November 15-16, Toronto, Ont.
Visit conference.appro.org/conference2011

EB WILL BE THERE!

SCTE Cable-Tec Expo
Society of Cable Telecommunications Engineers
November 15-17, Atlanta, Ga.
Visit www.scte.org

Automation Fair
Rockwell Automation
November 16-17, Chicago, Ill.
Visit bit.ly/1aBO3r

BICSI Canadian Region Meeting
November 22, Mississauga, Ont.
Visit www.bicsi.org

AEL ECOnference
Alberta Electrical League
November 23, Calgary, Alta.
Visit http://www.elecleague.ab.ca

Canadian Electrical Code & Electrical Safety Conference
CSA Standards
November 23-24, Calgary, Alta.
December 5-6, Halifax, N.S.
Visit shop.csa.ca

EB WILL BE THERE!

Construct Canada
November 30-December 2, Toronto, Ont.
Visit www.constructcanada.com

Solar Canada 2011
CanSIA (Canadian Solar I ndustries Association)
December 5-6, Toronto, Ont.
Visit www.cansia.ca

EB WILL BE THERE!

IEEE Globecom
December 5-9, Houston, Texas.
Visit www.ieee-globecom.org/2011

2012

IEEE IAS Electrical Safety Workshop
IEEE Industry Applications Society
January 30-February 3, 2012,
Daytona Beach, Fla.
Visit bit.ly/nviHyA

EB WILL BE THERE!

BICSI Winter Conference & Exhibition
February 12-16, 2012, Orlando, Fla.
Visit www.bicsi.org

EB WILL BE THERE!

Electric West
February 21-23, 2012, Las Vegas, Nev.
Visit www.electricshow.com

NETA PowerTest
InterNational Electrical Testing Association
February 27- March 1, 2012,
Fort Worth, Texas
Visit www.powertest.org

ECAA 50th Anniversary Convention
Electrical Contractors Association of Alberta
March 2-12, 2012, Cabo San Lucas, Baha California
Visit www.ecaa.ab.ca

EB WILL BE THERE!

IEEE IAS Electrical Safety, Technical and Mega Projects Workshop
March 19-21, 2012, Edmonton, Alta.
Visit www.ieee.org/estmp

Dave Smith

Entering indoor substations

Part six

(At the end of Part 5 "Entering indoor substations" last month, Dave explained how to discover corona, and the importance of using all of your senses to assess the safety of your environment.)

Once you've established there are no strange smells or sounds in your substation or electrical room, do a visual survey. Look for bulged equipment doors, things hanging from the ceiling, water infiltration, liquids on the floor, or anything else unusual. Look for the emergency lights, which are usually above the doors, and the location of the emergency equipment, such as First Aid kits and emergency blankets. Rescue hooks and fire extinguishers should be readily accessible.

(I believe every substation and electrical room should have a barrel of water with a quick-access top. Some might disagree, saying a substation is no place for water, and I'm not suggesting it should sprayed all over the place; I just know of too many instances where serious burns and amputations could have been reduced or prevented by quickly cooling the victim.)

When there are other workers in the substation, it may not be wise for you to be there. When they are in flash suits with equipment doors open, exit immediately. The flash protection boundary in most substations encompasses the entire substation when equipment doors are open, and the presence of flash suits indicates high incident energy—and you are at risk. When doors are open but the worker is only wearing a face shield and gloves, you are at reduced risk—but you have increased *his risk* because you are now a distraction.

When there is a fault in a substation, you have mere seconds to react—likely in the dark, with flames and toxic smoke boiling out of the equipment—so always know where the emergency equipment and exits are. Should you ever witness a co-worker caught in an explosion, you need to grab an extinguisher immediately. If the room goes dark, do not worry about calling for help, as people will already be running to see what happened. Get yourself as low as possible, because the smoke is toxic. First spray the equipment bottom-to-top, then your buddy (if he is in flames).

During fire extinguisher training, your instructor would have explained the difference between dry powder and CO_2 extinguishers, and how to extinguish a co-worker on fire. It is *impossible* to miss your buddy's face, so spray from shoulders to feet, and understand that he will be a moving target as he screams and writhes on the floor.

CO_2 extinguishers are not recommended for clothing fires, as they are intensely cold at the trumpet, typically last for about 20 seconds, and hot materials will re-ignite. Always know which you have before you need to use them. When you only have CO_2, then it is better to use it on your buddy than let him roast. With both, try to avoid his face and, again, understand your own subsequent trauma as you discover *it is impossible*—but you are doing as much as anyone could do.

A danger more common than arc flash is electrocution. Prepare for an electrical rescue before it happens by clearly knowing how to respond and under what conditions. Should some poor soul make contact at 2400V or higher, their muscular reaction is usually violent enough to expel them from the equipment. (Also note the presence of junk, as badly managed substations and electrical rooms are often used for storage, creating serious escape hazards.)

> Remember that no matter how qualified or experienced you are, you are still capable of making a very stupid human mistake.

Locate the highest-voltage switchgear, which can easily be 2.4kV to 25kV, and the low-voltage switchgear. The law requires an accurate, up-to-date single-line drawing to be prominently displayed in the substation. Never forget which equipment is which. There have been numerous accidents where supposedly qualified workers have mistaken high-voltage switchgear for low—with tragic consequences.

The last safety course you attended probably did not have a final exam; a good instructor will inform you that your final exam starts the moment you leave the class and continues for the rest of your life. Remember that no matter how qualified or experienced you are, you are still capable of making a very stupid human mistake.

Until next time, be ready, be careful and be safe.© EB

Canada Training Group has been providing consulting services to industry since 1980; Dave Smith, the president, can be reached at davesmith@canada-training-group.ca. At www.canada-training-group.ca, you will find this article (and others) available to you. Feel free to use them to support your own safety program and other initiatives.

Technology and economics are in wind's favour

Despite a rocky start over 100 years ago, large-scale wind turbines are here to stay

David Herres

Wind turbines throughout history have taken many forms. Today's focus, the electrical generator, eclipses older usages. We have simpler, less expensive equipment that can grind wheat, saw lumber, pump water and so on, but when it comes to producing electricity, each of wind's competitors is problematic in its own way.

There's no long-range future for fossil fuels, and wood chip boilers and various biomass strategies will never be a comprehensive solution. Nuclear power is increasingly being seen to have vulnerabilities, to put it mildly. Canada's vast hydroelectric capability would require an extensive transmission infrastructure investment to power our continent.

In contrast, wind power need not be located quite so far from the customer base. Here, again, Canada's wind resources are enormous, yet more evenly distributed throughout the country so that transmission is potentially less onerous. As for off-grid usage, wind and/or solar is the way to go. Diesel supply is diminishing while wind and sun show no sign of abating!

Wind turbines that generate electricity have experienced a highly fragmented development with numerous early failures, both technical and due to inabilities to compete with the cheap oil of a former age.

Early wind power installations

The first large wind generator was built in 1888 in Cleveland, Ohio. Charles Brush fabricated a 17-metre multiple-blade rotor with a huge tail (to provide yaw) and a bulky tower. It had a 50:1 step-up gearbox, providing 500 rpm to turn a DC generator. The Brush wind turbine operated for 20 years, its output a mere 12kW compared to the 100kW return provided by a comparably sized modern unit.

Poul La Cour created a much more efficient wind turbine in Denmark in 1891. His higher-speed rotor with advanced aerodynamics paved the way for 25kW machines in Europe, but the economic climate and cheap oil drove these machines into oblivion.

IMAGES © JUDITH HOWCROFT

Horizontal shaft wind turbine. Two-bladed rotor is most efficient for electrical generation since it starts with a low-torque load. Three blades are commonly used to prevent balance problems.

In the 1920s, great innovation in wind generation occurred in the North American Great Plains, where rural off-grid homesteaders and farmers wanted electrical power for new-fangled appliances and tools, to say nothing of lighting.

Paris-Dunn and Jacobs Wind-Electric provided 1kW to 3kW stand-alone wind generators to meet this demand, and soon these well-made machines were a common sight along rural roads throughout North America. The advanced rotors, rather than the flat blades of an earlier time, were based on the design of airplane wings. The leading edge had a greater radius, reducing airstream pressure to produce lift, which advanced the blade along its circular path.

Economic and social realities conspired to depress the market for these wonderful machines. Greater use of appliances in the home and electric motors on the farm meant a strictly utility-type power was desired. Increased rural electrification displaced wind power on all but the most isolated sites.

Even as stand-alone wind power entered a period of decline, new, highly ambitious projects emerged in some unlikely places. In 1931, Russia—on the edge of the Caspian Sea—was the scene of a 100kW wind machine. It lasted two years but proved impractical because of limited output for such a massive creation.

Another short-lived utility-scale experiment was the enormous (for its time) 1.25MW Smith-Putney wind machine, built on Grandpa's Knob in Vermont. It failed after several hundred hours of operation when one of its rotor blades snapped off at the hub. It was a down-wind model, meaning that the rotors were at the down-wind end of the drive train. Such machines have the advantage of automatic orientation into the wind, so they do not require a tail or wind direction sensor/servomotor combination to maintain yaw. But there is a less obvious, albeit sometimes, fatal flaw: the down-wind rotor is subject to air turbulence, harsh irregular motion, metal fatigue and sudden failure.

After World War II, the scene shifted to Europe, where high fuel prices made wind power increasingly attractive. Several innovative wind machines appeared and operated into the 1960s, when a drop in oil prices removed the financial advantage wind power had enjoyed previously. The new technologies (advanced lightweight glass fiber and plastic blades) were vastly more efficient, but lay dormant until the fossil-fuel panic of the 1970s revitalized the wind power industry.

This was a period of innovation due to American government subsidies and incentives, but real progress was limited. A number of designs were tried and eliminated because of inherent conceptual flaws. Early NASA models were downwind, with attendant instabilities and vulnerabilities. Subsequent efforts were more successful until 1981, when political opposition effectively dampened government-sponsored programs. (Some progress continued; notably a 3.2MW, 100-metre machine built at Oahu, Hawaii.)

Again the focus shifted as the public mindset embraced the ideology of "appropriate technology". An experimental facility at Rocky Flats, Colo., was the scene of a series of small wind generators; 1kW through 40kW machines suitable for high-reliability

Vertical shaft wind turbine has the advantage that it does not have to be pointed into the wind so there is no yaw mechanism required. Also, the generator is down on the ground and not exposed to the elements. However, power output is less than horizontal shaft machines.

Wind turbine used to pump water. Multiple blades allow the rotor to start under high-torque load. These machines were common on the Great Plains, and are still frequently seen.

PHOTOS BY JUDITH HOWCROFT

micro-loads, small residential, commercial and agricultural applications. These were successful, but didn't impact the worldwide fossil fuel dilemma.

Soon another venue shift took place. In Europe, utility-scale multi-megawatt wind turbines were built and tested. This trend evolved in a somewhat convoluted manner until the late 1980s and 1990s when European firms—particularly those in Denmark—moved into a central position. Eventually, Asia came to share the stage with northern Europe. The most recent development has been a truly multinational phenomenon where high-quality, efficient and trouble-free machines have become available and are being installed throughout the world.

Where is the wind blowing?

A look at some of these contemporary products is instructive should we wish to see the wave of the future. Large machines that are optimally spaced and sited along windy ridges have become common. Advanced versions are connected to the internet so they can be monitored offsite.

Vestas

Highly capable machines are made by Vestas, still the largest wind generator maker in the world (even though it has lost market share in recent years due to an increased number of competitors). The Vestas V90 3MW, three-blade model has a 90-metre rotor diameter. Its nominal speed is just over 16 rpm with an operating range of 9 rpm to 19 rpm. Power regulation is achieved by means of pitch and speed control. Air brakes actuate three cylinders during excessive, potentially damaging winds. (It should be noted that very little energy production is lost due to such outages, since potentially damaging winds are infrequent.)

The upwind rotor drives an asynchronous generator running at three megawatts at 60Hz and 1kV. Power is transmitted from the rotor to the generator through a gearbox with one helical and two planetary stages.

Vestas has secured two major Canadian sales this year: one is a 149MW order for 83 V90 1.8MW machines, and the other for 58 V90 1.8MW machines, with a project nameplate capacity of 104 megawatts.

Vestas is the biggest single Canadian wind turbine supplier with 1021 turbines totalling 1683 megawatts of installed capacity as of December 31, 2010. A sales office is located in Toronto.

GE

Another big player in the wind power arena is General Electric. The GE 1.5MW model, like many of its competitors, is characterized by active yaw and pitch control. It has power-torque control with an asynchronous generator. The yaw servo is controlled by a wind direction sensor, and there is automatic cable unwinding to prevent cable damage that could become catastrophic. In the normal course of events, random changes in wind direction should cause yaw rotation in terms of clockwise versus counter-clockwise motion to cancel out, so that the power transmission cable would not become overly twisted.

However, in the fullness of time, it is inevitable that yaw rotation would predominate in one direction until an unacceptable amount of twist could occur. This is typically taken to mean five turns. Accordingly, a twist sensor or turn counter is necessary to direct the yaw servo to correct the situation.

Another feature of the GE 1.5MW wind turbine is variable speed operation, which permits the rotor to absorb high speed wind events and generate power from them, rather than shutting down. A frequency converter

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controls generator torque so that the operating speed range is greater than seen in the products of GE's competitors—a definite plus.

A desirable aspect in the GE machine is that it is quite grid-friendly, especially when the grid is less than stiff, with higher-than-normal internal impedance. Reactive (current leading voltage) power acts to stabilize voltage and increase transmission efficiency.

Other positive features are a fail-safe braking system with electromechanical pitch control for each blade and a hydraulic parking brake. All blade tips have lightning electrodes so that electrical equipment is fully protected.

Reduced maintenance, increased life expectancy for the turbines and less tower oscillation are results of active damping. There is less objectionable noise due to elastomeric support for the gearbox and generator.

Siemens

Siemens manufactures some large machines, such as the SWT-2.3-93 2.3MW wind turbine. Its large rotor makes it feasible for low wind speed sites. It has a simple generator without slip rings, redundant safety features and an automatic lubrication system.

The SWT-3.6-107 model is a giant 3.6MW machine with variable rotor speed to maximize aerodynamic efficiency. The gearbox is three-stage planetary helical construction that occupies less space and minimizes noise.

These units are suitable for offshore use—an increasingly common application. Rotor blades are glass fiber-reinforced epoxy. Siemens produces them in a single operation, which means there are no glue joints that might allow water entry or vulnerability to lightning strikes.

Connected wind turbines

A fascinating aspect of contemporary wind energy technology has been its ability to embrace the internet. Now it is possible to remotely monitor a wind farm on a tower-by-tower basis. When potential trouble is detected (a rise in temperature of a specific bearing, for example), a maintenance crew can be dispatched with the right equipment to make the repair before any extensive damage and/or a prolonged outage take place.

The Siemens WebWPS SCADA system typifies this new methodology. Web-based protocols such as XML, XSL style sheets, Microsoft Internet information server and ASP are available for connecting to a remote monitoring facility via an ethernet network, modem and routers. Optical fiber is widely used. A communication driver controls the network onsite. Parameters may be set to address turbine operation, masts or grid issues.

An important capability is the automatic generation of reports thanks to Microsoft ActiveX Data Objects. All of this is configurable in conformance with the desires of the designers and technicians charged with the task of overseeing wind farm operation.

Wind turbine data, electromechanical status (including current, voltage, frequency, power factor, generator rpm, lubricant temperature and the like) are transmitted over the internet to the remote monitoring facility. The information can be organized in an Excel format for easy interpretation on a daily, weekly or monthly basis.

Wind power unlikely to be set aside again

As we have seen, wind generation functionality and reliability have increased greatly, and the cost per kW of installed equipment has dropped significantly, even as the price of fossil fuel has increased. At present, wind farms throughout North America, Europe


PHOTO COURTESY SIEMENS AG

and the world are proliferating. Similar dynamics are taking place in the context of solar photovoltaic power. Will the growth of solar power obliterate the gains that wind generation has achieved? I cannot provide an answer at this time, but it is likely that both technologies will share the stage as fossil fuel retreats and nuclear power experiences problems in an international context.

The Canadian Wind Energy Association (CanWEA) has an upbeat assessment. The organization states that wind energy can satisfy 20% of Canada's electricity demand by 2025. "Achieving this vision will generate investment, create jobs, produce revenue for municipalities, stabilize electricity prices and cut greenhouse emissions," it says.

Their website notes that wind turbine and component manufacturing now employ 235,000 people worldwide. As wind power acquires a greater share of the energy marketplace, it is likely that this figure will increase. It is clear that wind power has economic benefits. There are moral and aesthetic dimensions to all of this as well, so it seems like a winning situation. EB

Dan Leduc

The Incredible Power of a *Stat Dec*

You do it. You all do it. You all do it monthly. You make solemn sworn declarations that you have paid everyone all monies received on each progress draw received. You do so by executing and having sworn what is called a statutory declaration a.k.a. *stat dec*. And you do not think twice about what it means because everyone does it, and you've been doing it for years.

The process is simple. You complete a form which makes a statement that is a condition for a progress payment or release of holdback. As the CCDC Bulletin 21 (May 2003) states:

> **A Statutory Declaration of Progress Payment Distribution** is a sworn declaration made before a commissioner for oaths, notary public or justice of the peace, whereby a Contractor (on form 9A-2001) or Subcontractor (on form 9B-2001) declares that all amounts payable by them as a result of their receipt of a specified progress payment have been paid, subject to the three exceptions which are identified on the forms.

However, how often is the declaration true? How often do you read the declaration to verify its accuracy? Thankfully, the standard form CCDC 9A and 9B statutory declarations allow for certain qualifications to the declaration in respect of holdback monies, payments deferred by agreement or amounts withheld by reason of legitimate dispute.

But what if the declaration is not true? What if someone relies on a stat dec that is not true? What are the consequences?

The typical declaration is:

> *I solemnly declare that, as of the date of this declaration, I am an zauthorized signing officer, partner or sole proprietor of the Subcontractor (or Contractor as the case may be) named in the Subcontract identified above, and as such have authority to bind the Subcontractor, and have personal knowledge of the fact that all accounts for labour, subcontracts, products, services, and construction machinery and equipment which have been incurred directly by the Subcontractor in the performance of the work as required by the Subcontract, and for which the Contractor might in any way be held responsible, have been paid in full as required by the Subcontract up to and including the latest progress payment received, as identified above, except for:*
>
> *1) holdback monies properly retained,*
> *2) payments deferred by agreement, or*
> *3) amounts withheld by reason of legitimate dispute which have been identified to the party or parties, from whom payment has been withheld.*
>
> *I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.*

Take the story of Roy Murray, owner of Ramco Contractors Ltd. in Campbellton, N.B. In 1999, Ramco had a substantial contract with the City of Campbellton for the construction of the city's civic centre. To receive progress payments from the city, Murray filed statutory declarations with the city. The documents declared, falsely, that all of Ramco's subcontractors and suppliers had been paid. The city accepted the truthfulness of the declarations and, to its prejudice and that of the subcontractors and suppliers, advanced monies to Ramco.

Murray was charged with fraud, uttering documents containing false particulars and breach of trust. The evidence at a preliminary inquiry and seven days of trial before a jury showed that the subcontractors and suppliers had not been paid as declared.

The evidence disclosed that the false declarations were acted upon as genuine to the prejudice of the City of Campbellton which paid huge sums to Murray's company. The false stat decs were in violation of Criminal Code sections 366 (making a false document prejudicing the receiver), 367 (punishment) and 368 (the charge against Murray with a maximum 10-year sentence).

The trial judge sentenced Murray to a term of imprisonment of one year and ordered him to repay the city its losses of $250,000 as a result of his false stat decs. The sentence was later varied on appeal to house arrest for one year, though the order for the repayment of $250,000 in restitution to the city remained.

And all this because Murray swore a stat dec that was not true. EB

Dan Leduc is a partner at Norton Rose LLP and co-chair of the firm's Canadian Construction Law Practice Group. He is frequently called upon to advise and represent owners, engineers, subcontractors, suppliers and builders in such front-end services as contract review, tender issues and general construction matters, as well as in litigation and arbitration. Dan can be reached at (613) 780-1536 or dan.leduc@nortonrose.com.

Dispelling the confusion about electric vehicles

Bruce Lanzerotti

As [North] Americans become more aware of electric vehicles (EVs), the discussion builds and confusion grows. How do they work? Who will drive them, when and why? What does this mean to employers and facility managers? Will cars run out of charge and become stranded everywhere? What are charging stations and how do they work? What should facility and sustainability managers consider as they plan EVs in their parking lots?

Way back in 1994, I was proud to be the first driver in my neighborhood to have a "bag phone". Some of you may recall these behemoth devices; mine easily weighed at least 7 lb. It draped languidly over the centre hump of the front seat of my car. I was thrilled over the power to place a call without having to find a pay phone (remember using those?). I can remember hearing some futurist predict we'd one day have pocket-sized phones, and trying to imagine how that would look.

Fast forward to today. There's a lot of buzz about electric vehicles and an equal hum of confusion. You may be surprised to hear that electric vehicles aren't all that new. And, as we look at the groundwork falling into place, the idea of seeing a million EVs on the road by 2015 isn't inconceivable.

Who will drive them, when and why?

So which comes first: the chicken or the egg? Or, should I say, which comes first: the electric vehicle or the charging station (charging infrastructure)? Many EV detractors feel this technology will never take hold, but they forget the history of the internal combustion engine. Back when gas-powered vehicles were just getting started, there were very few gas stations. It was said: "This horseless carriage will never replace the convenience and dependability of a horse!".

All signs point to history repeating itself. No one should think internal combustion engine vehicles will go away but, rather, there will now be options. And options are good, because they foster competition.

IBM's Institute for Business Value surveyed 1716 American drivers and 123 auto industry executives about electric vehicles, and released a report this January stating that a fifth of American consumers (19%) are either "very likely" or "likely" to consider an EV for their next purchase. This is considered a significant finding, since 42% of drivers know only "a little" or have only "heard of them".

As we seek to dispel the confusion around EVs, it is interesting to note that so-called experts (i.e. industry executives) do not have an accurate understanding of what might motivate consumers to switch.

For example, when asked if higher oil prices would motivate consumers to switch to an electric-only vehicle, 51% of drivers said Yes. However, industry executives expected that number to be much higher (76%). Executives also thought consumers would be significantly more motivated by government incentives or regulations (they guessed 73%), whereas consumers actually came in at 41%. The executives also place less emphasis than consumers on green image/sustainability concerns at 33% compared to 48%. (Motavelli, 2011)

What does this mean to employers and facility managers?

You have a real opportunity to position your organization to demonstrate corporate social responsibility and to prepare for expected adoption by your stakeholders. How soon? Consider this: in a 4Q 2010 report, Pike Research made 10 predictions for 2011. The first one was that the majority of EV drivers in 2011 would be through rental or taxi programs. (Gartner, 2010)

This makes sense as a way for us to get familiar; you know, "kick the tires" and test drive an EV on our next business and leisure trips. Travel industry and corporate America, take heed—anyone driving an EV rental will need a place to recharge, and their GPS systems will lead them to your place *if* you offer a charging solution.

While familiarity is growing, education is still needed. We already see demand building in selected coastal cities and metropolitan areas where consumers have high environmental sensitivity and higher disposable income. Now that mass production of EVs has become a reality, automakers, equipment suppliers, associations, utilities and government entities will contribute to the knowledge base by creating educational materials, hosting events and holding public discussions. Of course, consumers and businesses will need to weigh the costs.

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In November 2004 oil prices were below $40/barrel; by May 2008 they were over $120/barrel. We can only guess at the tipping point for Americans to say "Enough!" over the price of a gallon of gas. Is it $5.00? $6.00? In 2003, the price of gas at the pump was around $1.50/gallon. Today it is inching over $4/gallon in some parts of the country. 100 years ago there were options: steam, electric and gas. Until the latest hybrid and electric vehicles arrived on the scene, there were no viable options. We were held hostage to one type of engine and fuel.

Time will tell, but most indicators point to higher prices—sooner rather than later. The former president of Shell Oil, John Hofmeister, says Americans could be paying $5 for a gallon of gasoline by 2012. "I'm predicting actually the worst outcome over the next two years, which takes us to 2012 with higher gasoline prices," he said. (Segall, 2010)

We now have a transportation alternative that may lessen our dependence on foreign oil. But if we build it, will they buy? Just how much do we depend on foreign oil? According to the U.S. Energy Information Administration, quite a lot. Although we are the third largest crude oil producer, about half of the petroleum we use is imported. Did you know that in 2009 the United States produced 11% of the world's petroleum and consumed 22%? (U.S. Energy Information Administration, 2010)

You may be surprised to hear that electric vehicles aren't all that new. And, as we look at the groundwork falling into place, the idea of seeing a million EVs on the road by 2015 isn't inconceivable.

Will cars run out of charge and become stranded everywhere?

According to the NY Times, CNN, Discovery News and a host of others, there's an emerging consumer phobia to contend with when it comes to making a purchase decision for an EV: *range anxiety*. Defined as "the fear of being stranded in an electric car because of insufficient battery performance", it is said to be a major barrier to sales of electric vehicles. However, Pike Research predicts that "range anxiety will prove to be more fiction than fact, [since] travelling 30 or fewer miles per day is the established pattern for most drivers—even those in gas-powered cars". (Gartner, 2010)

While most experts agree that the majority of EV charging will take place at home or at work, the need for public charging stations remains. One study recommends that one public charging station per 100 PEVs (plug-in electric vehicles) should be sufficient to overcome "range anxiety" during the initial ramp up of e-mobility, as most charging should take place at home. For this reason, cities are partnering with infrastructure providers and leveraging federal grants to minimize local costs.

In a study entitled "Electric Vehicles in America", we read about the learning curve and shortening lead time to readiness. The authors predict that, while local governments and industry must take the lead, "consumer demand will determine where electric vehicle adoption accelerates and where it stalls". (Roland Berger Strategy Consultants and Rocky Mountain Institute, 2010)

Last year, worldwide sales of charging stations was about $69 million, but the business is expected to reach $1.13 billion by 2013. (Pike Research Inc. Gartner, 2010) And a recent study by Verify Market projects the North American EV charging industry will reach $3.09 billion by 2017. (Verify Market, 2010)

What are charging stations and how do they work?

EVSE (electric vehicle supply equipment), electric recharging point, charging point are all names for an EV charging station. EVSEs come in different configurations and curb appeal, power intensity and electronic gizmos.

Many manufacturers offer charging stations that will only serve one vehicle at a time. They can be wall- or pedestal-mounted. However, several companies manufacture units that can charge 1, 2, 3 and even 4 vehicles at a time. The advantage of units that charge more than one vehicle is a lower cost of installation per vehicle. Today, there is one manufacturer that has a plug-less technology—no cord connection required.

Some charging station manufacturers have a utilitarian or industrial look, while some have been designed by product artists giving them an attractive, unique appearance. One manufacturer, Shorepower, has a multiple vehicle unit that sports a lit-up globe making it reminiscent of retro-style gas pumps from the early 20th Century.

What should facility managers consider as they plan for EVs?

When employees, customers and visitors park EVs in your lot, they may be running low on charge. Unlike gasoline pumps, which get their supply from ground storage tanks, EV charging stations can get their "fuel" from the grid, solar, wind and even geothermal sources. In addition to selecting the quantity and model of charging stations to offer, you may very well have a choice about the power source. By providing for electric vehicle charging, your facility will:

1. Send a highly visible message of sustainability.
2. Be known to employees and visitors as forward-thinking and progressive.
3. Welcome and assist visitors driving electric rental vehicles.
4. Provide a silent ambassador to your environmentally conscious customers. In addition, programmed stations can deliver coupons, messages and/or generate a new revenue stream.

No longer a dream, we are witnesses to the rise of a new wave of automobiles assimilating onto our nation's roads. Your organization can lead your industry and your community in the charge toward a positive impact on our environment, economy, and independence from foreign oil.

Offering electric vehicle charging units in your community or facility can provide direct revenue from your customers' usage, added profits from building customer satisfaction and loyalty, and recognition of your company or organization through sustainability leadership. EB

Bruce Lanzerotti is the COO of Plug-In Vehicle Solutions (www.getplugging.com), an Illinois-based distributor of multi-platform electric vehicle charging stations.

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Sold as a kit, IPEX Electrical offers the Round Floor Box and Stand conveniently packaged together as one complete product offering.

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Kwikon® Single Gang Concrete Wall Boxes offer a fully assembled, PVC alternative for installing boxes in poured-in-place concrete walls. Featuring a concrete-tight poly film covering the box opening and integral hubs, the Concrete Wall Box eliminates the time-consuming wrapping and taping work associated with traditional metal boxes.
The non-metallic, non-conductive and non-corroding boxes arrive at the jobsite ready to install saving you time and money!

ENT Support for Concrete Slab Construction

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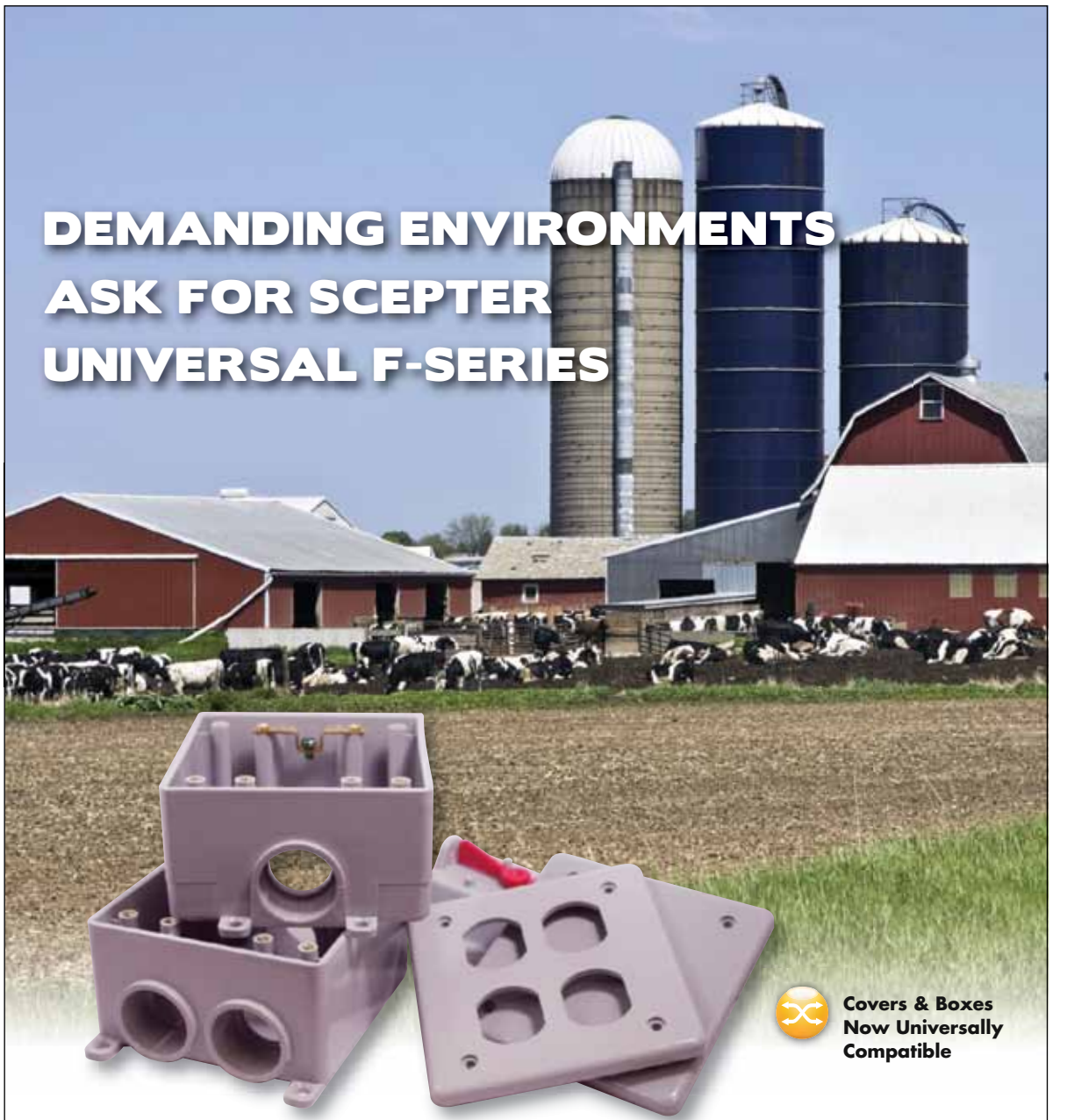

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Building a renewable ENERGY FUTURE for the community

TREC's SolarShare WaterView site: a 2.5-acre system of solar PV panels covering the roof of Daimler Buses North America Ltd.'s manufacturing facility in Mississauga, Ont.

TREC Renewable Energy Co-operative

Dr. Judith Lipp

In light of the ongoing global energy crisis, developers and communities alike seek to find environmentally sustainable and financially feasible alternatives for energy production. Many times, private developers are the first to move into this space, with large-scale renewable energy projects where investments are often foreign, and profits don't directly benefit the local economy.

However, communities interested in developing renewable energy initiatives have another option available to them. By developing renewable energy projects using a community power model, citizens are supplying clean energy to the grid and further diversifying income streams while fostering local leadership, business, jobs and financial returns for investment into other local priorities.

Community-owned renewable energy developments are key opportunities that can make way to a sustainable future, boasting a broad array of environmental and economic benefits at the community level and the broader context. Essentially, these citizen investments are about keeping the benefit within the community and allowing residents to own a part of the local resource. Leading the way in developing these community-owned renewable energy initiatives in Canada is a grassroots, Toronto-based organization, TREC Renewable Energy Co-operative.

TREC's SolarShare WaterView ribbon-cutting event, held July 6, 2011. (Left to right) Judith Lipp, executive director, TREC; Rich Ferguson, president & CEO, Daimier Buses North America Ltd; Hazel McCallion, mayor of Mississauga; Mike Brigham, president, SolarShare; Charles Sousa, Ontario Minister of Labour; Chris Bala, VP sales, Central US & Canada, United Solar.

PHOTOS © TREC RENEWABLE ENERGY CO-OP

Building community power, one step at a time

Incorporated in 1998, TREC is a non-profit organization that aims to support community renewable energy projects and energy conservation in Ontario. TREC is Canada's precedent-setting leader in the sector, having successfully implemented an ever-diversifying portfolio of wind and solar renewable energy co-operatives throughout the province.

In 2003, after four years of grassroots efforts and investments, TREC built Canada's first large-scale wind energy co-operative: WindShare. Its 750-kW wind turbine is located at Exhibition Place in downtown Toronto, and was set up in partnership with Toronto Hydro. This is North America's first urban-based, commercial-scale wind turbine. It began generating power in January 2003, and continues to be a key landmark in the Toronto skyline.

More recently, TREC launched its SolarShare Energy Co-operative this past July, along with municipal and provincial dignitaries on hand to cut the ceremonial ribbon. Founded in January 2010, and with a portfolio of 18 projects equalling over 600 kW and growing, SolarShare is the largest solar PV co-op in Canada and second-largest in North America. To-date, this project alone represents $3 million of community investment in Ontario.

The successful July 6th co-op launch coincided with the unveiling of the latest and largest SolarShare project—WaterView—which spans 2.5 acres of solar PV panels covering the roof of Daimler Buses North America Ltd.'s manufacturing facility in Mississauga, Ont. To-date, WaterView is the most powerful in the SolarShare selection of 18 sites, boasting 438 kW of installed capacity.

"The WaterView project has brought together

The Baker family in front of the solar installation on their rural property. This installation is one of 18 SolarShare co-operative sites.

cutting-edge technology, industry-leading design and local human resources in a project that allows residents in Mississauga and across the province to invest in, and benefit from, clean solar power," said Mike Brigham, president of SolarShare and chair of TREC Renewable Energy Co-operative.

As a result of the implementation of WaterView, SolarShare Energy Co-op has begun selling pre-release Solar Bonds this August, offering Ontarians the opportunity to invest in a portfolio of 600 kW of solar PV installation in their province. These bonds are available to all Ontario residents and businesses. Unrestricted bond sales will be possible after the province's regulatory agency—the Financial Services Commission of Ontario (FSCO)—approves the co-op's offering document. This unique green innovation not only inspires eco-consciousness, but marks a key gateway in community power, investment and economy.

Challenges in building community power

Unlike the Europeans, the value of community power is greatly underestimated in Canada, and is not being leveraged to its full potential; a bona fide concern in light of public arguments over the aesthetics, price and health concerns of renewable energy. A surge in solar and wind developments across the province has created tension between rural communities and the proponents of renewable energy. Large commercial wind development, in particular, has sparked an outcry from a very vocal opposition (representing an effective minority view).

Anti-development arguments are many, and the benefits of renewable energy brushed aside. Lack of control and ownership is certainly one reason for the tension, with local communities and landowners feeling disrespected, ignored and unable to influence their landscape. This dangerous combination breeds an undemocratic process and has produced contempt from local communities toward renewable energy. Unfortunately, these sentiments have scaled-up to an anti-Green Energy Act movement that has been usurped by various groups to fuel regressive energy policies.

This month's provincial election in Ontario puts community power at further risk. One opposition party has vowed to eliminate the FIT program and Green Energy Act, claiming the pricing model is "unsustainable". Their platform proposes a competitive bid process that typically awards contracts to companies that can build renewable energy projects

TREC established the first renewable energy co-op in Ontario when over 400 citizens pooled their funds to build the iconic WindShare turbine at Exhibition Place. SolarShare is the next evolution of community-owned power in Ontario. It exemplifies what the Green Energy Act and the Feed-in-Tariff program were designed to enable: profitable businesses generating green energy and green returns to the community.

at the lowest cost. Sadly, community power is unable to participate in such a process because local groups, co-operatives and communities are not able to access the capital, resources or economies-of-scale necessary to make their bids competitive.

Community power has the potential to help reduce tensions over renewable energy projects in Ontario. By being locally organized, financed and developed, community power places decision-making and authority back in the hands of the individuals who use the energy and live close to the point of production. As people become both personally and financially invested in renewable energy, they become less likely to protest. Also, with local members and investors, public input becomes a consistent and essential part of the project's development as opposed to a regulatory checkbox in commercial projects. This community participation also builds local capacity by providing skills, training and education to citizens in renewable energy, project development and business management.

What the future holds

While much of the country, and most decision-makers, haven't really caught on to the brilliance of community power, TREC and SolarShare work on enabling the participation of (hopefully) thousands of SolarShare investors. In a hotly contested political climate leading up to a provincial election on October 6, and with the Green Energy Act emerging as a wedge issue, the SolarShare team sees its biggest contribution to the green energy debate as the sale of community Solar Bonds. As for the results of the election, the hard hats are already on in the hope that sanity will prevail and the Green Energy Act and FIT programs will survive and thrive, regardless of who governs the province.

For the people committed to community power, it's obvious, as stated by WindShare president, Diane Saxe: "The people who live in a community should be able to invest in local power, help run it, help work for it, profit from it... be part of it".

For TREC, that means developing more co-operatively owned renewable energy projects and pushing for policy and regulatory changes that will make community development easier to accomplish. There is now the FIT review to comment on and ministry meetings to attend to push for progress on TREC's community wind farm. And there are conversations to be had with private developers, to bring community equity to commercial wind and hydro projects. The work of community power will carry on, regardless of the odds, because it's the right thing to do and its time has come. But a little more support from our elected leaders would be a welcome break. EB

Dr. Judith Lipp is the executive director of TREC Renewable Energy Co-op, a Canadian leader in community power project development. She has more than 10 years of experience in renewable energy policy and project development. She can be reached at jlipp@trec.on.ca.

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Electric vehicles:
charging stands & infrastructure

Mark Clapper

Fuelled by environmental concerns, the cost of energy and advance- ments in battery technology, the electric vehicle (EV) continues to march toward mainstream society; along with that march come the associated concerns over the electrical infrastructure required to support them.

This article will offer some basic insights in the areas of electric vehicle architecture, charging stands and the associated charging equipment infrastructure.

Some history

To gain some perspective on the electric vehicle, let's take a brief walk through its history.

Although the exact date is unknown, a Scottish inventor named Robert Anderson developed the first electric carriage in the 1832-1839 timeframe. Anderson's carriage was powered by non-rechargeable batteries available at that time.

He was followed by the American, Thomas Davenport, who is cred- ited with the first practical EV: a locomotive, back in 1835.

Through the remainder of the 19th century, various inventors and scientists made contributions to this industry, including the first lead acid rechargeable battery in 1859 by French physicist Gaston Plante, and an American-built EV by William Morrison of Des Moines, Iowa (1891).

It may surprise you to know that the first electric taxi in the U.S. hit the streets of New York City in 1897, and that the heyday for EVs in the U.S. was in the year 1900, when 28% of the 4192 cars produced were electric. That heyday was short-lived though, due in large part to the introduction of the first gasoline-powered, mass-produced vehicle in 1908: the Henry Ford Model T.

Wind the clock forward 110 years, and the introduction of the Nissan Leaf and Chevy Volt are upon us. Couple this with global EV charging stand projections of 3 million units by 2015, and we find ourselves asking not if, but when the electric vehicle population will develop, and how can we prepare our infrastructure to fuel the new machines.

Terminology

There are several terms that are widely used to describe electric vehicles:

- **HYBRID VEHICLE:** A vehicle that uses two or more distinct power sources to propel a vehicle. The term most commonly refers to hybrid electric vehicles (HEVs) which combine a combustion engine and one or more electric motors.
- **PHEV (Plug-in Hybrid Electric Vehicle):** An electric hybrid vehicle with rechargeable batteries that can be restored to a full charge by connecting to an external power source (charging stand).
- **BEV (Battery Electric Vehicle):** A vehicle that uses one or more electric motors for propulsion and uses rechargeable batteries as the sole power source.
- **EV (Electric vehicle):** A generic reference often used to describe PHEV and BEV.
- **EVSE (Electric Vehicle Supply Equipment).**

continued on page 32

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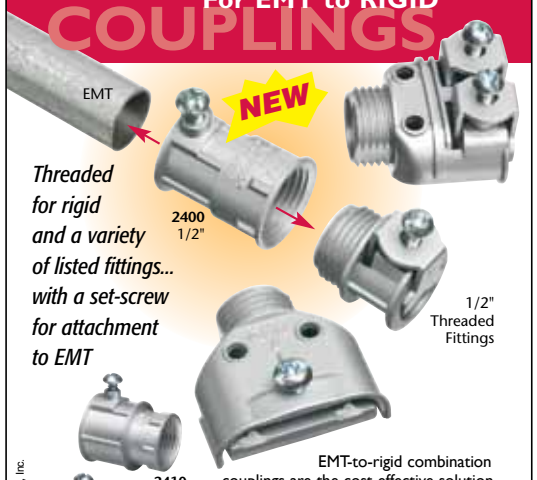

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Steel box w/ plastic flange
FL430S

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Mounting wings attach box securely to ceiling panel

Support wire provides 50 lb rating

50 lb rating on a drywall ceiling *with drop wire*

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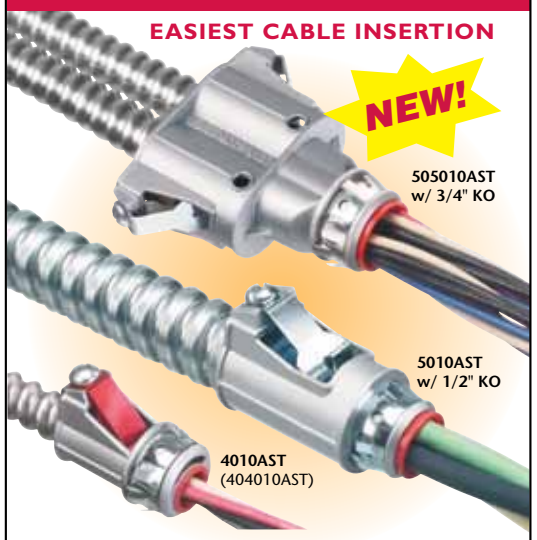

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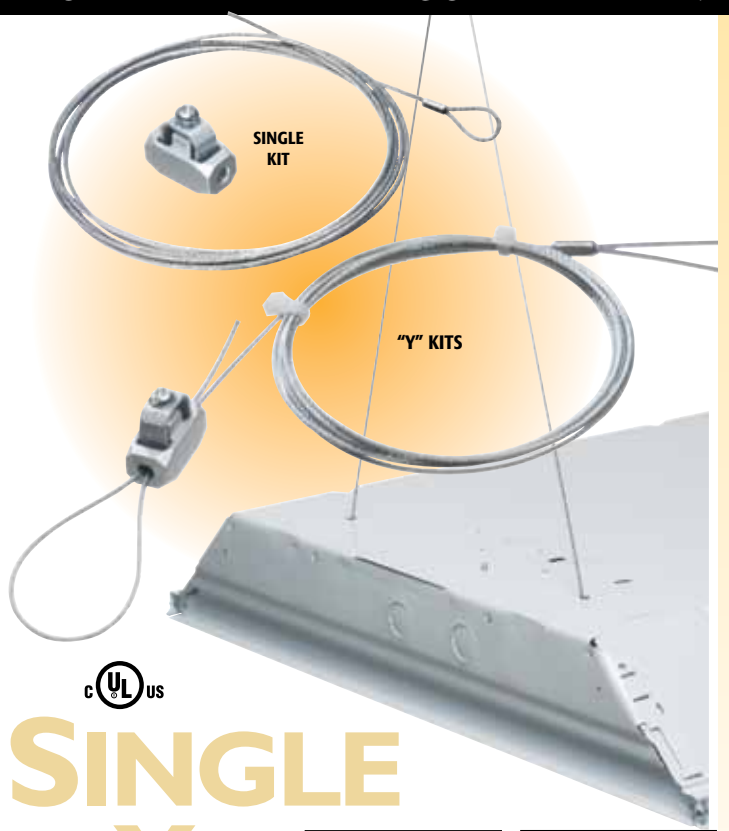
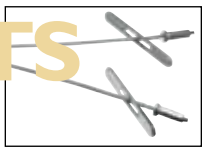
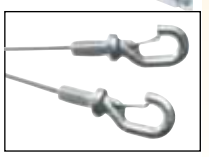


SINGLE AND Y KITS





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- KITS Single with loop, or "Ys" with toggles or hooks – with .080" braided wire in lengths from 5 to 30 ft (Bulk wire available)

SINGLE w LOOP ON END

CATALOG NUMBER	WIRE LENGTH
DWB0805	5'
DWB0812	10'
DWB0815	15'
DWB0820	20'
DWB0830	30'

"Y" w TOGGLES

CATALOG NUMBER	WIRE LENGTH
DWYT0805	5'
DWYT0810	10'
DWY2T0810 (2 PK)	10'
DWYT0815	15'
DWYT0820	20'
DWYT0830	30'

"Y" w HOOKS

CATALOG NUMBER	WIRE LENGTH
DWYH0805	5'
DWYH0810	10'
DWY2H0810 (2 PK)	10'
DWYH0815	15'
DWYH0820	20'
DWYH0830	30'

View Video

Wire Grabber Kits include FLG3 wire hanger, .080" galvanized braided wire

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EV charging stands & infrastructure

Basic electrical components

- **BEV inlet & connector.** The inlet is the "on-vehicle device" and the connector (plug) is associated with the charging stand. There may be a single AC inlet or a combination of separate AC and DC inlets. The AC inlet is used for Level 1 or 2 charging, while the DC inlet is associated with Level 3 charging. The power inlet is the primary method of recharging the batteries. The combination of the inlet and connector is referred to as the coupler.
- **An AC-DC switch mode power supply.** The power supply has several functions. It con- verts AC input power to DC to charge the on-vehicle battery pack. It also has intel- ligence to know the charge status of the battery, and may also take into account any thermal information from the battery, along with any ventilation requirements.
- **A rechargeable battery pack.** Stores the energy required to power the vehicle. Lithium-ion batteries are typical.
- **A motor or motors to propel the vehicle.** Typically AC for on-road vehicles.
- **A controller** to invert the DC battery supply to AC to regulate the frequency and voltage supplied to the motor and, thereby, regulate speed. The controller receives its input signal from the accelerator pedal.
- **Input signal.** An accelerator pedal. Allows the operator to change the power demand to the controller, typically done through a potentiometer.
- **The ability to regenerate the kinetic energy** associated with vehicle movement and brak- ing to recharge the batteries. The recovery of this energy is not enough to completely recharge the batteries, but can help extend the driving range of the vehicle. In combus- tion-engine vehicles, this energy is lost as heat through the braking assembly. In BEVs, the motor can be used to slow the vehicle, acting as a motor during acceleration and a generator during deceleration.

Standards & codes

There are four key standards related to safety, installation and connecting EVSE to the electric vehicle. They are briefly outlined below for reference purposes.

- **UL 2594 –** Electric Vehicle Supply Equipment. This standard covers EVSE, rated a maxi- mum of 250VAC/ 60 Hz which is intended to provide power to an electric vehicle with an onboard charging unit. The products covered include EV power outlets, EV cord sets, and EV Level 1 & 2 charging stands.
- **UL 2231 –** Personnel Protection Systems for EV Supply Circuits. UL 2231 covers devices and systems intended for use in accordance with the National Electric Code to reduce the risk of electric shock to the user from acces- sible parts in grounded or isolated circuits for charging EVs.
- **NEC Article 625 –** Electric Vehicle Charg- ing System. The provisions of this article cover the electrical conductors and equip- ment external to the EV that connect to a supply of electricity by conductive or induc- tive means, and the installation of the equip- ment and devices related to EV charging.
- **SAE J1772 –** Electric Vehicle and PHEV Conductive Charge Coupler. This SAE recommended practice covers the general physical, electrical, functional and performance requirements to facilitate conductive charging of EV/ PHEV vehicles in North America. This document defines a common EV/ PHEV and supply equipment vehicle conductive charging method, including operational requirements and the functional and dimensional requirements for the vehicle inlet and mating connector.

Now let's explore the charging stands, their features, and end with some installation considerations.

Charging stands

The charging stand is the primary method to recharge the batteries within the BEV. It has a typical voltage rating of 600 volts and below and, in broad terms, is responsible for:

a) The safe charging of on the vehicle batteries.
b) Commerce: the ability to facilitate multiple payment options.
c) Open communication protocols for monitoring, and intelligent metering for smart grid interface.
d) Aesthetics, ease of use and the flexibility to support future technology enhancements.

The most common reference used to describe an EV charging stand is its level. The industry recognizes three: 1, 2 and 3, with the primary differentiator between each level being charging speed, power requirements and cost. Generally speaking, faster charging comes along with increased power requirements and equipment cost.

Charging: electrical & time parameters

The typical performance of each level is briefly listed below.

- *Level 1*, slow charging, 15+ hours
- *Level 2*, faster charging, 4 – 6 hours
- *Level 3*, ultra-fast charge, 15 – 30 minutes

Note the above times describe a charge from a fully depleted battery source. Actual charge time will vary based on the charge level and condition of the batteries. Article 625.14 of the NEC does a nice job of outlining the ratings of charging stand level, outlined below.

Level 1 charging

- Power: 120vAC
- Overcurrent device 15A or 20A, depending on receptacle.
- Maximum allowable load 12A (1.4 kVA)
- Connection: The NEC permits connection to a common grounded NEMA 5-15R or 5-20R, receptacle (plug & cord).
- Charge time: 15+ hours
- Application: "Opportunity charging"

Level 2 charging

The NEC notes this as the primary and preferred method of charging at both private and public facilities.

- Power: 240vAC or 208vAC
- Maximum allowable load is 32A (7.7 kVA @ 240V, 6.7kVA @ 208V)
- Minimum overcurrent device: 40A
- Connection: SAE J1172
- Charge time: 4 to 6 hours
- Application: private & public

Level 3 charging

- The NEC likens Level 3 charging to the equivalent of a commercial gasoline dispensing station.
- The cost premium for Level 3 chargers may approach an order of magnitude higher than Level 2.
- Because of individual power supply requirements and available voltage sources, exact voltage and load specifi- cations have not been defined. Refer to individual manufacturers for more information. An example of a Level 3 charger may be a 480V, 400A, 3-phase service.
- Charge time: 15 to 30 minutes.
- Application: Public

Because Level 2 charging is considered the primary charging method, the balance of this article will focus on this level.

Charging: safety-related parameters

As previously noted, the charger is tasked with the "safe" charging of the on-vehicle battery system. When one thinks of charg- ing stands, a picture of a person standing in a puddle with an energized power cord comes to mind. To prevent this picture from ending poorly, the aforementioned codes & standards combine to ensure that items such as electrical interlocks, automatic cable de-energizing, ventilation interlocks and personnel protection are addressed before allowing electrical power to be applied to the EV.

Electrical interlocks

Level 2 charging stands are required to have an electrical interlock that de-energizes the EV connector and cable whenever it is uncoupled from the vehicle.

In other words, power is not supplied to the coupler until positive confirmation that the inlet and connector are properly mated

together. Conversely, if they are mated, are under load and become disjointed, power will be automatically removed. Please note, this requirement is not present for Level 1 charging.

Automatic cable deenergization
Have you ever seen somebody drive off from the gas station with the hose still in the tank? With this scenario in mind, the NEC states that the "EVSE or cable-connector combination must have an automatic means to de- energize the cable conductors and electric vehicle connector when they are exposed to a strain that could result in either cable rupture of separation of the cable from the connector and exposure of live parts". Once again, this requirement is not mandated for plug and cord type chargers (Level 1).

Personnel protection
Both UL 2231 and the NEC outline the requirements for a listed system of personnel protection against electrical shock. Unlike the previous two items, both Level 1 and Level 2 EVSE have to meet this requirement.

Ventilation interlocks - indoor applications
Hydrogen build-up is always a consideration when talking about battery charging. As such, EVSE can be listed or labelled as suitable for charging EVs indoors without ventilation or listed and labelled as suitable for use for charging EVs that require ventilation for indoor charging. EVSE bearing the second label is required to have an interlock in the connector that prevents the EV from being charged until it receives positive confirmation that ventilation is present.

Commerce and communications
Commerce and communications are two key items that a charging stand needs to accom- modate. The owners of the infrastructure need methods to collect a fee for charging stand use, to monitor their infrastructure for service needs, and to allow their clients access to applications that show where EV stands are located, their status, etc.

Commerce
For a publicly accessible EV charging stands, some type of fee collection method will be a necessity. This means that designers of the EVSE infrastructure will need to become comfortable with the specification and instal- lation of these items.

Communications
In addition to communications related to commerce, the charging stands will also need to have the options to communicate with the utilities for smart grid metering and with third party applications. The third party applications cover functions that range from identifying stand locations and status, to maintenance and collection services.

Since EV charging stands are relatively new and will be in the public eye, some of the frequently asked questions about them include: What do they look like? Do they come in different colours? What are the mounting configurations? And, "What is inside the box?" Unlike the typical elec- trical installation which is behind closed doors, owners in this operating space are concerned not only with function, but that the design not be obtrusive to the surroundings and be easy to use.

The shape and colour offering of a charging stand will vary by manufacturer, but they can typically be categorized into a pedestal, pole or wall-mounted product.

Installation considerations
The basic installation considerations associ- ated with EV charging stands and upstream equipment are not unlike those we see daily.

The governing installation standard for EVSE is Article 625 of the NEC. This article mandates the usual items that pertain to:

- Overcurrent protection – NEC 625.21
- Personnel protection – NEC 625.22, UL 2231
- Cable sizing, type, physical length and mounting height – NEC 625.17

Outside of the above, there are some non- traditional tasks that may require additional thought, potential code revisions, design time and, perhaps, some new skill sets:

- An audit of the available kVA capacity in the system, both from a utility and installed equipment viewpoint.
- Harmonics: Since each EV has an "on- vehicle" switch mode power supply asso- ciated with it (AC/DC), there will be some level of harmonic distortion generated by this device. At present, there is not a large volume of information to quantify the impact and the potential need for mitiga- tion in the upstream equipment.
- Ventilation requirements (indoor): Refer to NEC 625.29D.
- Load balancing: Level 1 and 2 charging stands are single-phase load and, as such, should be balanced in the typical fashion of dispersing them among A-B, B-C and C-A connections.
- Service ratings: In the 2008 NEC, EVs are considered to be continuous loads, which leave no room with regard to reducing upstream capacity needs, based on diver- sification claims. As we gain more experience with these types of installations, perhaps the data will allow the load classifications to change and, in turn, allow service ratings to be reduced.
- 208V versus 240V, 32A, single-phase charging (Level 2). Assuming a con- stant current of 32A, does the overall kVA available through the charger have any significant impact on charge time reduction? Should the design engineer lean one direction or another? Is it worth the cost to modify an existing 208V service to 240V?
- Communication networks will need to be installed and tested (both wired and wireless).
- Commerce: Installers will need to be versed in the installation and testing of commerce applications that accommodate user authentication, multiple payment methods and bill reporting/generation. The physical location of the equipment will most likely be a challenge. Perhaps the largest item to contend with will be the routing of power and networking conductors and conduits.
- Resale of electricity. The laws around the resale of electricity vary between jurisdictions. New regulations may need to be established.
- Logistics & flow: Installations may stretch outside of the traditional pedestal or pole-mounted applications. Consider an example of a taxicab hub. In this environment the expired battery packs may simply be swapped and the expired batteries placed in recharging racks. A design in this application may mix Level 2 and 3 chargers, and will require that the industrial process/flow of swapping, moving and recharging the batteries will be mapped out.

The EV dates back some 178 years, and it is interesting to see it make a renewed push back into society. The momentum seems to be increasing with new battery plants being constructed, new vehicles being introduced and the U.S. Department of Energy sponsoring pilot EV charging stand installations. This leads to one final thought...the EVs are coming, but is our infrastructure—your infrastructure—ready to support them? EB

Mark Clapper is a specification engineer with GE.

Keith Moss, president and CEO of **Sonepar Canada** (www.soneparcanada.com) has been appointed president of the Asia-Pacific Region, succeeding **Marius van Huijstee**. Meantime, **François Anquetil** (president of Lumen) has been appointed managing director of Sonepar Canada to succeed Moss. Sonepar Canada is a national electrical and safety distributor, providing service to residential, commercial, industrial and specialty business customers since 1984. There are over 1500 employees in more than 90 branches within six divisions: CenturyVallen, Gescan, Lumen, Osso Electric, Texcan and SESCO. Anquetil, a Canadian citizen born in France, started his career at Lumen in 1988 as controller. He subsequently held a variety of positions inside the Sonepar Group, both in France and Canada, before taking up his current position as president of Lumen in 2008. Anquetil will report to Dave Gabriel, and will be based in Toronto. A Canadian citizen born in the United Kingdom, Moss joined Sonepar Canada in 1999, and had growing responsibilities before being promoted managing director of the country in 2008. In the last 10 years, the group's Canadian organization has grown its sales from $500 million to $1 billion, and multiplied its PBIT by 10. Moss will become a member of the senior executive council, and report to Franck Bruel. He will be based in Hong Kong, and will be taking his new position as of November 1.

Universal Lighting Technologies (www.unvlt.com) has added two manufacturer rep agencies to its sales network in the Atlantic Provinces. **Vigilant Technical Sales Ltd.** is representing the company in Newfoundland & Labrador, while **Carrtech Sales Ltd.** is handling New Brunswick, Nova Scotia and Prince Edward Island. Both are authorized to represent Universal and its line of high-efficiency linear fluorescent, compact fluorescent, HID and e-HID ballasts, as well as control systems, lamps and lamp holders.

Electec Ltd. (www.electeconline.com), a manufacturer of modular building wiring systems, announced three new representatives joining its sales network: **Omnilumen Technical Products** (Toronto and Northern Ontario), **Luminous Concepts Inc.** (Southern Ontario), and **Lumilux+** (Ottawa and Quebec).


Derrick McColeman

Derrick McColeman is a new associate partner of **Telmec Sales** (Ottawa, Ont., www.telmecsales.ca), a division of **Contact Delage Inc.** (www.contactdelage.com) McColeman brings with him "an extensive background in the electrical distribution industry," said Guy Goupil, president of Contact Delage.


Bruce Fleming

The board of directors of **CD Nova Ltd.** (www.cdnova.com) Group of Companies has appointed **Bruce Fleming** as president, replacing **Don Bealle** (who remains board chair). CD Nova Ltd. is a Canadian supplier of instrumentation to the industrial, utility and government marketplaces.

Nova Scotia has appointed **Power Advisory LLC** as an independent renewable electricity administrator to oversee a call for bids from independent power producers to win the right to develop large, renewable-electricity projects to deliver 300 GWh/year between now and 2015.

"The use of a third-party administrator ensures that the bids process is seen as equitable and transparent to all Nova Scotians," said energy minister Charlie Parker. Nova Scotia's 2010 Renewable Electricity Plan set a target of 25% of the province's electricity needs being met through renewable sources by 2015, and 40% by 2020. The plan also calls for an equal amount of renewable electricity to be developed by independent power producers and directly by Nova Scotia Power, as well as about 100MW for community organizations, municipalities and aboriginal groups.

Individual ratepayers can also take advantage of a program through Nova Scotia Power that pays them for extra electricity they generate, said the province. Visit nsrenewables.ca for more information.

Philips Lighting has appointed **Pierre Legare** to the position of director professional sales, Lighting Systems, Controls and Lamps Canada. In his new role, Legare will lead the professional sales team in strengthening its Canadian position in lighting products and solutions. He was previously with Thomas & Betts Canada, and now reports to Michael Gentile, vice-president & general manager, Philips Lighting Canada (www.lighting.philips.ca).

AFFILIATED™ DISTRIBUTORS

Where market leaders grow

Affiliated Distributors (A-D)—a North American wholesale marketing group—is sporting a new look for Fall 2011. With this year marking A-D's 30th anniversary, CEO Bill Weisberg said, "The new logo is a reflection of our core operating principle, which is that A-D drives accelerated growth for companies that are market leaders or that want to become market leaders. The AD brand has stood the test of time and continues to evolve through innovation and service to our Affiliates and Preferred Suppliers". The decision to change the brand's logo, tagline and both public- and private-facing websites came about through strategic discussions between A-D, its independently owned distributor Affiliates and Preferred Suppliers, noted Weisberg. "A-D's new mark called, The Mountain... better reflects the group's leadership position and aspirational qualities," he added. The Mountain, shown as a series of peaks growing upward from the A-D triangle, "shows the growth/performance aspect found within AD and the surrounding sphere represents the collaborative AD community". Meantime, the updated tagline "Where Market Leaders Grow" is meant to underscore A-D's "foundational commitment to quality, growth-oriented members and suppliers". Finally, the A-D website has updated its URL from MyA-D.net to www.ADHQ.com.

The 2011 Ontario Electrical Safety Awards were recently awarded, recognizing "outstanding contributions in advancing electrical safety and building a safety culture in Ontario". This year's winners are:

- Consumer and Home Electrical Safety: **Mike Holmes**
- Powerline Safety: **Cambridge North Dumfries Hydro, Guelph Hydro, Kitchener Hydro** and **Waterloo North Hydro** • Product Safety: **Whirlpool Corp.**
- Worker Safety: **Entertainment Electrical Safety Committee of Ontario (EESCO)**

"We are on a mission to eliminate electrical fatalities and serious injuries in Ontario and these people and organizations exemplify the leadership and effort needed to achieve that goal," said Peter Marcucci, Electrical Safety Authority (ESA, www.esasafe.com) chief public safety officer. "We're very pleased to have an awards program that formally acknowledges the contributions of so many others working towards the same goal." The awards were established by ESA to acknowledge the contributions made by people and organizations to reduce electrical fatalities, injuries and loss.

Cree Inc. (www.creeledlighting.com) has acquired **Ruud Lighting Inc.** (www.ruudlighting.com) for a net cost of about $525 million. "Combining two highly complementary LED innovators, the acquisition allows Cree to extend its leadership position and increase the adoption of energy-efficient LED lighting," said the company. "Cree is taking another bold step in leading the LED lighting revolution, creating a company that has an unrivalled focus and commitment to driving LED lighting adoption," said Chuck Swoboda, chair and CEO of Cree. The acquisition aims to create a market leader for indoor and outdoor LED lighting, accelerating adoption and expanding the market for both Cree's LED systems and components. Ruud Lighting will continue to be based in Racine, Wisc., and will operate as a subsidiary as part of Cree's lighting business. Additionally, Alan Ruud, chair and CEO of Ruud Lighting, has joined the Cree board.

Hubbell expands NRG 300B Series with 15W LED wallpack

Hubbell Lighting has expanded the NRG 300B Series with a 15W LED wallpack that, it says, provides an excellent upgrade from CFL systems. It features a 10-LED system that delivers 635 lumens at 5000K, providing optimal colour recognition says Hubbell. The 50,000-hour L70 rated life wallpack is available with or without photocontrol, a 1/2-in. bottom knockout for surface conduit wiring, and is UL 1598 wet location listed.
HUBBELL LIGHTING
www.hubbelloutdoor.com

Universal Lighting adds WTDCL time controller to DCL control system

Universal Lighting says its DCL control systems are now even easier to use, thanks to the new WTDCL time controller. "With this user-friendly device, all programming, including basic configuration of the DCL system, is achieved by front-panel keystrokes," says the company, adding that no computer or special commissioning tools are required. The WTDCL is packaged in a NEMA 1 enclosure with an integral Class 2 transformer. The only required connections are a 120vAC power source and a DCL load.
UNIVERSAL LIGHTING TECHNOLOGIES
www.unvlt.com

Phoenix Products launches RSL LED series

Phoenix Products Company has released its RSL LED series, which it describes as a rough-service linear LED fixture. In addition to long life and low maintenance, the RSL is an instant-on, surface mounted fixture designed to replace linear fluorescent fixtures, it says. The fixture has a light output of 4600 lumens, and comes in three different configurations: a two-foot-one LED module (26W); a four-foot-two LED module (56W); and a four-foot-three LED module (84W). For greater heat dissipation from the LEDs, the fixture employs a thermal pad, aluminum housing, and aluminum heat sink, adds the company.
PHOENIX PRODUCTS
www.phoenixproducts.com

Nicor releases Maxcor 5-in. and 6-in. recessed LED downlights

Nicor has released its Maxcor 5-in. and 6-in. recessed LED downlights, saying they're suitable for retrofit and new construction applications. According to Nicor, the luminaire operates at less than 14 watts, produces 900 lumens and is dimmable to around 5%. A 4-in. version is planned for late this year.
NICOR
www.nicorlighting.com

Chloride Systems PathMaster horizontal luminaire

Chloride Systems has introduced what it describes as an "impressive but discrete" state-of-the-art architectural lighting luminaire—the horizontal PathMaster. By eliminating any visible fastening hardware, the PathMaster seamlessly blends into interior spaces as well as outdoor areas to support low-level illumination. The PathMaster incorporates a 10-year continuous duty-rated white LED light engine and driver, and features a powder-painted cast aluminum housing with numerous standard finishes, satin acrylic lens, low-voltage and line-voltage models, user-selectable light level dip switch, and line-voltage dimmable drivers.
CHLORIDE SYSTEMS
www.chloridesys.com

BetaLED OL Series linear luminaires

BetaLED, a division of Ruud Lighting Inc., introduced the OL Series linear luminaire for multi-purpose-use at Lightfair 2011. It is designed, says the company, to provide high-performance interior/exterior illumination for a variety of architectural accent applications, including façade, sign and wall wash. The low-profile design and 360-degree adjustability allow for flexibility, and promise better than 85% predicted lumen maintenance at 50,000 hours at 25ºC.
BETALED
www.betaled.com

Pre-Master Electrician Course now available through CSA

Are you preparing to write the Master Electrician Exam? CSA's 12-module course references sections of the Ontario Electrical Safety Code and other pertinent legislation, electrical calculations, as well as trade and business practices. The program takes about 36 hours to complete with a flexible format that allows for self-paced study within a 90-day period. It was developed in collaboration with the Electrical Safety Authority (ESA). The course is now available through CSA's online store.
CSA
shop.csa.ca

SMA adds 30-48 kW Sunny Tower configurations

SMA has expanded the capacity of its Sunny Tower inverter system to include 30 through 48 kW configurations. With the Sunny Tower, solar professionals can now install any combination of SMA Sunny Boy 5000-US, 6000-US, 7000-US and 8000-US inverters to create a custom power output based on the overall PV system design, it says. The Sunny Tower comes prewired for three-phase utility interconnection, and has an integrated load-break-rated lockable AC/DC disconnect switch and fused-series string combiner.
THE SMA GROUP
www.sma-canada.ca

Leviton expands Evr-Green line of electric vehicle charging options

Leviton has expanded its Evr-Green line of residential, commercial and public charging systems with the addition of the 120 Level 1 portable charger and 160 Level 2 home charging station. According to Leviton, the portable charger can be plugged into any standard 15A or 20A, 125-volt grounded receptacle, while the home charging station provides up to 16 amps at 240vAC (3.8kW output).
LEVITON
www.leviton.com

GE EverGold SVT Series grid tie solar inverters

GE Energy Industrial Solutions claims its new GE EverGold SVT Series Grid Tie Solar inverters for residential and small commercial photovoltaic systems are engineered for flexibility in system design and for ease of installation. They are now available to distributors, integrators and contractors for new construction and retrofit projects. According to the company, the transformerless design reduces inverter weight to about one-half of that of traditional transformer-design inverters on the market, making the installation of solar energy systems that much easier.
GE ENERGY
www.geindustrial.com/solar

Silfab Spa and ISC Konstanz debut Zebra solar cell

Silfab Spa (Italy) and the International Solar Energy Research-ISC Konstanz (Germany) have joined to develop the Zebra—a back-contact solar cell with an "actual" 19+% energy conversion efficiency (and a potential exceeding 22%) that uses, they say, a "low-cost industrial process". The Zebra cell concept is based on large-area (156 x 156 mm) n-type monocrystalline silicon wafers and is a back-contact, back-junction cell, without any metallization on the sunny side.
SILFAB SPA
www.silfab.eu

Wago 789 Series feedthrough solar DC current sensors

Wago Corp. claims its new Feedthrough Current Sensors continuously measures DC currents to optimize photovoltaic (PV) energy

production. "Via serial connection, the 789-620 (0–80A DC) and 789-621 (0–140A DC) sensors transmit data with an accuracy of 0.5% (full scale value)," and can be used to quickly identify defective or damaged PV modules, bolstering performance and reliability, it says. According to Wago, the sensors are equipped with dual RJ-45 interfaces and transmit data via RS-485 serial communication lines up to 4000 feet. The sensors are said to operate in temperatures of -20ºC to +70ºC.
WAGO
www.wago.us

SolarWorld publishes Energy for You and Me booklet

SolarWorld, a manufacturer of solar panels, has published a free-to-download booklet that explains solar energy (intended primarily for Grade 8-12 schoolteachers). Available from the company's website, "Energy for You and Me" uses colour photography, illustrations and graphics to unlock the science and technology of how crystalline silicon solar panels are produced and deployed, and how they generate electricity. "As a kind of Solar 101, our new publication will help these future leaders [schoolchildren] understand how solar energy not only will, but is currently building a clean, green future," said SolarWorld Americas president Kevin Kilkelly.
SOLARWORLD
www.solarworld-usa.com

Eclipsall adds engineering, procurement and construction services for solar PV

Eclipsall Energy Corp. has expanded its business to include the provision of engineering, procurement and construction services for solar photovoltaic (PV) projects under the Eclipsall Solar banner. Additionally, the company will offer project development and management services under the Eclipsall Development Corp. name. Eclipsall says it has arranged for project equity and financing in connection with small and large solar PV projects within Ontario.
ECLIPSALL ENERGY
www.eclipsall.com

EnOcean now fully interoperable with TCP/IP

EnOcean Alliance has announced its wireless, battery-less energy harvesting sensors and associated control systems are fully interoperable with TCP/IP. By establishing TCP/IP interoperability, building owners and facility managers can monitor, manage, and control these systems centrally and from any web-enabled device, from anywhere in the world, says the company.
ENOCEAN ALLIANCE
www.enocean-alliance.org

Phihong develops POE16R-1AF wall plug adapter

Phihong, a global provider in Power-over-Ethernet solutions, has developed a new midspan product that features a wall plug for AC power. Designated the POE16R-1AF, the 15.4W wall plug adapter is fully compliant with the IEEE802.3af standard and may be used for a variety of applications including wireless and Bluetooth access points, IP telephones, or IP print servers, it says. The midspan features over-voltage, over-current, over-temperature and short-circuit protection and conforms to UL60950-2, while the wall plug unit features a single bi-colour LED that can operate at 10Mb or 100Mb Base-T data rates.
PHIHONG
www.phihong.com

Crestron unveils V24-C touchscreen display

Crestron has launched the V24-C 24" HD touchscreen display as the latest addition to its family of high-definition V-Panel touchscreens. According to Crestron, the "revolutionary" V24-C blends full touchscreen navigation, high-performance graphics and HD video with DigitalMedia 8G+ connectivity and a widescreen display. The company says all uncompressed HD audio/video, control, ethernet and USB HID signals are transported directly to the V24-C through a single Cat 5e wire or DM 8G cable without requiring a separate receiver.
CRESTRON
www.crestron.com

Cooper Wiring Devices QuickGrip industrial plugs and connectors

Cooper Wiring Devices has announced the QuickGrip line of industrial plugs and connectors, which it claims provides superior performance and durability and quick and easy installation. The plugs and connectors are built for long-lasting use with quality materials for rugged construction and reliable performance, it adds. The QuickGrip utilizes a single-piece hinged body and, says Cooper, has a unique terminal configuration that places screws in only two directions, and a large wiring chamber that can greatly reduce installation time, labour costs and increase efficiency.
COOPER WIRING DEVICES
www.cooperwiringdevices.com

Extech HDV600 videoscope series

Extech Instruments' new HDV600 high-definition borescope camera series features a 5.7" (145mm) colour display for bright outdoor sites or poorly lit facilities, it says. Optics include 4mm-6mm LED-illuminated camera probes and SD memory stores 15,000 JPEGs or video, plus audio annotations. The series also features glove-friendly controller handsets with 320° articulated probes and wireless connectivity (10m range) simplify inspections, and adjustable LED lighting.
EXTECH
www.extech.com

Appleton tray cable connectors

Appleton now offers a "versatile" line of tray cable connectors engineered for use with TC, ITC, PLTC and other commonly-used types of tray cable which it claims features a compensating displacement seal that provides ingress protection to NEMA 4X and IP68 standards, allowing use in highly caustic or harsh environments. The connectors also provide a seal insert that lets each gland terminate the broadest cable range available in a single hub size, it adds. Manufacturered in aluminum, stainless steel and nickel-plated brass, the new connectors come in trade sizes ranging from 1/2 in. to 4 in.
APPLETON
www.appletonelec.com

Meltric publishes 2011-2012 product catalogue

Meltric Corp., a manufacturer of industrial-duty electrical plugs and receptacles, has published its 2011-2012 product catalogue featuring Decontactor Series switch-rated plugs, receptacles and connectors. The 231-page catalogue also includes other plug and receptacle product offerings, such as the new DSDC Series direct current rated devices (up to 750 VDC), high ampacity devices (up to 600A), and a wide variety of Multipin devices (up to 37 contacts).
MELTRIC
www.meltric.com

Snake Tray messenger wire cable tray for solar installations

Snake Tray has launched a patented cable tray system which it says manages cables that quickly snaps on to messenger wire for the fastest installation on the market. Solar Snake Tray for Messenger Wire is designed to easily suspend from messenger wire and requires no hardware to mount, says the company. Snake Tray comes in hot dipped galvanized and stainless steel to protect from weather and other environmental conditions.
SNAKE TRAY
www.snaketray.com

Milwaukee 6-in-1 lineman's pliers

Milwaukee Tool's hand tool offering has expanded with the addition of its 6-in-1 lineman's pliers (48-22-3309)—a 9-in. tool that can be used for reaming pipe, cutting bolts, pulling fish tape and nails, cutting nails and for standard plier applications. According to Milwaukee, the tool features rust protection to reduce corrosion and increase tool life, and induction-hardened jaws for durability and performance. Specs include: jaw length of 1 5/8-in.; jaw capacity of 1 in.; knife length of 13/16 in.; bolt cutter for #6-32 and #8-32; and pipe reaming up to 1 1/2 in.
MILWAUKEE
www.milwaukeetool.com

ADVERTISER INDEX

Kris Paszkowiak, P.Eng.

Delta to wye conversions

The most common system used for power distribution is the wye-connected secondary on the step-down transformer. Another, less commonly used system is the delta-connected secondary. For many years, there has been a trend to convert from the 3-phase, 3-wire delta to 3-phase, wye-connected 4-wire systems. There are many benefits to the power distributor as well as the end user resulting from this conversion; for the latter, these include a more stable power system with better power quality.

When an intermittent line-to-ground fault occurs on an ungrounded delta system (such as arcing), then severe overvoltages can be present on the system, causing electrical equipment insulation damage. A second ground fault incident will result in a phase-to-ground-to-phase fault with enough fault current flowing to damage the electrical equipment itself. What is even more important than damage to electrical equipment is the fact that there will be enough current flowing to pose an electrical shock hazard to people.

A solidly grounded wye system can provide different voltages for connecting electrical equipment. The 4-wire system offers secondary phase-to-phase voltages such as the 600V or 208V, and additional phase-to-neutral voltages such as 347V or 120V. The typical delta system offers only the 600 phase-to-phase voltage, but other power requirements require the use of additional transformers.

A number of Canadian Electrical Code (CEC) Rules that need to be considered when converting from a delta-supplied consumer service to a wye-connected system.

Rule 10-106 requires the alternating-current systems to be grounded to limit the maximum voltage-to-ground to 150V, or be grounded when the system incorporates a neutral conductor. Also, upon completion of the conversion from an ungrounded 3-wire delta system to the grounded wye system, the previously required grounding devices must be removed.

Rule 10-204 states that where the system is grounded at any point, the grounded conductor shall be run to each individual service, have a minimum size as specified for bonding conductors in Table 16 and, where used as the neutral conductor, must be sized as per Rule 4-022.

Rule 14-012 states that electrical equipment required to interrupt fault currents must have ratings sufficient for the voltage employed and for the fault current available. This is a concern because, in a grounded system, the fault current will flow on the occurrence of any line-to-ground fault, and the new power transformers supplying the 4-wire system tend to have lower impedance, thereby increasing the available short circuit current.

Rule 14-102 requires ground fault protection to de-energize all normally ungrounded conductors of a faulted circuit of a solidly grounded system rated more than 150 volts-to-ground, less than 750V phase-to-phase, and 1000A or more and for a solidly grounded system rated 150V or less to ground and 2000A or more.

Conversions facilitating the connection of line-to-neutral loads require equipment modifications to avoid electrical safety issues, such as electrical shock, fire or explosion. EB

Kris Paszkowiak is principal of CodeSafety Associates, a consulting firm serving the needs of the electrical industry. He holds a Master Electrician licence and has served numerous organizations over the years, including the Canadian Advisory Council on Electrical Safety, Committee on CE Code Part I and UL Electrical Council. E-mail CodeSafety Associates at kris.paszkowiak@codesafety.ca.

Questions and answers compiled by the Electrical Safety Authority | VISIT WWW.ESASAFE.COM

Tackle The Code Conundrum... if you dare

Answers to this month's questions in December's Electrical Business.

How did you do with the last quiz? Are you a...

Master Electrician ? (3 of 3)
Journeyman ? (2 of 3)
Apprentice ? (1 of 3)
Plumber ?! *(0 of 3)*

Question 1

For a mobile home, the minimum length of #6AWG power supply cord measured from the attachment plug to the point of entrance to the unit is:

a) 4 m **c)** 6 m
b) 5 m **d)** 7.5 m

Question 2

Does CEC permit the installation of communication jacks in bathrooms?

a) Yes **b)** No

Question 3

When Type CFC system wiring is used, it shall be covered with abrasion-resistant tape and secured to the floor so that all cables, corners and bare conductor ends are completely covered.

a) True **b)** False

Answers to Code Conundrum EBMag October 2011

Q-1: Does the CEC permit a #8AWG system grounding conductor, that is free from exposure to mechanical injury, to run exposed along the surface of a building construction without protection?

b) No. Rule 10-806.

Q-2: It is permitted to use electrical non-metallic tubing (ENT) underground and in concealed locations; however, it is not permitted to install ENT in exposed locations.

b) False. Rule 12-1500.

Q-3: The CEC requires a splitter to be installed where two or more conductors are connected to a conductor larger than [___] copper.

b) #6 AWG. Rule 12-2000 (6).