NOVEMBER 2016 || VOLUME 52 || ISSUE 11

ELECTRICAL BUSINESS

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INSIDE

- Your fleet is integral to delivering customer value
- Shock hazard with "approved" solar PV equipment
- Playing matchmaker with conductors, OCPDs & loads

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"There were many moments where we were nervous" P.16

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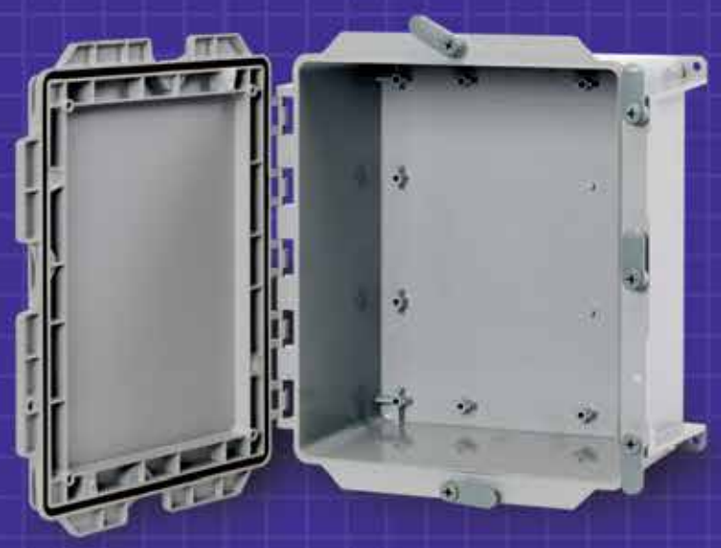

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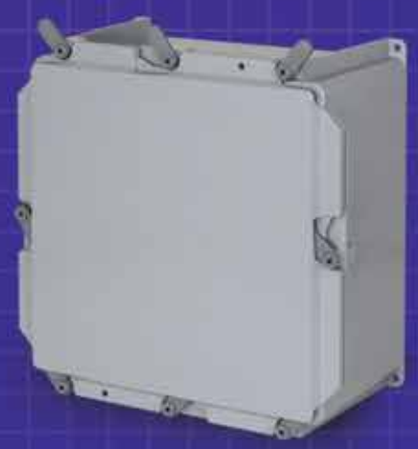

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from the **EDITOR**

ANTHONY CAPKUN

Fingers crossed... Prompt Payment is coming!

It's been a few years now that we've been tracking the Prompt Payment movement in Ontario. To make a long story short, the Province of Ontario commissioned an "expert review" of the Construction Lien Act in February 2015. The review was to include an examination of payment issues within the construction sector.

This past September, the Office of the Attorney General released the long-awaited results from the review, which was led by construction law experts Bruce Reynolds and Sharon Vogel of Borden Ladner Gervais LLP. Their findings and recommendations can be found in the report, "Striking the Balance: Expert Review of Ontario's Construction Lien Act", which you can download from EBMag.com at tinyurl.com/hp42che.

Of particular interest is Chapter 13, Clause 47, which states:

> We recommend that a prompt payment regime be legislated in Ontario and that it be applied to both the public and private sectors.

"Overall, I think the report is fair and balanced," said Jeff Koller, Electrical Contractors Association of Ontario (ECAO), when I asked for his take on the review. "I think Bruce and Sharon understand the problem of systemic payment delays in the construction industry, and I think they've made recommendations that could go a long way to addressing that, including a legislated Prompt Payment regime for the public and private sectors, holdback reform, mandatory project trust funds, and expedited and binding dispute resolution."

To ensure balance—and to confirm they're on the same page—I also sought opinion from the Ontario Electrical League.

"We support the recommendations and look forward to the legislation to implement the changes required to improve the conditions in which our members operate," said OEL's Stephen Sell.

However, the report is just that... a report with a bunch of recommendations, and no teeth.

"Ultimately, it will come down to how this report—with its recommendations—translates into legislation," Koller noted.

To Koller's point, the province plans on introducing legislation in Spring 2017 based on the report's main principles. "We'll be watching that process closely and making our views known," Koller added. We should all do the same and, hopefully, see Prompt Payment translate across more Canadian jurisdictions. EB

P.S. Register now for an important webinar November 22, 2016, at 2 pm EST, where out Legal Desk columnist Dan Leduc will break down the results of the review, and explain the ramifications for you and your business. Visit EBMag.com/webinars.

COVER PHOTO © SOLAR IMPULSE/CHAMMARTIN.

CONTENTS

NOVEMBER 2016 || VOLUME 52 || ISSUE 11

Wind turbine collapses; Enercon launches investigation

According to the Canadian office of wind turbine player Enercon, an evacuation protocol was triggered following a turbine collapse at the Point Tupper wind farm, located near Port Hawkesbury, N.S.

Enercon (www.enercon.de) explains the onsite technician followed the evacuation protocol and safely evacuated the turbine and its surroundings in time to avoid any injuries prior to the collapse, which occurred this past August. Only property damage has been reported.

Enercon Canada says a technical team has launched an investigation to uncover the cause of the incident, which did not occur during regular operations.

The affected turbine is being disconnected from the grid and the rest of the wind farm continues to operate.

The company says that, with close to 1000 wind turbines installed in Canada over the course of the last 15 years, this is the first time such an event has occurred.

EXCLUSIVELY AT EBMAG.COM

The weather couldn't have been better for the 16th annual EFC Federation Cup Golf Tournament, drawing 270+ golfers (and duffers) to Rattlesnake Point in Milton, Ont. *Browse photos from the post-golf networking reception and awards dinner at tinyurl.com/j4ur82w.*

Dyson Canada was rolling out some lighting (and air dryer) glam at the Royal Ontario Museum in Toronto for a special event and EBMag was there to capture a new LED product introduction. *Catch the action at tinyurl.com/go7zobn.*

We first brought you news of Liteline moving from its location in Brampton, Ont., into a new, much-larger facility in Richmond Hill and we recently had the opportunity to video tour the company's new digs. *Follow along at tinyurl.com/zxqhs6s.*

For the latest industry news, events, solutions, stories and more from the industry, go to **EBMAG.COM**

Auto parts manufacturer faces $218K fine for electrical hazards & more

American workplace safety and health inspectors have cited York Metal Toll Processing Inc. for exposing employees to uncorrected electrical, crushing and respiratory hazards, as well as recurring amputation hazards.

Occupational Safety and Health Administration (OSHA) in the U.S. opened two follow-up inspections at the company's Syracuse, N.Y. auto parts manufacturing facility after the employer failed to prove they corrected violations cited during previous OSHA inspections. One of the previous inspections occurred as a result of an employee's hand being amputated by a power press.

As a result of the follow-up inspections, OSHA has issued York Metal Toll Processing citations for failure to abate fourteen previously cited violations, four repeat violations and three serious violations. The company faces proposed penalties of $218,502.

To see the citations, visit tinyurl.com/hjuz2f6.

EFC 2016 Scholarship Program dishes out $136,000

Electro-Federation Canada (EFC, www.electrofed.com) and its members have awarded Canadian university and college students $136,000 across 53 scholarships this year. Congratulations to all the recipients!

"Thanks to members from across the Canadian electrical and electronics industries, the EFC scholarships provide support for bright Canadian talents pursuing careers in the electrical industry", said Joris Myny, a senior vice-president with Siemens Canada and the 2016 chair of the scholarship program–EBMag's editor was also a program judge this year. "The EFC scholarships also attract young talent to the electrical industry and in turn ensure that Canada is positioned as a leader in this field."

Download the complete list of scholarship winners at tinyurl.com/zdndx6z.

EFC notes this initiative has supported students with over $1 million in funding since the program started in 1994.

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Occasionally, Electrical Business will mail information on behalf of industry related groups whose products and services we believe may be of interest to you. If you prefer not to receive this information, please contact our circulation department in any of the four ways listed above.

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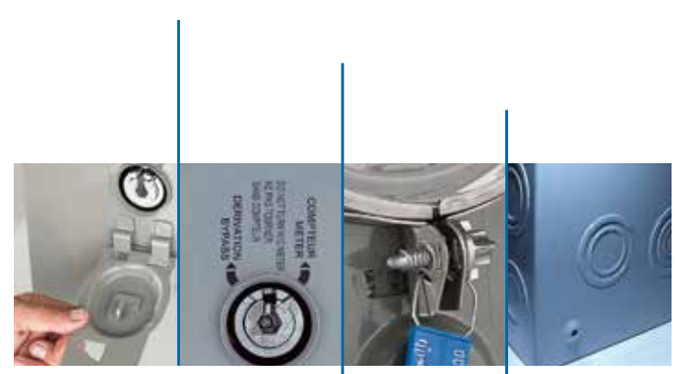

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LETTERS

ESA responds to fee increase and "the larger issue"

In response to the letter from Leonard F. addressed to the Electrical Safety Authority (EBMag September 2016, page 4), I want to advise EB's readers that ESA will not be increasing wiring fees in 2017.

We had contemplated a 1% increase and held a public consultation, as is our usual process. We heard from a number of contractors (including Leonard), associations and others. ESA reviewed all the feedback, reviewed the financial outlook and, mindful of the impact of a fee adjustment, decided not to proceed with an increase.

But to the larger issue Leonard raises of the underground economy, we, too, are deeply concerned. That's why it's one of ESA's corporate-wide goals to significantly increase the portion of underground work that we intercept.

We've used new approaches to find unlicensed work, blitzed in the commercial renovation sector, argued successfully in the courts for higher fines (so they are a real deterrent and not just the cost of doing business), and measurably raised public awareness of the importance of licensing.

The underground economy is a multi-billion dollar business in Ontario, with construction and renovation one of the top categories. The problem is not only those doing electrical work without a licence, but those who readily pay unlicensed people—often under the table—to do electrical work. And electrical is just one of dozens of categories of underground activity across the trades.

So we are all fighting an uphill battle. Nonetheless, ESA will continue to focus here, and welcome all efforts to turn this tide. — *Nancy Evans, vice-president, Communications & Stakeholder Relations, Electrical Safety Authority*

Make some noise, push for change

I really enjoy and value your mag as an ECRA contractor and electrician. I would like to respond to the Letters written by Leonard F. and James A (EBMag September 2016, page 4).

I completely agree with these two gentlemen and would say they nailed exactly what is wrong with the industry in Canada. I have been in this for almost 35 years (9 years in my own business) and feel the same frustrations as these guys on a daily basis.

We, as an ECRA group, follow and abide by the law in the daily course of business while a large majority of reno contractors of all kinds and Joe Public capitalize in a huge underground economy of lawbreakers and unsafe installations.

Meantime, the Electrical Safety Authority [ESA], government and the insurance industry do practically nothing… except regularly raise my rates and fees.

I have had enough and would like to reach out to these two guys and chat with them. If we make enough noise as a group, maybe something will change. — *Jim D., Ontario* EB

We welcome your Letters to the Editor all the time and, sometimes, we send you a little swag to say Thank You.

For taking the time to click on "Submit Letters to Editor" while visiting EBMag.com, we are sending Jim D. a bucket organizer wrap (48-22-8175), 6-in-1 combination pliers (48-22-3069), metal lock 18mm snap-off knife (48-22-1961) and 11-in-1 screwdriver (48-22-2113), all of which are courtesy of our friends at Milwaukee Tool (milwaukeetool.com).

PERSONALITIES

Hammond Manufacturing (www.hammondmfg.com) has appointed **Benoit Duteau** as the new Quebec sales representative for the Montreal-South shore and Ottawa territories. He is based in Laval, Que.

Alberta Electrical League (albertaelectricalleague.com) thanks everyone who came out to its RoundUP event at the Calgary Zoo. "So much fun was had by all," said AEL's Tara Ternes.

Standard Products (www.standardpro.com) has hired two new lighting specialists—**Corey Henderson, Julie Paquin**—and an account manager, **Bryan Wozney**. Henderson will be covering Ontario and Paquin (photo) will be representing the Greater Montreal region while Wozney is joining the B.C. sales team.

Ann Barteaux has been appointed general manager of Hensall, Ont.-based **Cos Phi**—a designer and manufacturer of power factor and power quality correction equipment for large commercial and industrial clients (www.cosphi.com).

Pilz Automation Safety Canada (www.pilz.com) announced **Andreas Sobotta** has accepted the position of CEO & general manager of the Canadian operation. Over the years, Sobotta has held positions at Davis Controls, Festo, Siemens, Phoenix Contact and, most recently, Hammond Manufacturing.

Michael Ross is the new Industrial Research Chair for Colleges in Northern Energy Innovation, a position awarded to Yukon College by the **Natural Sciences and Engineering Research Council of Canada**. This position is supported by electricity companies in all three Canadian territories, says Yukon Energy (yukonenergy.ca), to solve challenges faced by the northern energy industry (www.nserc-crsng.gc.ca).

Toronto Hydro's president and CEO, **Anthony Haines**, has been named to the 2017 Clean16 group of leaders (torontohydro.com), which acknowledges "those who have helped advance the cause of sustainability and clean capitalism in Canada." EB

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ESA recognizes Ontario's leaders in electrical safety

Congratulations to Eaton Electrical Services & Systems, Birnie Electric, Toronto Hydro and contributors to the Ontario Electrical Safety Report–all winners of a 2016 Ontario Electrical Safety Award from the Electrical Safety Authority (www.esasafe.com).

Eaton Electrical Services & Systems was recognized for its "I Choose Safety" program to achieve a goal of zero lost-time injuries, and improve overall worker safety in their workplace and homes. (Worker Safety award)

Birnie Electric was recognized for its ongoing CurrentSAFE program, which educates homeowners about the dangers of degraded electrical systems and suggests solutions to address electrical hazards. (Consumer & Home Safety award)

Toronto Hydro was recognized for its media event educating consumers on what to do should a powerline fall on their cars. The utility partnered with Toronto Fire Services to create a mock accident scene using a car and a hydro pole, and showed how to safely evacuate the vehicle in the event the downed wires started a fire. (Powerline Safety award)

All the winners and honourable mentions of the 2016 Ontario Electrical Safety Awards.

PHOTO COURTESY ESA.

Franklin Empire will assemble & service Siemens' Simogear geared motors

PHOTO COURTESY SIEMENS CANADA.

Under a new agreement, Siemens Canada (www.siemens.ca) and Franklin Empire (www.feinc.com) will assemble and service Siemens' Simogear geared motors in Canada for the first time, thereby promising customers faster product delivery, product customization, training and customer service.

The new geared motor assembly will occupy a dedicated facility at Franklin Empire's Boucherville, Que., location, where representatives from Siemens and Franklin marked the expanded partnership at a recent inauguration event. Franklin Empire's DS Tech division in Boucherville has been selling and servicing the Flender product line (the predecessor of Simogear) for 13 years, says Siemens.

Venture Construction fined after worker severely shocked

A company from the Rural Municipality of Corman Park No. 344 in Saskatchewan has been fined $35,000, the province reports, for violating one count under Occupational Health and Safety (OHS) legislation.

Venture Construction Inc. pleaded guilty for failing to ensure that no worker or equipment is operating within the minimum distance from any exposed energized electrical conductor.

Charges stem from an incident that occurred near Peerless, Sask. on July 14, 2014. A trailer was being raised and came into contact with a powerline, resulting in a worker being severely shocked.

Alberta posts RFI; wants half its power from solar

A solar farm dream has snagged the Alberta government's (alberta.ca) attention as the province continues on its path to more renewable energy generation and the phasing out of coal-fired electricity.

A Request for Information (RFI) to provide advice on the potential cost and best approach for procuring solar power for half of government operations has been posted. This will explore the opportunity to use solar energy to replace two existing green energy contracts that expire by the end of 2017 with solar power, Alberta says, and could lead to the first solar farm in Western Canada. The total consumption for the two contracts is 135,000MW hours a year.

$182k for Electrical Industry Training Institute in Langley, B.C.

Ninety-six training seats for electric utility arborists in Langley, B.C. are now available thanks to a recent investment of $182,000 from the province through the Industry Training Authority (ITA, www.itabc.ca).

These funds are slated for the Electrical Industry Training Institute (www.eiti.bc.ca) and are part of a larger sum of $660,000 to go to three training providers for 464 training seats in "high-priority trades" through to March 31, 2017.

"A certified utility arborist's job consists of vegetation removal at heights and within close proximity of energized electrical equipment, structures and conductors," says Kerry Van Sickle, director of the Electrical Industry Training Institute. "The B.C. government's contribution helps provide students with hands-on practical training using the same specialized vehicles, rigging equipment and climbing systems they will be required to use on the job."

Southwire increases footprint with United Copper acquisition

The United Copper facility in Denton, Texas.

PHOTO COURTESY SOUTHWIRE.

Southwire Company LLC has acquired United Copper Industries (Denton, Texas), saying this expands its manufacturing capabilities in the company's core building wire products segment and enhances its geographical footprint.

United Copper is the third-largest manufacturer of building wire in the United States, reports Southwire, offering a full line of copper building wire products and metal-clad cables (southwire.ca). The company has a workforce of about 300 employees.

The 450,000-sf facility in Denton (photo) consists of sales and support resources, a copper rod mill, a manufacturing plant and distribution resources. Southwire plans to fully integrate this campus into its existing operations.

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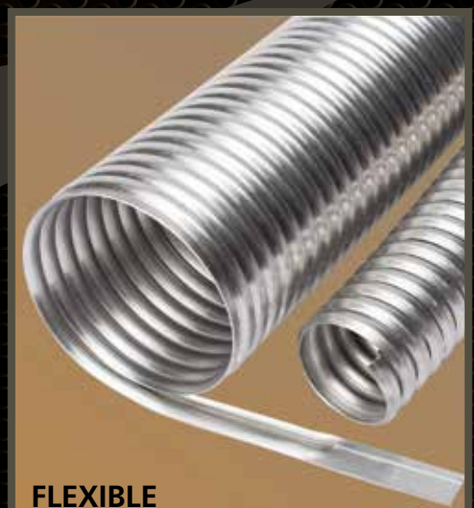

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GE breaks ground on new multi-modal factory in Welland

GE (www.ge.com) broke ground on its new multi-modal factory in Welland, Ont., which is expected to create 220 jobs with operations commencing in early 2018. The first phase of the investment is $165 million US.

The facility will initially manufacture GE Power's reciprocating gas engines, components for compression, mechanical drive, and power generation, and manufacture components for GE transportation diesel engines. The multi-modal design enables future production expansion for other GE global businesses, says the company, including Power, Oil & Gas, and Transportation.

"Here, we will run three-dimensional machining simulations for CNC programs, gain real-time analytics to better understand the operating conditions of a machine or a test cell, install lights-out machining, and combine all with advanced lean manufacturing practices," explained Heiner Markhoff, president & CEO of GE's Water and Distributed Power Business.

PCL Construction is the general contractor for the project.

PHOTO COURTESY GE CANADA.

ABB and Fluor partner to deliver global power substation projects

ABB (abb.ca) and Fluor (fluor.ca) have announced a global partnership for large turnkey engineering, procurement and construction (EPC) projects for electrical substations.

"We are proud to partner with Fluor to tap the vast opportunities of the ongoing energy revolution and related power infrastructure investments," said ABB CEO Ulrich Spiesshofer. "Together, we intend to grow our businesses by complementing each other's strengths in unique customer services for substation projects. Strategic partnerships like this are a core pillar of our 'Next Level' strategy and help us to drive growth while mitigating risk."

ABB specializes in air-insulated, gas-insulated and hybrid substations with voltage levels up to 1200kV.

Schneider Electric donates switchboards for two IBEW Locals

PHOTO COURTESY SCHNEIDER ELECTRIC.

Schneider Electric has donated QED switchboards to IBEW Locals 303 Niagara and 804 Kitchener-Waterloo training facilities (www.schneider-electric.ca). The company says these switchboards, valued at approximately $8000 each, will assist in the training and development of electrical workers.

Standing in front of the donated QED switchboard is (from left to right): Robert Wall, IBEW Local 303; Schneider Electric Canada's John Wade and Robert Allen; and Mark Cherney, IBEW Local 303.

Montreal streetlighting getting smarter

Energere reports it has won a $28-million contract for the implementation of a smart public lighting management system for the City of Montreal, which will create an infrastructure capable of controlling 135,000 luminaires.

Besides requiring a single, scalable platform, the city called for the integration and implementation of three different smart control products.

Energere's (energere.com) strategy was based on the integration of three suppliers: DimOnOff (dimonoff.com) for the integration platform and management software, Current for 60% of the equipment (CurrentByGE.com) and Telematics Wireless for the nodes and gateways (telematics-wireless.com).

In addition to monitoring and controlling the streetlights, Telematics' T-Light platform will enable an array of smart solutions, such as integrated snow sensors that notify public works when the streets need to be cleared; the ability to blink the streetlights on specific streets to warn citizens to move their cars for the plows; and the use of sensors on water meters to provide readings, detect leakage or monitor sewage lines. EB

WOMEN ARE HELPING LEAD THE RENEWABLE ENERGY TRANSITION IN ONTARIO

LISA OELKE

Part of WiRE's programming includes educational field trips, which are open to both women and men.

PHOTO COURTESY WIRE.

Women in Renewable Energy (WiRE) is a not-for-profit volunteer group brought together by co-founders and co-chairs Rebecca Black and Joanna Osawe in 2013 to educate and enable women to become more active in renewable energy development in Ontario. WiRE forges partnerships with a spectrum of renewable energy industry associations, professional women from across the energy sector and academic providers.

WiRE programming includes educational field trips (open to men and women), monthly networking meetings, an awards recognition program, student mentoring and bursaries, communications and engagement initiatives.

WiRE credits its success to a number of outstanding volunteers, partners, sponsors and industry supporters. The group is organized by an Advisory Committee with a common objective: to ensure inclusion in the renewable energy field.

A monthly newsletter is distributed to 950+ men and women, and interest in WiRE initiatives has seen rapid growth. WiRE field trips are extremely popular and well-attended. Both men and women are invited to sign up to build their knowledge about energy utilities, technologies and research. In fact, about 25% of participants in 2015 were men working in the sector.

In 2015 alone, WiRE hosted sold-out trips to the Independent Electricity System Operator (IESO), Whites Lane MicroGrid (Woodstock Hydro) and 2MW Minto Flywheel System (NRStor).

The monthly Toronto networking meet-ups engaged a record turnout of over 250 women in 2015. Those in attendance heard from esteemed speakers on topics of interest to the energy sector, and made new connections in an environment that garners consistently positive feedback for its low-pressure, intimate format.

WiRE has actively participated in trade-show events hosted by the Association of Power Producers of Ontario (APPrO), Canadian Wind Energy Association (CanWEA), Canadian Solar Industry Association (CanSIA) and Ontario FIT Forum, with interactive booths and speaking engagements. Visitors to the WiRE booth at these events are expressing a sincere interest in diversifying their workforces and accessing the best talent, regardless of gender. They are looking to WiRE to introduce them to today's up-and-comers, and connect them to established professionals in the energy sector.

This past year WiRE's recognition program expanded to three annual Woman of Distinction Awards in 2015 for Solar Energy, Wind Energy and Woman of the Year in the Renewable Energy sector. Awards are presented at industry partner conferences and events, providing ample recognition to award winners and an effective platform for spreading the word about the importance of diversity in the workforce.

Another noteworthy 2015 WiRE initiative was a speed mentoring event held at the Canadian Power Conference & Networking Centre in association with APPrO and sponsored by NRStor. Students in a relevant field of study to the energy sector had a chance to draw from the experience of accomplished professionals through three 15-min 2-on-1 mentoring sessions. The experiment drew wide praise from both students and mentors, and two of the student participants were subsequently offered employment by the companies represented by mentors... a great success for a new initiative that will be replicated in 2016.

WiRE would not be possible were it not for the dedication of its co-chairs, Advisory members and countless volunteers. Support from industry association partnerships—and the opportunities they provide for WiRE to engage students and professionals—has nourished its growth. WiRE is especially grateful to the support of CanWEA, CanSIA, Ontario Waterpower Association (OWA) and APPrO—the leading renewable energy associations in Ontario.

Continuing to grow in 2016, WiRE has mapped out many exciting field trips, networking events and new initiatives. Visit www.womeninrenewableenergy.ca for more information and to get involved. EB

Workforce diversity makes you more competitive

While at Solar Canada 2014, EBMag caught up with several WiRE members to learn more about this group and how it seeks to advance the inclusion and promotion of women in a field that's bursting with opportunities. Hear from Jennifer Manning, Debbie Ellis, Rebecca Black and Joanna Szarek Osawe at tinyurl.com/go4vsas.

FLEET VEHICLES THAT MEAN BUSINESS

EBMAG STAFF

We continue to bring you the goods from this year's Work Truck Show in Indianapolis. Check out a few more gold-star finds when it comes to building a "game changing" fleet. We also bring you news of a unique Canadian partnership between Mercedes-Benz and Enercon, who have joined forces to develop a new, specially tested Sprinter 4x4 fleet.

Representatives from Mercedes-Benz Canada and Enercon gathered in Smithville, Ont., to celebrate the beginning of a Canadian partnership that saw 20 Sprinter 4x4s added to the fleet of service vehicles that support Enercon's wind farms across the country.

ENERCON TAKES DELIVERY OF NEW SPRINTER 4X4 FLEET

After two years with a single 4x4 prototype based on a standard RWD Sprinter built in Germany to Canadian specs, Mercedes-Benz Canada (www.mercedes-benz-vans.ca) and Enercon Canada VIPs officially hailed the beginning of a Canadian partnership that will see 20 Sprinter 4x4s added to the fleet of support vehicles serving Enercon's wind farms across the country.

Enercon tested the prototype at sites across Nova Scotia, Ontario and Quebec over a period of six months, covering a total of 7984 kilometres in the process. To establish the correct technical specs for Canada, the prototype was outfitted with equipment to monitor its engine module. Real-time results were transmitted by GPS back to Mercedes-Benz Global HQ in Stuttgart where they were used to verify and tweak engine programming for the production Sprinters.

"The Canadian climate and turbine locations required some adjustments, which we are proud to share have been successfully addressed by Mercedes-Benz," said Volker Kendziorra, head of service of Enercon Service Deutschland.

Even with the added weight of the 4WD system, Mercedes-Benz says this Sprinter retains its payload capacity and fuel efficiency. It can also be equipped with an optional low range gear that makes it more sure-footed in difficult terrain. Downhill Speed Regulation can be added optionally to slow the vehicle to a set speed during downhill grades.

The powertrain for the 4x4 Cargo and Passenger vans will be the 3.0L V6 BlueTEC that offers 188 hp and 325 lb-ft of torque.

The Sprinter 4x4 will open up new markets and opportunities, says the automaker, and provide its customers with an expanded choice of commercial vans.

Enercon Canada Inc. (www.enercon.de) has over 600 employees with offices located in Montreal, Toronto and Dartmouth, service stations coast-to-coast, manufacturing sites in Matane (Que.) and Beamsville (Ont.), and a dedicated training and warehouse facility in Boucherville (Que.). It currently has over 2000MW installed throughout seven Canadian provinces and territories.

Be sure to check out our May edition for truck accessories from the Work Truck Show (tinyurl.com/jqfny4r) and our August edition for more on trucks with power, productivity and savings (tinyurl.com/znnqjex). Plus, visit EBMag.com for all our photos from the show (tinyurl.com/j9bdqwv).

PHOTOS COURTESY MERCEDES-BENZ CANADA.

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An AmeriPride Ford F-59 service truck is upfitted with the XL3 Hybrid electric drive system. PHOTO R. FRANCOEUR.

This drawing shows how the drive system works.

IMAGE COURTESY XL HYBRIDS.

MORE FUEL EFFICIENCY WITH XL HYBRIDS

You had to look *way up* when at the XL Hybrids booth at the Work Truck Show. Raised high above your head was an AmeriPride Ford F-59 service truck, upfitted with the XL3 Hybrid electric drive system (www.xlhybrids.com).

Hybrid-electric F-59 trucks are the latest on-road deployment of XL Hybrids technology by AmeriPride, which noted it already operates a fleet of other service vehicles with XL3 systems in Canada.

"The fuel efficiency improvements from XL Hybrids technology actually improve the productivity of our drivers, who can now go longer between fill-ups to make more product deliveries," said Banny Allison, fleet manager with AmeriPride Services.

In a nutshell, the XL3 system transforms an OEM vehicle into a hybrid by adding an electric motor, a lithium-ion battery pack, and control software. It is compatible with Class 2, 3, 4, 5 and 6 vans and passenger wagons, commercial vans and shuttles, box trucks and delivery vans. Installation takes about six to eight hours.

All field results are being captured by XL Hybrids' proprietary wireless data connectivity system which tracks key performance indicators like MPG, vehicle duty cycle and CO2 emissions reduction.

The F-59 platform has payloads exceeding 15,000 lb. The Ford warranty is maintained, plus there's a 3-year, 120,700-km warranty on the hybrid powertrain.

"Our XL3 hybrid system provides up to a 25% increase in MPG with minimal impact to fleet operations, and no driver training or charging infrastructure requirements," added Clay Siegert, XL Hybrids co-founder.

ISUZU'S 2018 FTR WELCOMED TO CLASS 6

Isuzu (www.isuzutruck.ca) caught a lot of attention when it dramatically introduced the "game changing" 2018 FTR with a sweep of a silky black sheet off this new entry in the Class 6 medium-duty offering.

Isuzu—which celebrates its centennial this year—noted this vehicle is powered by a 4HK1-TC 5.2L turbocharged four-cylinder diesel engine—a first in the segment.

"As fuel economy and emissions regulations become stricter, you're going to see more and more competitors in this Class turning to four-cylinder engines," said Shaun Skinner of Isuzu Commercial Truck of America.

Although horsepower and torque ratings have not been finalized, the company said the 4HK1 engine is well-known for its high torque output. The powerplant will be mated to an Allison 2000 Series automatic transmission, and the engine carries a B10 durability of about 498,897 km—meaning that 90% of engines should reach that mileage before requiring an overhaul.

There will be eight wheelbase configurations for bodies ranging from 16 to 30 ft, with a 50-gal or 100-gal aluminum fuel tank. "It will be stingy at the pump while still providing the capability you want in a Class 6 truck," Skinner added.

The dock-high truck with 11R22.5 tires is slated for North American production in mid-2017, the same time more information on pricing, power ratings and configurations will become available.

"The overall concept of the FTR is to bring to our customers the next generation medium-duty low-cab-forward truck—one that features a clean, durable, highly efficient four-cylinder engine and is the best Class 6 choice for pickup and delivery in cities," Skinner concluded, adding, "The letters 'FTR' don't stand for 'future', but this truck represents the future, and it will be here—soon." EB

▲ Shaun Skinner, executive vice-president and general manager of Isuzu Commercial Truck of America, shares the benefits of the FTR with Work Truck Show crowds.

PHOTO R. FRANCOEUR.

◀ The 2018 FTR from Isuzu is powered by a 4HK1-TC 5.2L turbocharged four-cylinder diesel engine. PHOTO R. FRANCOEUR.

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Vehicle(s) may be shown with optional features. *On F-450 DRW with 6.7L-V8 diesel engine. When properly equipped with available factory-installed equipment. Class is Full-Size Heavy Duty Pickups over 8,500 lbs. GVWR vs. 2016 competitors. **On F-350 DRW with 6.2L-V8 gas engine. When properly equipped. Class is Full-Size Heavy Duty Pickups over 8,500 lbs. GVWR vs. 2016 competitors. ***On F-250/F-350 with 6.7L-V8 diesel engine with automatic transmission. When properly equipped. Class is Full-Size Heavy Duty Pickups over 8,500 lbs. GVWR vs. 2016 competitors. †F-Series is the best-selling line of pickup trucks in Canada for 50 years in a row, based on Canadian Vehicle Manufacturers' Association statistical sales report up to 2015 year-end.

SOLAR IMPULSE SHOWS "WE CAN RUN THE WORLD WITHOUT CONSUMING THE EARTH"

Solar Impulse 2: the first-ever solar-powered round-the-world flight / ANTHONY CAPKUN

"As you can imagine with such a challenging project, there were many moments where we were nervous, where we were tense and said 'Will it really work?'," admitted ABB CEO Ulrich Spiesshofer upon the historic occasion of its alliance partner Solar Impulse 2 (Si2) completing the first ever round-the-world flight powered only by energy from the sun.

236 feet
Si2 wingspan

17,248
solar cells built into the wing

Back in January 2015, ABB formed an innovation and technology alliance with Si2 to help Bertrand Piccard and André Borschberg achieve this milestone. Si2 is a zero-emission electric and solar airplane, capable of flying day and night without fuel. Starting March 9, 2015, and ending July 26, 2016, the pilots flew a total of 43,041 km in 23 days over a 17-leg journey.

Si2 is a flying laboratory of "clean" technologies. Made of carbon fiber, the single-seater aircraft has a 236-ft wingspan and weighs 5100 lb. The 17,248 solar cells built into the wing power four batteries (38.5 kWh per battery) that, in turn, power the four electric engines (17.5 hp each) and propellers. The plane is capable of saving energy generated during the day so it can fly throughout the night on batteries.

"This will be a landmark project that demonstrates energy efficiency, renewable energy [and] lightweight construction can be taken beyond limits that mankind would have perceived," said Spiesshofer proudly. "It demonstrates clearly that, with pioneering spirit and clean technologies, we can run the world without consuming the earth."

"The partnership with ABB is not only technological, it's also a partnership in spirit," said Piccard, adding, "Our partners don't come from the world of aviation, they come from the world of industry, and the technologies that they provide to us are the ones they put on the market."

"It's a historic first for renewable energy and clean technologies [and not just] for aviation," said Piccard. "By combining their respective strengths, Solar Impulse and ABB were able to show how breakthrough innovation can be transformed into credible solutions, and how energy can be more-efficiently produced, stored and used to create a cleaner world."

"Because what we try to do at Solar Impulse is to demonstrate how clean technologies can be used to achieve the impossible," he added.

PHOTO LEFT © SOLAR IMPULSE/CHAMMARTIN.

At Chongqing Jiangbei Int'l Airport, China. PHOTO © SOLAR IMPULSE/REVILLARD/REZO.CH.

Bertrand Piccard gets a beautiful shot from over the Red Sea.

Piccard's cockpit selfie. THIS AND PHOTO AT LEFT © SOLAR IMPULSE/BERTRAND PICCARD.

To attempt the flight, Solar Impulse had to confront the same challenges people face on the ground, such as maximizing the power yield from solar cells, integrating renewable energy into the electricity distribution systems, and improving energy efficiency.

"Solar impulse is a flying microgrid," said Spiesshofer. "You have renewable power generation, you have storage, you have control..."

"The mission would not have been possible without the expertise and support of ABB and other organizations that contributed to the project," said Borschberg. "As part of its innovation and technology alliance with Solar Impulse, ABB provided experts to support the mission, including engineers who served as embedded members of the ground crew throughout the round-the-world flight."

During its flight, Solar Impulse made stopovers on four continents (Asia, North America, Europe and Africa), and flew across the Pacific and Atlantic oceans, as well as the Mediterranean Sea and Arabian Peninsula. On the way, it set several new aviation records, including that of the longest solo duration for an airplane (117 hours, 52 minutes) achieved by Borschberg on the leg from Japan to Hawaii, and the first crossing of the Atlantic Ocean in a solar airplane achieved by Piccard.

17.5 hp
power of each of the 4 electric engines

"And it's clear that if we can fly day and night with no fuel, it means that these technologies are mature," said Piccard. EB

Watch our video to hear from ABB's Ulrich Spiesshofer and Solar Impulse's Bertrand Piccard. You'll find it on our YouTube channel at youtu.be/9g8l399mteQ.

It's hands-on hydro work for this student at Port Perry High School.
PHOTO COURTESY PORT PERRY HS.

POSSIBLY THE YOUNGEST POWERLINE TECHS YOU'LL EVER MEET

Port Perry High School rolls out Electrical Network program / RENÉE FRANCOEUR

Sixteen year-old Charlie Kerry says he always had a little bit of an interest in the electrical field and, now, after a new course offered at his high school this past spring, he's set his sights more squarely on becoming a powerline tech.

"We went to Hydro One's training centre and it was really cool and interesting, and seems like a lot of fun," the Grade 11 student says.

Kerry's high school in Port Perry, Ont., launched its Electrical Network program in February, where students learn more about residential electrical wiring and associated downstream connected loads, as well as how powerlines work and the maintenance involved. About 17 students signed up and there's already a waiting list for next year, says Kevin Lanigan, who teaches the course.

"A lot of them have never had this type of exposure before, and I was really surprised at how engaged they were," Lanigan says. "When you walked in here, all [the students] had hard hats on, all were working, all participating in the entire program."

School officials say they don't know of any other high school in the province offering this type of course.

17
Grade 11 students enrolled in Electrical Network program

The program gets right down to business

Thanks to Hydro One, the program boasts miniature hydro pole replicas (about 6-ft tall) in the schoolyard and, inside the classroom, the wood construction class set up frames to mimic a house floorplan. Students were responsible for wiring up either the kitchen, living room, etc. Kerry says this was his favourite part.

"The group I was with, we wired up a bathroom with a heated floor, Jacuzzi tub, light fixtures and a couple outlets. It was just cool," he says.

Once the room was laid out and wired, they had to make sure there were proper feeds back to the panel and tie in, he adds.

Kerry also learned how to calculate voltage, amperage and ohms, and how to wire-up services entrances.

All projects were critiqued according to the CE Code.

"It's very exciting," says Jake Smith, a teacher and the tech head at Port Perry High School, explaining the school has put through a lot of commercial and residential electricians, and powerline techs, over the past decade.

"Up until this point, we haven't done anything really to train them properly—other than [provide] those employability skills. Now we are giving them hands-on, practical skills so, if they do a co-op or post secondary or go to work for Hydro One, they're not just adequate, but at the top of the class and can mentor other students," Smith adds.

Not possible without industry support

Earlier this summer, the school gave a tour of its trades programs for the companies who helped get the Electrical Network course on its feet. Representatives from Hydro One, Eaton, Hubbell, Westburne, the Electrical Safety Authority and more attended. Other contributors included IPEX, Thomas & Betts and Circa Hydel.

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8413	1-1/4"	1.000	1.460	.870	1.370	2-3, 2-4, 1-3, 1-4, 1/0-3, 1/0-4, 2/0-3, 2/0-4, 3/0-3
8414	1-1/2"	1.360	1.770	1.250	1.590	2/0-4, 3/0-3, 3/0-4, 4/0-3, 4/0-4, 250-3, 250-4
8415	2"	1.700	2.200	1.550	2.050	250-4, 300-4, 350-3, 350-4, 500-3
8416	2-1/2"	2.100	2.700	1.950	2.400	500-3, 500-4, 600-3, 600-4, 750-3
8417	3"	2.500	3.300	2.350	3.000	600-4, 750-3, 750-4

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Mini hydro pole installation work underway at the school.

Representing some of the companies who donated to the Electrical Network program are (left to right) Trent Mood of Hubbell Canada, John Wood of Eaton Canada and Ken McCallum of Westburne, who attended a trades tour and Thank You lunch at the school.

Students were tutored in the installation of a main service panel and how to handle proper feeds back to the panel from various rooms in a house.

Ken McCallum with Westburne did most of the coordinating in terms of gathering donated material for the program.

"We will be continuing to support Kevin in this program moving forward," McCallum says. "We have had discussions about coming into the school to present about careers in the electrical business beyond carrying tools, such as industrial automation and electrical distribution."

John Wood, a construction area sales manager with Eaton, also toured the school and says Eaton is proud to be a part this hands-on learning.

The company will go on providing Port Perry students with educational and training material, Wood says, with emphasis on Eaton's residential electrical product offering such as arc fault circuit breakers and Mike Holmes-approved Whole Home surge protection.

February 2016
Electrical Network program launches at Port Perry HS

Port Perry HS—which also boasts a live auto shop, greenhouse and hydroponics lab for the food sciences class to harvest school-grown fish—calls its tech education "gold collar" initiatives because "we all go to work eventually". It says it believes in celebrating the trades—a Grade 10 "Women in the Trades" course is launching this year—and exposing students to real world challenges and experiential learning.

"What we want to do for teenagers is to let them know this is not only a viable option for them but an incredibly lucrative, well-paid option doing important work," Smith says of the Electrical Network course. "We try to instil that in them at this point and, if it is an option for them, we support them... We want them to not just go out and be successful, but be *incredibly* successful after graduating high school." EB

Tour Port Perry High School's Electrical Network classroom with us at tinyurl.com/gsuqble.

CALENDAR

Wind Optimization & Maintenance Canada
Nov. 29-30, Toronto, Ont.
Visit tinyurl.com/zsfscx6

EB **EFC Christmas Receptions**
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EB **The Buildings Show**
Nov. 30-Dec. 2, Toronto, Ont.
Visit www.thebuildingsshow.com

Electricity, Distribution, Information Systems &Technology (EDIST) Conference
Electricity Distributors Association
Jan. 18-20, 2017, Toronto, Ont.
Visit tinyurl.com/zbxn5bf

BICSI Winter Conference & Exhibition
Jan. 22-26, 2017, Tampa, Fla.
Visit www.bicsi.org/winter

EB **IEEE IAS Electrical Safety Workshop**
Jan. 31-Feb. 3, 2017, Reno, Nev.
Visit tinyurl.com/jfkjhz7

NEMRA Annual Conference
National Electrical Manufacturers Representatives Association
Feb. 1-4, 2017, Orlando, Fla.
Visit www.nemra.org

Saskatchewan Safety Council Industrial Safety Seminar
Feb. 6-8, 2017, Regina, Sask.
Visit www.sasksafety.org

EFC Ontario Region Gala
Electro-Federation Canada
Feb. 10, 2017, Toronto, Ont.
www.electrofed.com

Mid-Canada Electrical Expo
Electrical Assoc. of Manitoba (form. Manitoba Electrical League)
Feb. 22-23, 2017, Winnipeg, Man.
Visit www.eamanitoba.ca

PowerTest by NETA
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PHOTOS COURTESY PORT PERRY HS.

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ICE-1480C	14″	80 LB	ICE BLUE	.180″	4.125"	100PCS/PK
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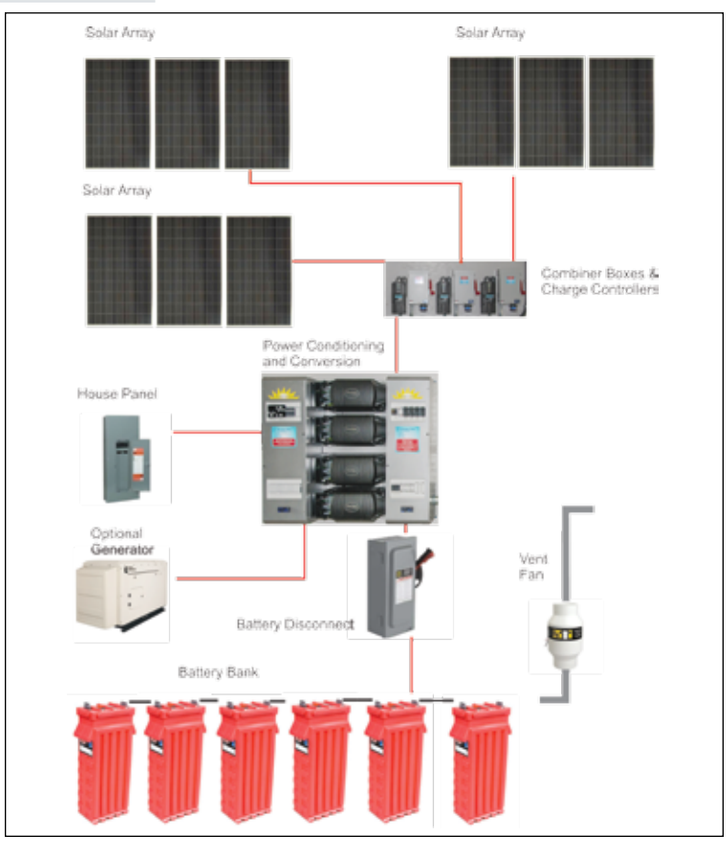
SHOCK HAZARD WITH DE-ENERGIZED "APPROVED" SOLAR PV EQUIPMENT?

Navigating the nuances of battery-based solar systems / ERHARD HERMANN

FIGURE 1



Have you ever turned off all sources of power to an enclosure and still found a hazardous voltage inside? This is a very possible situation with battery-based solar systems using current "approved" equipment.

While I have warned about this possibility in the past, I recently encountered a real-life situation demonstrating this shock hazard. So how can life-threatening "approved equipment" be allowed?

The dangerous nuances of renewables

There are several factors that create this hazard, so I will set the stage so you better understand the situation. Keep in mind that, for the most part, the CE Code assumes a centrally generated, grid-distributed system; this is vastly different from locally produced power (e.g. solar), which has several sources of power and different hazard potentials.

Battery-based renewable energy systems also use very different and specific equipment with which electricians and inspectors are generally not familiar. Grid-connected solar systems are generally much simpler in design and do not have the same hazards as the multiple-power source battery-based systems.

Figure 1 shows a simplified diagram of a battery-based system's major components. AC power sources are the inverter system and the generator. DC power systems are the batteries, the solar arrays and the inverter system when charging (there could also be wind or hydro).

In terms of safety, each power source system needs to be considered separately, then you consider all the systems in combination.

Everyone is familiar with the AC side requirements, so that's pretty straightforward: disconnects for the inverter power and generator, bond the neutral and ground the system. This effectively means all of the metal is bonded and grounded, including the DC side components.

Now, let's look at the DC side. Rule 64-064 does not require grounding of nominal voltage systems of less than 50V. Rule 64-070 (Appendix B) does require the negative-to-metal bonding of enclosures to provide a return path to trip overcurrent devices in the event of a fault.

Since the metal enclosures are already connected to earth/ground through the AC side, all of these types of systems would automatically be grounded. Simple enough, right? Well, let's now throw in a solar array.

The DC supply systems from the solar arrays normally operate above 50V, so we now need to have one of the arrays' conductors grounded (normally the negative). With the 2015 CE Code, these now need to have ground fault protection. Well, that's easy, right? Just put in a GFI breaker or use the integral GFI protection of the available charge controllers; if there's a ground fault, it just opens the breaker feeding the charge controllers or stops the controllers from functioning.

So what, then, is the problem?

Well, when we use the ground fault protection for the solar array, currently available equipment grounds the array through either a 1/2A breaker or internally in a charge controller through a very small jumper (Figure 2). We now need to remove the negative-to-enclosure bond so the GFI will work (Rule 64-064[7]). This now removes the path for the overcurrent devices to operate for the rest of the system, as the 1/2A breaker or 1A fuse will open really quickly, thereby removing the negative-to-enclosure bond that was provided by the GFI protection.

In terms of a schematic (Figure 3), let's consider a fault on the positive of an inverter conductor to the metal enclosure. The fault would trip the 1/2A breaker, which would remove the negative-to-enclosure bond and ground thereby pushing the negative to a negative value with respect to ground. The negative would now no longer be the grounded conductor, and the positive now becomes the grounded conductor. So we end up with a fault that cannot be cleared and a grounded conductor becoming the ungrounded conductor.

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Battery-based charge controllers are available with input voltages as high as 600vdc, and remember: DC does not let go as easily as AC!

FIGURE 2

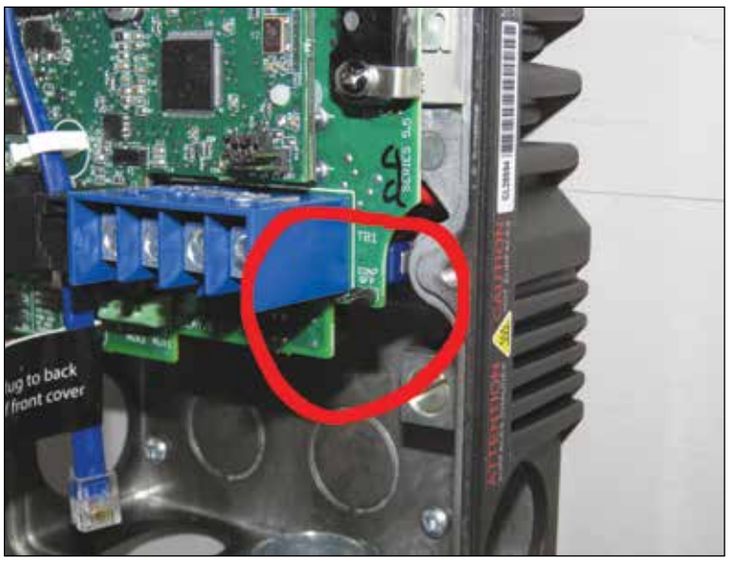


FIGURE 3

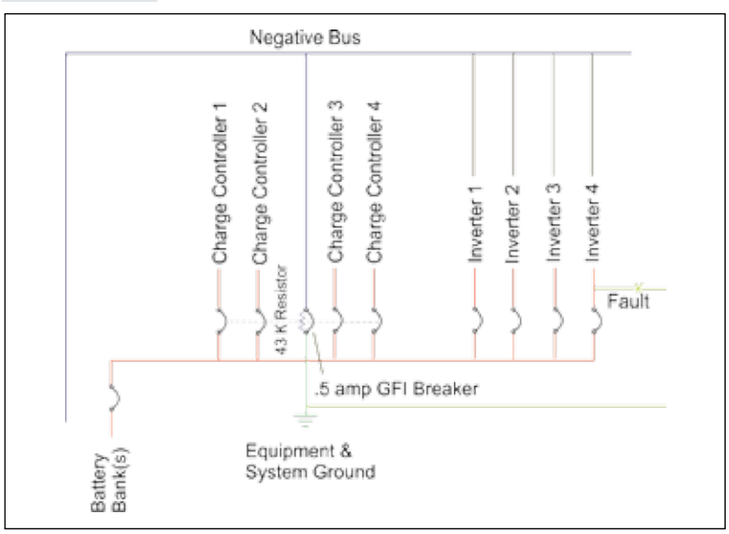
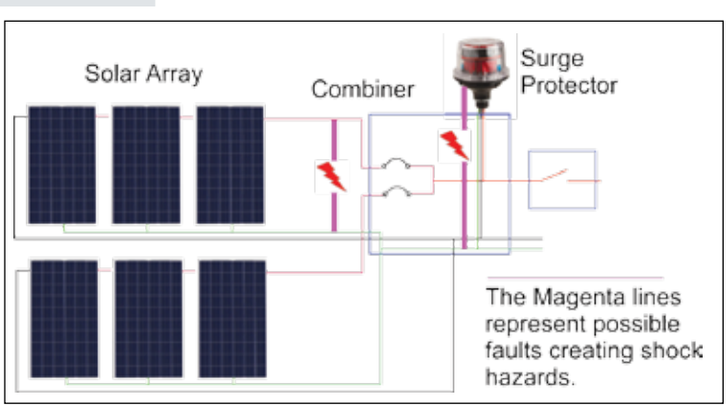


FIGURE 4



Hmm. It's less than 50V, right, so what's the big deal?

Well, it becomes a much bigger deal when you consider the batteries are capable of producing several thousand amperes of short circuit current and you have your hands in there! Not only that, these systems are frequently installed without a dedicated battery disconnect.

Other fault conditions

And there are other fault conditions to consider (Figure 4). Most 48V systems have the array set up with three modules in series. The open circuit voltage of these can be as high as 142vdc (ouch!). Battery-based charge controllers are available with input voltages as high as 600vdc, and remember: DC does not let go as easily as AC!

With available equipment, we are also limited to a 4-charge controller using the breaker-type of GFI protection. What about when we use the charge controllers? We now have the negative-to-ground bond in a serviceable item and, when using multiple charge controllers, only one of them can have the negative-to-ground jumper installed. So what happens when the unit is serviced, removed or replaced—or even installed—without this jumper being put into place?

A lot of people working with this equipment could miss this, especially when you have a homeowner replacing a unit. Also, Rule 64-064(7) only allows the negative-to-ground to be internal to the equipment so, in multiple charge controller installations, you would be limited to using the breaker type of GFI protection, since the GFI protection for all the other charge controllers would not be internal to the equipment.

When I looked at this particular system (Figure 4), I turned off all the disconnects into an enclosure to check on the wiring inside. For safety's sake, I checked for power inside for voltage on all the ungrounded conductors. All clear! Well, just to make sure, I checked the negative (supposedly grounded) conductor terminal to the metal enclosure. 100vdc! Not good.

Where is this coming from? All the power is off, right?

I went out to the array and turned off the array's output circuit. That should do it, right? Nope, still energized.

Next, I turned off each solar string feeding the combiner. OK, that isolated the problem: it had to be in the combiner. It turns out the surge arrestor at the combiner had taken a hit and was passing the array voltage through to the metal enclosure through the green conductor.

This equipment bond now brought the open circuit voltage of the array into the building and, since the negative-to-ground bond was not there, the negative had the 100vdc between it and the equipment.

The same situation could happen where there is a source circuit fault from the array to the frame or other grounded/bonded equipment. In this case, the small jumper was not in the correct position inside the charge controller to provide even minimal negative-to-equipment bond; thus, there was no indication of a problem in the system at all.

One of the key foundations of the CE Code is you should always be able to disconnect all power sources and be able to work safely in an enclosure, and that the grounded conductor is always the grounded conductor. Having even a remote possibility of a grounded conductor becoming an ungrounded conductor presents an unacceptable workplace hazard.

I have brought this up with inspection agencies with whom I work, and have submitted something to the CE Code Section 64 committee. Meantime, be aware and work safely. EB

The president of Boyd Solar Corp., Erhard Hermann is a certified Master Electrician and Hydronic Designer who has been living off-grid since 2001 without ever using a backup generator. The experience he has gained in living daily with a totally renewable power system allows him to help others to do the same. Visit www.boydsolar.com.

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LEVEL UP

ANDREW HOUSTON

Structuring your business to pay for your freedom in 2017

Did 2016 *rock*... or just *roll* you over?

It's that time of year when we ask ourselves questions like: "Where did the year go? I still have so much left to accomplish!" or "Where did I go wrong? I didn't get the results I wanted from my business!"

These questions tend to make you feel either very good or very bad—but usually very bad. Let's see if you can relate to the following (check off the boxes that resonate with you):

- I'm not getting the freedom I wanted from owning my own business.
- I feel imprisoned in my job; drowning in an extremely long To-Do list.
- I'm working on tasks that are way below my pay grade.
- I'm too involved in simple routine tasks that my employees should be handling.
- I'm not making the profits I deserve considering the work I put in.
- My cash flow is like a roller-coaster—totally unpredictable and, sometimes, scary.
- I want to take my business to the next level but don't know where to start.

The list of challenges a contractor can face in his business can be endless, making you feel overwhelmed and discouraged. You're probably an amazing tradesperson but, when it comes to playing a businessperson, it's a whole different show.

So how do you master your business in 2017 and make it the best year ever?

STEP #1

Know the 3 core pillars that make up a successful contracting business:

1. Time & Team
2. Profits & Cash Flow
3. Marketing & Sales

STEP #2

Know the order of these pillars and the reasoning behind it. Time & Team comes first because, if it's out of control, you simply won't have time to focus on improving your profits, cash flow, or marketing and sales.

Profits & Cash Flow comes second because you need to know whether you're doing profitable work before you go out, land more work and market yourself out of business. When you're unable to forecast your cash flow, and you get more work than your bank account can handle, you can go bankrupt very easily.

Once you have a handle on your profits, you can identify both the types of work and the clients that are more profitable, which helps you amp up Marketing & Sales.

STEP #3

Create a plan relative to the 3 core pillars that will help you see quick results. Start by joining me and Electrical Business Magazine for a Planning for Profits & Freedom in 2017 webinar on January 12, 2017, 2 pm EST. During this workshop, you will:

- Learn how to plug leaks in each of the 3 core pillars.
- Learn strategies for systemizing aspects of those pillars within your business.
- Learn how to be more profitable.

Meantime, let's have a look at some top core pillar strategies for you to try out before January's webinar workshop. These strategies will deliver the best results in the least amount of time and with the least amount of effort.

> **Leverage this data to determine team efficiency, and whether the type of work you're doing—and *for whom* you're doing the work—is a good fit.**

Time & Team top strategy

Draw three columns on a blank piece of paper labelled: Tasks, Value and DSEK. Under Tasks, write down everything you do (yes, it will be a long list). Next, estimate a value beside each Task in terms of money, time, etc. In the last column, determine what should be done with every task. Are you going to:

D: delegate?
S: systemize?
E: eliminate?
K: keep?

Circle the lowest-value tasks and get started!

Profits & Cash Flow top strategy

Compile time sheets and costs (material and other). Add them up and compare to your quote to determine whether you're profitable on the work you're doing. Leverage this data to determine team efficiency, and whether the type of work you're doing—and *for whom* you're doing the work—is a good fit. Knowing this is a game-changer for your Profits & Cash Flow!

Marketing & Sales tops strategy

Start using a client feedback form on every job; ask clients to fill it out while your crews are cleaning up. Have them rate the quality of work, cleanliness, promptness, etc., of your company. Include a testimonial and referral section. Now you have something you can show your next prospect to prove you're the best contractor for them and the job. I call it "Trust Transference". *Stop saying* you provide good quality and service and *start proving* it. (Added bonus: this is also a great document for employee reviews.)

Free tools

In closing, when you register for our workshop webinar, you'll get a copy of our *done-for-you* feedback form plus the Contractor's Toolbox of Strategies tool, which gives you over 70 strategies for improving each of the 3 core pillars. Visit EBMag.com/webinars and click on the January 2017 event. EB

Andrew Houston is the owner and founder of Profit for Contractors. He has been consulting to trades business owners for nearly a decade, helping them improve their business skills so they can achieve their personal and business goals. A graduate of George Brown College, Andrew achieved Industrial Controls Licensed Electrician as well as Electronics Engineering Technologist. Visit www.profitforcontractors.com.

Don't forget to check out Andrew's latest Tradie Tip video. Visit at EBMag.com, click on "News & Articles" then click "Level Up".

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RECALL: United Copper MC aluminum armoured cables

United Copper is recalling certain metal-clad (MC) aluminum armoured cables due to fire and shock hazards. The recall involves 250-ft and 1000-ft cabling with date codes between August 2015 and November 2015. For more details, visit tinyurl.com/gvjfbrk.

UNITED COPPER
www.unitedcopper.com

Hubbell MBUL LED bullet

Hubbell Outdoor Lighting is calling its new mini decorative LED bullet the MBUL. It's a compact floodlight capable of replacing 50W to 70W HID, 100W incandescent or 84W CFL luminaries. It comes with options of a 7-in. stake with 8-in. SO cord or 1/2-in. 14 NPT threaded mounting box.

HUBBELL
www.hubbell.com

HellermannTyton's HelaGuard rated to 600V

HellermannTyton has announced independent voltage test results for its HelaGuard non-metallic conduit line. Tests performed by National Technical Systems confirm that HelaGuard standard weight, nylon-corrugated conduit (HG-SW) withstands 600V performance, as measured by ASTM D3638-12. This benchmark rating applies to all diameters in the HelaGuard HG-SW conduit series.

HELLERMANNTYTON
www.hellermann.tyton.com

Brushless drill, impact driver from Porter Cable

Porter Cable has launched its 20V Max lithium-ion brushless drill/driver (PCCK607LBLW) and 20V Max lithium-ion brushless impact driver (PCCK647LBLW), which are both part of the new Brushless Edge family of tools. The company says both feature more runtime.

PORTER CABLE
www.portercable.com

RECALL: Eaton 30A general duty switches

Eaton has announced a voluntary recall of its 30A general duty 2- and 3-pole switches with catalogue numbers beginning with CDG221 or CDG321. This is because the line/load lugs may cause terminal overheating or allow wires to dislodge.

EATON
www.eatoncanada.ca

Keytroller's Cyberwatch Sat

Keytroller has a tool to monitor and track the location of equipment and no Wi-Fi is needed, the company claims. The Cyberwatch Sat is a satellite wireless hour, alarm and location meter designed for remote locations. It uses the Iridium network and transmits up to six-hour meter readings and six alarm readings with GPS location. Free demo kits are available.

KEYTROLLER
www.keytroller.com

Burndy's Wiremikeci measuring device

Burndy says its Wiremikeci can confirm any finished crimp when using butting "U" dies crimped with Burndy 750, 46, 39 and 35 series of installation tools. This tool is used when verifying the size of stranded, solid and DLO (Diesel Locomotive) wire for copper and concentric, and compact wire for aluminum.

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www.burndy.co

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

Compiled by Ontario's Electrical Safety Authority

www.esasafe.com

QUESTION 1

When a service switch is marked for continuous operation at 100% and is supplied by multi-conductor cable, what is the maximum continuous load permitted?

a) 100% c) 85%
b) 80% d) 70%

QUESTION 2

What is the minimum size copper bonding conductor that can be secured to the surface on which it is carried (with mechanical protection)?

a) 10 AWG c) 4 AWG
b) 6 AWG d) 2/0 AWG

QUESTION 3

A 5-15R receptacle mounted outdoors at 750mm above finished grade requires a cover plate:

a) suitable for wet location, whether a plug is inserted into the receptacle or not
b) marked "Extra Duty"
c) marked "Wet Location Only When Cover Closed"
d) A and B
e) B and C

ANSWERS Electrical Business, October 2016

Question 1

Class H fuses can be used for overcurrent protection in places where circuit overload protection is provided by other means.

b) False. Rule 14-212.

Question 2

The maximum voltage for a class 2 circuit is:

d) 150V. Rule 16-200.

Question 3

The space within 6m (horizontally in any direction) from dip tanks and their drain boards, and extending to a height of 1m above the tank, is considered:

a) Class I, zone 1. Rule 20-302.

How did you do? **3** • Master Electrician **2** • Journeyman **1** • Apprentice **0** • *Plumber?!?*

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CODE *file*

NANSY HANNA, P.ENG.

Playing matchmaker with conductors, overcurrent devices and loads

The main purpose behind matching the conductor with the correct overcurrent protection is to safeguard the downstream conductor from overload and/or short circuit. Based on that simple concept, the rating of overcurrent protective devices (OCPD) always needs to be equal to or lower than the ampacity of the protected conductor.

There are, however, specific exceptions where OCPDs are permitted to exceed conductor ampacity, such as Rule 28-200 for motors. Another general exception is found in Rule 14-104(1) Table 13.

Moreover, a conductor should be matched with the load, and should not feed a load that can draw more current than its ampacity. That said, the calculated load is permitted to *slightly exceed* conductor ampacity, and Rule 8-106(1)—a.k.a. the "5% Rule"—provides the parameters for this permission.

Let's clarify the application of Rules 14-104(1) and 8-106(1), as some inconsistent practices within industry have led to conflicting approaches and confusion.

Rule 14-104(1) does not permit the OCPD's rating to exceed the protected conductor's ampacity. But when the conductor ampacity does not match a standard ampere rating of a fuse or circuit breaker, the Rule permits the use of the next-larger standard OCPD, as shown in Table 13, to a maximum rating of 600A.

Table 13 does not modify or change the allowable ampacity of the conductor. Table 13 stops at 600A, so when the OCPD exceeds 600A, its rating is always required to be equal to or lower than the ampacity of the conductor (except where permitted by amended sections of the code).

For example, a 500-kcmil copper conductor with an ampacity of 380A (Table 2 at 75°C) can be protected by a 400A OCPD as per Table 13 for conductors with an ampacity between 351A and 400A.

As circuit ampacity increases and, along with it, conductor size, it is common practice to run parallel sets of smaller conductors. For example, two parallel sets of 300-kcmil copper can be protected by a 600A breaker (Table 2 at 75°C = 285A•2 = 570A total ampacity). Table 13 permits conductors with an ampacity in the range of 501A to 600A to be protected by a 600A OCPD.

The premise behind the application of Table 13 is for the total conductor ampacity of the parallel runs to be protected by one OCPD. It is not permitted to add the OCPD values of Table 13. For example, a circuit protected by a 1200A OCPD is not permitted to be supplied by two parallel runs of conductors with a total ampacity of 1140A (2•570A), as it is not permitted to add the 600A OCPD value of Table 13 for each conductor run with 570A ampacity.

Interestingly, the OCPD rating as determined by Rule 14-104(1) and Table 13 is harmonized between the CE Code and the U.S. National Electrical Code (NEC). The only difference is NEC goes up to 800A. ESA has submitted a proposal to the CE Code to expand Table 13 to 800A.

Let's now look at Rule 8-106(1), a.k.a. the 5% Rule. When the load is determined by calculations specified in Section 8, Rule 8-106(1) permits the use of the next-smaller standard size switch and/or conductor, provided it is not smaller by more than 5%.

There's a popular misconception that the 5% Rule applies to all loads, but the 5% Rule *is not applicable* to fixed known loads that are not calculated. Furthermore, the 5% Rule does not permit the OCPD to exceed conductor ampacity (another misconception!).

For example, a demand calculation (in accordance with Section 8) results in a non-continuous load of 399A. When applying the 5% Rule, a conductor with 380A ampacity can be used. Rule 8-106 does not determine how the conductor is to be protected; that information comes from Rule 14-104. For this example, a 400A OCPD is permitted to be used, based on Table 13.

Matchmaking between conductors, overcurrent protection and loads is important for safety, so apply these Rules only within the specified parameters. EB

Nansy Hanna is the director for Engineering & Program Development at Electrical Safety Authority (ESA) where, among other things, she is responsible for product safety, code development, improving harmonization and alternative compliance, worker safety, and aging infrastructure programs. She is a LEED-Accredited Professional and a member of CSA CE Code-Part I, Sections 24, 32, 46, 50 and 64. Nansy can be reached at nansy.hanna@electricalsafety.on.ca.

Always consult your AHJ for more specific interpretations.

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