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50 years Electrical Business

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EBMag is featuring a different guest editor on this page every issue during our 50th anniversary year. You can always reach the editor at acapkun@annexweb.com.

Ark Tsisserev is president of EFS Engineering Solutions Ltd., and has been an electrical safety regulator for more than 25 years (having retired from the City of Vancouver as its chief electrical inspector). He has been chairing the CE Code-Part I Committee for 15 years, and is a registered Professional Engineer with a Master's Degree in Electrical Engineering.

Canada's electrical safety system... an insider's tale

Notwithstanding years of serving on the Canadian Electrical Code (CE Code) Committee, ULC S500 series committee and representing the code abroad—and despite numerous published articles and speaking engagements—my start in the electrical industry was unremarkable.

After completing the apprenticeship program at a community college in the USSR, I joined the industry as a junior electrician—bending pipes, drilling concrete and pulling wires at a large construction project site in Ukraine.

After compulsory military service—including a brief stint in Cuba in 1963 (where the Soviets had no "official" presence)—undergraduate and graduate schools in electrical engineering, work for the State research company, and a few years of being refused emigration, my family and I were finally allowed to leave the USSR. Our Soviet citizenship was revoked.

The Canadian government accepted us as refugees, and the next stage of our lives brought us to Winnipeg in early 1978 with three suitcases and $270 US in our pockets.

Our new beginning was the classic tale: English studies at every free opportunity, working several jobs (draftsman by day, gas station attendant by night and electrician on weekends) and loving every moment of it. We never took anything for granted.

After a two-year gig in Fort McMurray with Syncrude Canada and another two years with Manitoba Rolling Mills, the next logical step was to upgrade my education and, after completing a graduate degree in Electrical Engineering at the University of Manitoba, I was fortunate to find a temporary job with the City of Winnipeg. Perhaps I did something right during this assignment because, when a permanent position opened with Electrical Inspections, I was advised to apply.

The rest is history, and the real fun began. Not only was I constantly tested by fellow inspectors, contractors and designers, but was asked to represent the City of Winnipeg on the CE Code Committee.

Only after joining this prestigious group of technical experts—who dedicate their time, passion and knowledge to the development of the code and other numerous safety standards—did I start to appreciate the unique characteristics of the Canadian electrical safety system, and the sheer beauty of the truly consensus-based process, facilitated by CSA.

Although the electrical industry is a very large entity, the community of volunteers involved in the development of codes & standards is a relatively small group that remains constant for quite a few years. We need the next generation of stakeholders to step forward and join this group, and they, too, will immediately discover tremendous joy in participating in the process and contributing to Canada's Electrical Safety System.

I'm still amazed (30 years later!) by the clarity and integrity of this consensus-based process, which fosters ultimate respect for your peers, and makes every member a stronger expert and a better person. EB

STOCK PHOTO

On the Cover and Page 26

Lighting safety considerations in industrial settings

Recent advances in lighting technology have caused many industrial organizations to evaluate the replacement of lighting fixtures in their facilities, as many of these fixtures have been in place for years, if not decades.

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IMAGE COURTESY BRITECH.

From left to right, Ryan Maguire, Tara Rimmer, Keith Maguire, Chris Maguire of CR Browne & Associates.

CR Browne & Associates now representing Britech in B.C.

Britech (www.britech.ca) has appointed CR Browne & Associates (www.crbrowne.com) to represent its line-up of electrical heating cables and controls in British Columbia, saying that the agency's team "approaches the marketplace with professionalism, technical knowledge, and prides itself in providing the highest level of customer service".

Established in 1998, CR Browne & Associates is a sales and marketing agency boasting over 100 years of experience collectively. Meanwhile, Britech Heating Cables & Controls provides engineered heating cable solutions across Canada, operating from coast to coast with a central warehouse and custom cable manufacturing facility in Toronto, Ont.

IBEW Local 1928 and NS Power reach agreement

Nova Scotia Power (www.nspower.ca) and IBEW Local 1928 (www.ibew1928.org) say they have reached an agreement that will provide "further job stability for employees and long-term, sustainable cost savings for customers".

In July, the union and its executive board agreed to present a tentative agreement to its membership; members were then provided the opportunity to vote and, a few days ago, the majority voted in favour of accepting.

"This is certainly a positive result for our company and, most importantly, for our employees," said Bob Hanf, NS Power president and CEO. "The ratified agreement will result in long-term cost savings, while also providing further security for our employees in the years to come."

"After a great deal of work and negotiation, we are pleased to be able to reach an agreement with the company," said IBEW business manager Jeff Richardson. "Our members have voted in favour of the agreement, and we fully support them in their decision."

Mercor Lighting becomes AD Canada's newest member

Affiliated Distributors (A-D) Canada has announced Mercor Lighting—a provider of lighting solutions—as its newest member. In business since 1959, Mercor is the result of a merger between Mercury Lighting and Eclairage Corlite with a focus on property management, national retail and energy savings, it says. The company operates warehouses and offices in Quebec and Ontario.

Meanwhile, AD is a North American industrial and construction products buying and marketing group with more than 450 members.

40% of NB Power's in-province sales to come from renewables

The Government of New Brunswick says it is moving ahead on its commitment to ensure that a minimum of 40% of NB Power's in-province sales come from renewable resources by 2020.

"Coupled with NB Power's groundbreaking work on NB Smart Grid and in implementing new efficiency programs initiatives, the renewable portfolio standard will effectively ensure that our province reduces reliance on fossil-based generation in a manner that keeps rates low and stable for the foreseeable future, and better optimizes the investments we have made over generations in our provincial grid," said Craig Leonard, energy and mines minister.

NB Power (www.nbpower.com) currently sources 30% of its in-province electricity demand from wind, biomass and hydro resources, says the province. Its new renewable energy target will include local and First Nations small-scale renewable projects, which will provide opportunities for non-profit organizations, associations, cooperatives and municipalities to develop renewable energy for the benefit of their communities, adds the government.

Visit bit.ly/ZeBK1a for The New Brunswick Energy Blueprint.

50 years Electrical Business

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Editor
Anthony Capkun - acapkun@annexweb.com

Group Publisher
John MacPherson - jmacpherson@annexweb.com

Account Managers
Scott Hoy - shoy@annexweb.com
Melanie Kirk - mkirk@annexweb.com

Associate Editor
Alyssa Dalton - adalton@annexweb.com

Art Director
Svetlana Avrutin - savrutin@annexweb.com

Production Manager
Kathryn Nyenhuis - knyenhuis@annexweb.com

Subscriber Customer Service Representative
Marie Weiler - mweiler@annexweb.com

President
Mike Fredericks - mfredericks@annexweb.com

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CIRCULATION: Marie Weiler
e-mail: mweiler@annexweb.com
Tel: 1-866-790-6070 • Fax: 1-877-624-1940
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We acknowledge the financial support of the Government of Canada through the Canada Periodical Fund of the Department of Canadian Heritage.

Canada

CCAB BPA WORLDWIDE BUSINESS

Not everyone pleased with WSIB's 2015 rate freeze

Ontario's Workplace Safety & Insurance Board (WSIB, www.wsib.on.ca) says that—for the second consecutive year—premium rates in 2015 will be maintained at current levels for the majority of employers.

"Thanks to continuing improvements in return-to-work outcomes, more timely adjudication and lower claim volumes, the WSIB is able to provide premium rate stability while improving our funding position," said Elizabeth Witmer, WSIB chair.

Maintaining current rates for 2015 can also be attributed to modest increases in employer premiums in previous years and continued growth in employer payrolls, says WSIB, adding that matching premium revenues to overall costs has ensured a more sustainable system. The compensation system is more than 64% funded today, adds the board, "and we are on our way to meeting our legislated requirements of 80% funding by 2022 and 100% by 2027".

But not everyone is enthralled with WSIB's announcement.

"A rate freeze is not the good news story it once was," said Richard Lyall, interim-chair of the Construction Employers Council on WSIB, Health & Safety, and Prevention—a coalition of associations such as Ontario General Contractors Association (OGCA), Ontario Road Builders' Association (ORBA), Ontario Sewer & Watermain Construction Association (OSWCA), and more.

"Employers in Ontario are being overtaxed as premium rates remain much higher than is necessary given the significant decline in LTI rates over the last decade. While we are encouraged by the board's improved finances, let me be clear: this largely came about by employer actions to reduce injuries and accept high premium rates."

Lyall pointed out that, since 2004, construction injuries have declined by 36%, and yet, over the same time period, the average maximum construction premium per worker has increased by 41%. Employers are continually investing in health & safety training and technologies to improve their LTI performance, but they have not seen a return for this investment (through decreasing premium rates) in over a decade, says the council.

These fees are putting a considerable strain on Ontario construction employers and add significant costs to the price of infrastructure development, insists the council, offering this comparison: a residential construction worker in Alberta pays $1698 to insure a worker earning $100,000, while the same employer in Ontario would pay 4.5x that amount to cover the same amount of risk.

Lyall concluded that "the time has come for employer premium rates to more accurately reflect our risk. Today, they do not".

Yukon kicks off inCharge electricity conservation program

Yukon's two electric utilities have developed a territory-wide initiative aimed at helping Yukoners save electricity and money.

The initiative, called inCharge (www.inchargeyukon.ca), commences October 1, and was created after substantial input from Yukoners and with direction from the utilities' regulator, the Yukon

Utilities Board, said the partners.

For 2014, the initiatives will focus on:

• LED Lighting Rebate: Yukon residential customers will receive a rebate of $7 for each Energy Star qualified LED light bulb they purchase from Yukon retailers, up to a maximum of eight bulbs per year, per residential account.

• Low-Cost Energy Efficient Products: the two utilities and community partners will distribute electricity saving kits that include items such as LEDs, smart power bars, block heater timers, low flow showerheads, motion detectors for lighting, insulation for hot water tanks/pipes and clothespins.

• Public engagement and education: The utilities will provide general information about how to save electricity through public events, written material, and the inCharge website www.inChargeyukon.ca.

Customers who apply for an LED rebate or participate in a user survey before the end of this year will be eligible to win one of three 40-in. energy-efficient TVs.

The Yukon Utilities Board (YUB) directed the utilities to start slowly with electricity conservation aimed at the residential customers and prove savings before reporting back to the board. Once the initial phases of the conservation program have been completed, the utilities will present a much more comprehensive suite of initiatives to the YUB for approval, it said.

Hydro One is making itself "less attractive"... to thieves!

About $2-million worth of copper is stolen from Hydro One (www.hydroone.com) annually, says the utility, which is why it is embarking upon a plan that will see the use of composite groundings with "no scrap metal value".

"By making changes to the way we operate, we can deter metal theft," said Ron Gentle, chief security officer, Hydro One.

Going forward, when the company undertakes maintenance work and upgrades at its stations, the new groundings installed will be made of a copper and steel composite rather than pure copper. Signage will be posted at stations alerting would-be thieves that this composite has no scrap value.

Hydro One explains that, when copper is stolen from a station, it compromises the electrical system, resulting in outages, costly repairs and, most importantly, can cause severe injuries and death—not only to those committing the crime, but also to employees, law enforcement officers responding to the scene and, potentially, the public.

Scott Tod, deputy commissioner and provincial commander of Ontario Provincial Police's (OPP) Investigations and Organized Crime applauds Hydro One's "initiatives aimed at ensuring its assets are less attractive to the criminal element in the future, thereby enhancing public and officer safety."

Visit bit.ly/1xyv8K4 to watch the video.

TORONTO 2015 Pan Am/Parapan Am Games seeks Structured Cabling Installation Providers

EBMag has learned of a great opportunity (thanks BW!) for structured cabling installation providers with the TORONTO 2015 Pan Am/Parapan Am Games taking place throughout southern Ontario next summer.

Structured cabling installation providers are encouraged to register their business (www.toronto2015.org/business/register-your-business) with the TORONTO 2015 Pan Am/Parapan Am Games Organizing Committee (TO2015) for a future RFP to be posted on MERX for:

• CATV/CCTV and Structured Cabling Technicians onsite venues games time (Cable Installation)

• On the Registration form, select Other Product/Service and register as:

• Structured Cabling Installation Provider

You have until the end of November 2014 to register your business.

The RFP is scheduled to be released to market using MERX by the end of December 2014.

More about the Games:

The TORONTO 2015 Games will be the largest international multi-sport Games ever held in Canada, with more than 7600 athletes from 41 countries competing in 51 sports in more than 30 competition venues.

The Games will also involve 16 municipalities stretching from Oshawa to Welland, and some 23,000 volunteers.

The TORONTO 2015 Pan American Games will take place July 10–26 and the Parapan American Games August 7-15.

For more information about the Games, visit TORONTO2015.org.

Franklin Empire acquiring Measuremax's distribution business

Electrical distributor Franklin Empire Inc. (Montreal, Que.) says it has entered into an agreement of purchase and sale regarding Measuremax Inc.'s (Peterborough, Ont.) distribution business.

Measuremax is a supplier of process & instrumentation products. With this acquisition, Franklin says it will become Exclusive Distributor for Siemens process & instrumentation products for the majority of Ontario, in addition to other major brands in this product category.

The remaining Measuremax business is not part of this acquisition and will continue under Measuremax Inc. Franklin will continue operating this business unit in its existing facility in Peterborough.

Franklin Empire says Measuremax's customers will have access to a "vastly larger basket" of electrical products, and Franklin staff will gain new market opportunities and forge new supplier relationships.

GE is "creating a new type of industrial company"

"This transaction is consistent with our strategy to be the world's best infrastructure and technology company [...] We are creating a new type of industrial company..." said GE's chair and CEO Jeff Immelt (photo 1) of the company's decision to sell its Appliances business to Electrolux for $3.3 billion.

GE (www.ge.com) says it has taken significant steps this year to reshape and focus its portfolio. In June, GE's offer for Alstom's Power and Grid businesses was accepted by the Alstom board and recommended by the French government. Power & Water is one of GE's higher-growth/margin industrial segments. In August, GE completed the IPO of its North American Retail Finance business (Synchrony Financial) as a first step toward its exit from that business.

The 2014 portfolio activity continues the company's "longer-term redeployment of capital from non-core assets like media, plastics and insurance to higher-growth, higher-margin businesses in Oil & Gas, Power, Aviation and Healthcare". GE aims to achieve 75% of earnings from its Industrial business by 2016 and, along with today's announcement, highlight GE's focus on core infrastructure businesses supported by a valuable specialty finance business.

Jeff Immelt

Keith McLoughlin

"GE Appliances is a well-run operation with strong capabilities in key areas such as R&D, engineering, supply chain and customer service," said Keith McLoughlin, president and CEO of Electrolux (photo 2). As part of the transaction—which is expected to close in 2015—Electrolux may continue to use the GE Appliances brand.

Apprentices to enjoy seamless mobility between B.C. and N.B.

Apprentices in British Columbia and New Brunswick will now be able to seamlessly work in either province, thanks to a Memorandum of Understanding (MoU) signed by Premiers Christy Clark and David Alward at the Council of the Federation meeting in Charlottetown, P.E.I.

"With new and emerging opportunities in the construction, oil and gas and forestry sectors on the horizon, this important agreement couldn't have come at a better time," noted N.B. premier Alward. "It also complements a variety of efforts to support apprentices, create jobs and provide employers with the skilled workers they need for current and future generations."

Starting this fall, apprentices in both provinces will be able to seamlessly work in either province to achieve their Red Seal certificate, and move freely between the two to take advantage of job opportunities.

The MoU is meant to address immediate and future demand for skilled labour in both provinces, say the partners, adding this may contribute to the development of a national apprenticeship mobility strategy.

Differences in provincial and territorial apprenticeship certification requirements mean that, for some Canadian apprentices, gaining the skills training required to achieve their Red Seal (www.red-seal.ca) certificate can be a challenge when they are unable to move to where the jobs are.

These differences also make it difficult for employers—particularly those with operations in multiple Canadian jurisdictions—to employ apprentices from other parts of Canada to meet their short-term labour needs.

"B.C. is entering a time of incredible opportunity... not only for British Columbians, but for all Canadians. In addition to meeting the needs of employers and apprentices in B.C. and New Brunswick, this agreement will complement the work our province is leading with other provinces and territories to improve labour mobility across the country," said B.C. premier Clark. EB

Thanks to all of you for taking the time to send us your thoughts. For their efforts, we're sending *these* writers of Letters to the Editor some of the following prizes:

- Milwaukee Tool combination pliers, diagonals cutting pliers, lineman's pliers and screwdriver combo pack (www.milwaukeetool.com).
- Golf shirts from our friends at Fluke (www.fluke.com).
- Professional 25-ft FatMax auto-locking tape rule from our friends at Stanley (www.stanleyblackanddecker.com).
- Assorted swag from our friends at GM Fleet & Commercial (www.gm.ca)

Some lucky writers may also receive a very-limited edition Tuff-Tote tool pouch—customized with EBMag's 50th Anniversary logo—from our friends at Ideal Supply (Canada) Corp. (www.idealindustries.ca).

We always welcome Letters to the Editor at **acapkun@annexweb.com.**

You all deserve a High Five!

I wanted to pass on to you and your staff my sincere thanks for at least 30 of your last 50 years. I have held my subscription to EB as diligently as possible since at least 1984 when I became a journeyman electrician.

The articles, information and ads have always helped keep myself and those I work with better informed on issues affecting our livelihood.

The Code File and quiz have been especially useful tools for both journeymen and the apprentices that learn from—and with—us. My personal favourite lately is Patrick Lynch and the work he explains for us.

The pinnacle of your product, however, has to be the July issue! I was glued to it from cover to cover, and could hardly wait to discuss the articles with my work partner (I was a journeyman before he was born).

We are always looking to improve on what we know about our work and become better at the toughest part of our jobs: troubleshooting, which is something you can't see. Your mag helps us do exactly that. Thanks again for a great mag... you all deserve a High Five from the rest of us!

— Jim T., Quesnel, B.C.

ECAA enhanced Master Electrician program

Back in 2009, we published news of Electrical Contractors Association of Alberta (ECAA, www.ecaa.ab.ca) creating two new Professional titles: Certified Master Electrician and Registered Master Electrician. To see the full news item, visit tinyurl.com/34u7kd6. Meantime, Dave T. needed some more information, and ECAA was happy to oblige.

Q: I am an electrician from B.C. with his FSR B and FSR A tickets. I am now working in Alberta and employers would like to see me get my masters. Do you have a online review package or course to prepare you for this test?

— Dave T.

A: The regulations in Alberta currently recognize both the FSR A and B certificates that you have as equivalencies to our Masters Program. You will have to make application to write a Jurisprudence exam [which] is to make sure you are aware of the province's regulations and responsibilities as required by an Alberta Master Electrician.

An FSR B will have limitations similar to those in B.C. on what voltage you will be able to work on. The application for writing the Jurisprudence exam needs to be made with the Safety Codes Council (www.safetycodes.ab.ca); they will be able to guide you with the information you will need to prepare for the exam.

Once you have your Masters certificate, you can apply to ECAA to become a voluntary Certified Master Electrician (regulated by the Professions Act), and you will need to take and write an Ethics course, which is available at www.ecaa.ab.ca.

Hope this helps.

— Clem Gratton, chair, Professional Electrical Contractors, ECAA

More news can be found online.

Visit us at EBMag.com

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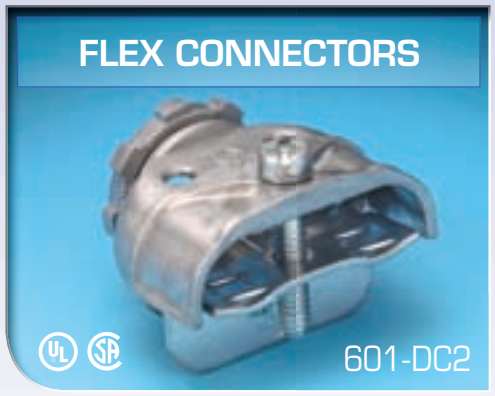

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Has the electrical safety pendulum swung too far?

**We published the article "Has the electrical safety pendulum swung too far?" by Joe Electrician (not his/her real name) in the 50th anniversary edition of EBMag (July 2014, p.20) in the hopes that, in our own words, the piece would lead to "spirited and mature debate".*

Are we being killed at an alarming rate?

"Has the electrical safety pendulum swung too far?"

The answer is Yes.

I guess I'm from the old school where we were taught to work on electrical distribution systems (EDS) hot. I know we probably lost someone to electrocution, but I was never aware of the arc flash hazards that seems to proliferate the industry today, killing electricians at an alarming rate.

One theory is that the industry, in its rush to bigger profits, has stopped using real copper bus. Modern silver flashing bus work and the use of more plastic has created distribution systems that are inherently unsafe, and the electrician may not return to his family safely because of cheaper manufacturing processes.

Or are we not training apprentices properly today? Are the older electricians retiring and not mentoring the younger worker? How many companies actually know about Bill C45? Today's market does not have 'electrical inspectors' anymore; you can inspect your own work and certify to the safety authority that the installation is safe.

I'm all for safety and everyone coming home to their families every night after work, but all the safety methods, procedures and company policies will not prevent stupidity nor the odd accident. A panel could be left unsafe by the last person working on it, for example. And, for some companies today, profit tops *proper* maintenance.

The use of insulated tools promotes carelessness ("I don't have to be careful... my tools are insulated!"). Add to that restricted vision and mobility while wearing a moonsuit, gloves and tinted visors. The moonsuit is also hot and uncomfortable, so the job may be rushed so the wearer can get out of his suit as soon as possible.

I trust this provides spirited debate and, possibly, better solutions to the ultra-safe pendulum that may have swung too far.

— *R.S.*

How did we ever get so screwed up?

The article "Has the electrical safety pendulum swung too far?" (EB July 2014, p.20) was one of the best articles I have read in a long time. I agree 150%.

I have been in the trade for almost 50 years and am really sorry to see that common sense has died. I really wonder how we ever got so screwed up, and has anyone ever thought about the cost of all the useless BS just on the chance that this or that *may* happen?

Just like 9/11 changed the world and added billions of dollars to prevent something *that might* happen.

Thanks, and I really hope you push it... we need a voice! EB

— *Larry*

2014 International Utility Locate Rodeo—a.k.a. the Olympics of the locate industry—recently came to a close, and congratulations to **Paul Delsey** of Frontier Utility Locating (Jerseyville, Ont.), who scored #1 Rank in the Power Division. The event featured 73 locate technician competitors and 125 volunteers from across North America (www.locaterodeo.com).


Warren Frost

Warren Frost has joined **Electric Power Research Institute** (EPRI, www.epri.com) as country manager for Canada, Member & Technical Services, where his responsibilities focus on ensuring Canadian participation in EPRI research, "improving the value Canadian members receive from EPRI" and promoting "active participation of Canadian members in the collaborative process".

Gerrie Electric Wholesale Ltd. (www.gerrie.com) has appointed **Dan Schellenberg** to the role of director of sales for the East and West regions, with a particular focus on the commercial construction business. **Ken Cherrett** has been promoted to the position of director of industrial sales for the Central Region. **Peter Postrozny** has been promoted to director of national accounts. **Joe Conciatori** has joined the company in the role of director of contractor sales in the Central Region.


Sean Dunnigan

Techspan Industries' Electrical Division has expanded its Ontario Sales Team with the appointment of **Sean Dunnigan** to account manager for the GTA (Greater Toronto Area) Central Region (www.techspan.ca). He will be responsible for servicing and managing growth plans with the company's distributor partners while driving demand for products and solutions with electrical, industrial, OEM and contractor customers.

Robertson Electric Wholesale (www.robertson-electric.com) welcomed **Mike Thompson** as vice president & general manager, British Columbia. "Mike joining Robertson is another edge over our competition, and is an asset to facilitate the accelerated growth in British Columbia..." **Rick Campbell**, president, added "having these facilities in B.C. will support our growing national accounts business—servicing customers coast-to-coast". Meanwhile, **Dana Shutt**, formerly vice-president of sales at HD Supply Canada, has been named national accounts vice-president.

Patrick (Pat) Haughey—formerly general manager of GE Lighting Canada—has joined **Medgar Lighting Concepts** (www.medgarlci.com) as distribution sales manager. According to Medgar, Haughey has over 30 years of experience in the lighting industry, and has held "key positions with two of the largest global lighting manufacturers".


Chantal Guimont

Catherine Kargas, board chair of **Electric Mobility Canada** (EMC, www.emc-mec.ca), announced the appointment of **Chantal Guimont** to the position of president and CEO. Based in Montreal, Que., Guimont previously served as director, strategic planning and transportation electrification at Hydro-Quebec, where she worked in a variety of capacities for over 30 years.


Phonse Delaney

Phonse Delaney has been named president and CEO of **FortisAlberta**. "His depth of experience in the utility industry and his familiarity with the operating and regulatory environment in Alberta will allow the Corporation to build on the success it has achieved under the leadership of Karl Smith [appointed EVP and CFO, see below]," said **Doug Haughey**, chair (www.fortisalberta.com).

Fortis (www.fortisinc.com) has announced **Karl Smith**, president/CEO of FortisAlberta, will become EVP and CFO. **John Walker**, president/CEO of FortisBC, will become EVP, Western Canadian operations. Succeeding Walker is **Michael Mulcahy**, who will also serve as president/CEO of both FortisBC and FortisBC Energy. **Earl Ludlow**, president/CEO of Newfoundland Power, will become EVP, Eastern Canadian and Caribbean operations.


Michael Mulcahy

Yukon Energy's board of directors (www.yukonenergy.ca) has selected **Andrew Hall** as its new president and CEO, replacing outgoing president/CEO **David Morrison**, who is retiring at the end of the year.


Steve Good (right) with Eaton's Andrew Leslie

Eaton (www.eatonelectrical.ca) congratulates the winners of its C22 Pilot Device promotion in which distributor sales reps were incentivized for product sales with reward points that were redeemable for prizes: **Steve Cassano** of Aztec Concord; **Steve Good** of L&B Electric Bridgewater; **Dan Wasyliw** of Gescan Edmonton; and **Shaun Nagy** of Wesco Burnaby. EB

Making light work of wireless street lighting control

Antony Corrie

We all need light, but how can we keep the costs and carbon emissions that result from it under control?

The efficient use of power has to be a priority as more and more demands are put on the planet to provide for our requirements. As technology develops, we continue to see new generations of electrical devices coming to market—smartphones and tablets included—allowing us to connect in real-time with people right across the globe for both personal or professional reasons.

In just a generation, incredible strides have been made in a host of industries, with social media technology a major part of millions of lives. But as we link arms across continents via the internet, are we in danger of losing sight of the urgency to save energy and rein in our carbon emissions to preserve the planet for future generations?

Across North America, some cities have already grasped the metaphorical nettle by analyzing their streetlighting networks and replacing outdated infrastructure with LED lighting, thereby discovering a more efficient and environmentally friendly alternative to the sodium vapour streetlights that have been in existence since the early 1970s.

And those stylish smartphones and tablets that we use to communicate instantaneously with each other are all part of the control & monitoring solutions that can employed as part of any new LED installation to further cut carbon emissions and energy bills.

Essentially, the technology allows users to 'talk' to individual or groups of lights, adjusting their brightness so they operate at their most efficient level for the circumstances at the time. This, too, can be done in an instant at the touch of a button. It's a technology that could save local authorities and municipalities across the world a small fortune—on a grand scale.

STOCK PHOTO

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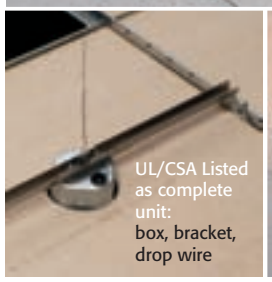
FIXTURE BOX

MOUNTS FIXTURES SECURELY TO SUSPENDED CEILING GRID



UL/CSA Listed as complete unit: box, bracket, drop wire

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FS420SCL not only saves time (and money!), it's tested, listed to hold up to 50 lbs. as required by the 2014 NEC.

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POWER and LOW VOLTAGE BOX
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  NEW WORK Box screw-mounts to stud
- Includes ground clip; optional covers available

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TVBU505GC TV BOX™ For Power and Low Voltage

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Changing end stop bushings is fast and easy; no need to remove the strap. Insert the bushing that works best with the cables you're installing.

Our MC cable fittings reduce inventory... cost much less than steel or malleable iron fittings.

Catalog Number	Trade Size	Cable O.D. Min	Cable O.D. Max	Wire Bundle O.D. Min	Wire Bundle O.D. Max	Conductor size # of Conductors* (AWG/KCMIL)
8412	1"	.780	1.120	.660	1.000	6/3, 6/4, 4-3, 4-4, 2-3, 2-4, 1-3
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

8415
2" trade size

IN MULTIPLE SIZES

*Examples of 3- and 4-conductor cables accommodated.

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When will we cut the carbon?

Last year, 40% of the total energy consumption in the States was attributed to residential and commercial use—a figure that includes street and other outdoor lighting. Latest figures show that the U.S. taxpayer faces an annual bill of more than $2 billion to meet the costs of powering its streetlights alone—and that's not taking into account the cost of maintaining an ever-aging and outdated system.

According to a 2012 article in The Boston Globe, the U.S. has around 26 million streetlights that soak up as much electricity as 1.9 million households and generate a similar amount of greenhouse gas emissions to 2.6 million cars.

The U.S. Department of Energy (DoE) has said that promoting the use of LED streetlighting technology across the country could save more than $750 million a year in energy costs.

Within five years, LEDs are expected to account for more than 50% of the global lighting market as more authorities and municipalities grasp the benefits of expanding the use of existing wireless technology.

The additional use of wireless monitoring & control systems can also help save taxpayers many thousands of dollars while meeting 21st Century needs. In strained economic times—when belts have to be tightened and budgets closely scrutinized—these savings could make a major difference to whether projects in need of funding stand or fall.

Can you actually see this night sky?

Irish playwright Oscar Wilde, who spent a year conducting a series of lectures in America in 1882, is credited with saying: "We are all in the gutter, but some of us are looking at the stars". Had he visited the U.S. today, his view of the universe would have been considerably less impressive.

The glow from urban lighting obscures all but the brightest orbs, with much of the light emitted cascading out into the blackness. This means that not only are millions of dollars' worth of energy being wasted each year, but also that greenhouse gas emissions are much higher than they need to be and light pollution is evident, even in the smallest of cities.

Some environmental campaigners also say that too much artificial light at night has an adverse effect on birds and wild animals, confusing their natural patterns and disturbing their breeding cycles. It's clear that things need to change.

Control and monitor

As with other sectors, technology in the lighting industry is forever evolving. With efficiency as the 'prime mover'—due to pressure from the Obama Administration to take urgent action on climate change—market players are creating tailored solutions giving value for money in streetlighting and other outdoor lighting scenarios... maintaining levels of light where required, putting the light where it's needed while being able to dim individual lamps at the touch of a button.

New wireless monitoring and lighting control technologies are available on all those devices we use to contact our friends via Facebook and Twitter. In less than the time it takes to post a tweet, users have the power to restore a lamp to full brightness via their laptop, computer, tablet or even smartphone from anywhere in the world.

In turn, each lantern can be wirelessly controlled to be made as energy efficient as possible—in a residential area, for example, where lighting can be dimmed in the early hours when the majority of people are in bed.

Users can remotely monitor and control the output of individual or groups of streetlights. Using a combination of radio frequency and GPRS (general packet radio service), users can easily configure and manage the output, reacting immediately when required to a sudden change in circumstances.

The London, England, borough of Westminster was keen to eliminate wasted energy from its 15,000 streetlights and meet parliamentary directives demanding it reduce carbon emissions by 60%, so it turned to one such wireless monitoring & control system to accomplish this.

Following a successful trial six years ago, Westminster rolled the solution out across the whole borough. The project, which initially targeted Westminster's main road networks and focused on areas where lighting could be dimmed by 25% during off-peak times, has resulted in substantial amounts of carbon emissions being saved per streetlight annually.

The wireless monitoring & control system gives Westminster the potential to save more than 1.5 million kilograms of carbon as well as an estimated reduction of well over half-a-million dollars in energy costs per year at current energy prices (which, as you know, are always rising). The city council even used the system to control its Christmas lights! Its biggest gift to residents, however, may be its anticipated $35 million-plus savings over an anticipated 20-year product life cycle.

Putting light where it's needed

The system is equally effective on main roads away from the urban heartlands, where streetlighting can often be reduced by up to 30% in the early hours—depending, of course, of how busily travelled those sections of road.

Again, the beauty of these solutions is that users can tailor their lighting requirements to suit the needs of a particular area. For example, lighting may need to be maintained at full brightness all night at certain road junctions, or in areas with a proliferation of bars, hotels or nightclubs, where public safety is paramount.

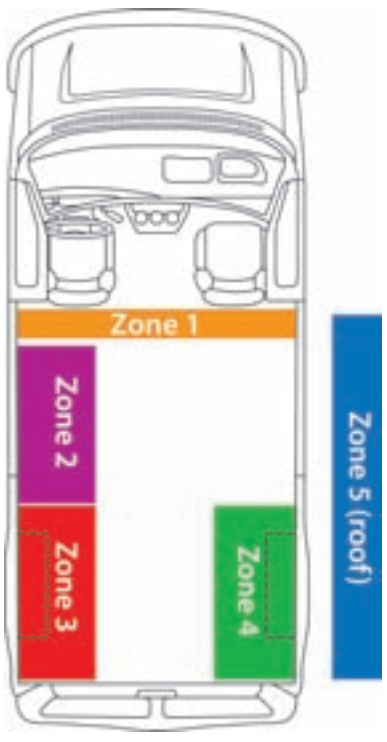
In addition to creating a safer environment by maintaining lighting levels in specific areas, and reducing energy costs by allowing the dimming of individual lamps when full brightness is not required, these solutions also have other benefits.

As each lighting point is monitored, any faults in a particular lantern are reported directly to the user every morning via email. This, again, offers a cost saving, reducing the need for unnecessary maintenance visits or night scouting, as maintenance schedules can be created as a result of the emailed feedback.

These monitoring & control systems offer a robust solution to the issues facing many authorities as they examine ways of cutting costs and tackling climate change while ensuring those who need lighting to be operating to its best effect—pedestrians, cyclists and motorists—are always taken into account where brightness is key to people's safety. EB

Antony Corrie is the vice-president of Harvard Americas (www.harvardeng.com). Harvard is a player in the design, development and manufacture of electronic HID ballasts, LED drivers and control products for the lighting industry. It is also the company behind the LeafNut wireless monitoring and control system for street and outdoor lighting.

How to organize your van for efficiency and safety



Separate the space inside your vans into zones, which allows you to make the most of available space.

As a fleet manager, you face multiple challenges when it comes to increasing efficiency. One major challenge is streamlining processes for your drivers to increase safety and decrease wasted time. Organizing your work vehicles can streamline your processes, which greatly impacts efficiency and safety.

Step 1: Take inventory

Before you rush to upfit your vehicles, take the time to inventory the typical loads for your drivers. What equipment and tools do your drivers haul each day? Note the parts, products and documents that your drivers must have in their vehicles. Also note which of these items must be retrieved daily, and which are used only occasionally.

Now that you know what items your drivers carry and utilize, you can begin the process of structuring your vans in a way that maximizes efficiency.

Step 2: Create zones

Separate the space inside your vans into zones, which allows you to make the most of the space inside, and on top, of your van.

Zone 1: Partition

The first area to address is the partition, which is an essential safety feature for your work vehicles. Don't try to cut costs here; a partition is vital to the safety of both your drivers and their equipment.

A partition keeps cargo in the cargo area, and prevents it from shifting into the cab where it could distract or injure a driver. This is especially important for large pieces of equipment or heavy tools, which could cause significant damage to drivers if not properly secured.

Costs associated with accidents and damage to expensive equipment really add up. By upfitting your work vehicles with a partition, you reduce the likelihood of incurring these costs.

When organizing your fleet, the partition should be addressed first so the cargo management system can be designed around it. You have several options for partitions, so choose the one that best fits your fleet's needs. Plus, many accessories can be mounted directly onto the partition cabside, enabling your drivers to easily find documents and safety items.

Another benefit of a partition is noise and climate control within the cab area. A partition can decrease the amount of noise your drivers have to endure, which makes it easier for them to concentrate on driving. It also allows drivers to heat or cool the cab area quickly, making their drive more comfortable.

Continues page 20

Introducing the Sprinter 4x4.

Starting at $49,900.*

Sometimes getting to the job site is work itself. That's why we're introducing Canada's only 4-wheel drive commercial van – the Sprinter 4x4. Activated at the push of a button, the Sprinter 4x4 uses the 4ETS feature to electronically control individual wheels, giving these cargo vans some serious ground-gripping power when you need it. See what it's made of at Sprinter4x4.ca.

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Square D brand electrical equipment has a proven track record that is a testament to its quality. We offer a lifetime warranty on all QO breakers and loadcentres.

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To simplify and speed up installation, QO residential loadcentres are evolving to include new endwalls, main breaker trims and plug-on neutral AFCI's. Learn more at www.schneider-electric.com/ca or from your authorized Square D Brand distributor.

With over 100 years of reliability, put your reputation on us instead of on the line — ask for Square D QO — the brand of choice for quality and reliability.

Electrical contractors – sign up to receive **5 QO golf shirts*** or **10 HomeLine t-shirts*** co-branded with your company name and a chance to **WIN** $5,000 towards sponsoring a local youth sports team of your choice.

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**Shirt quantities limited. While supplies last. Available to electrical contractors only.*

HomeLine Loadcentres

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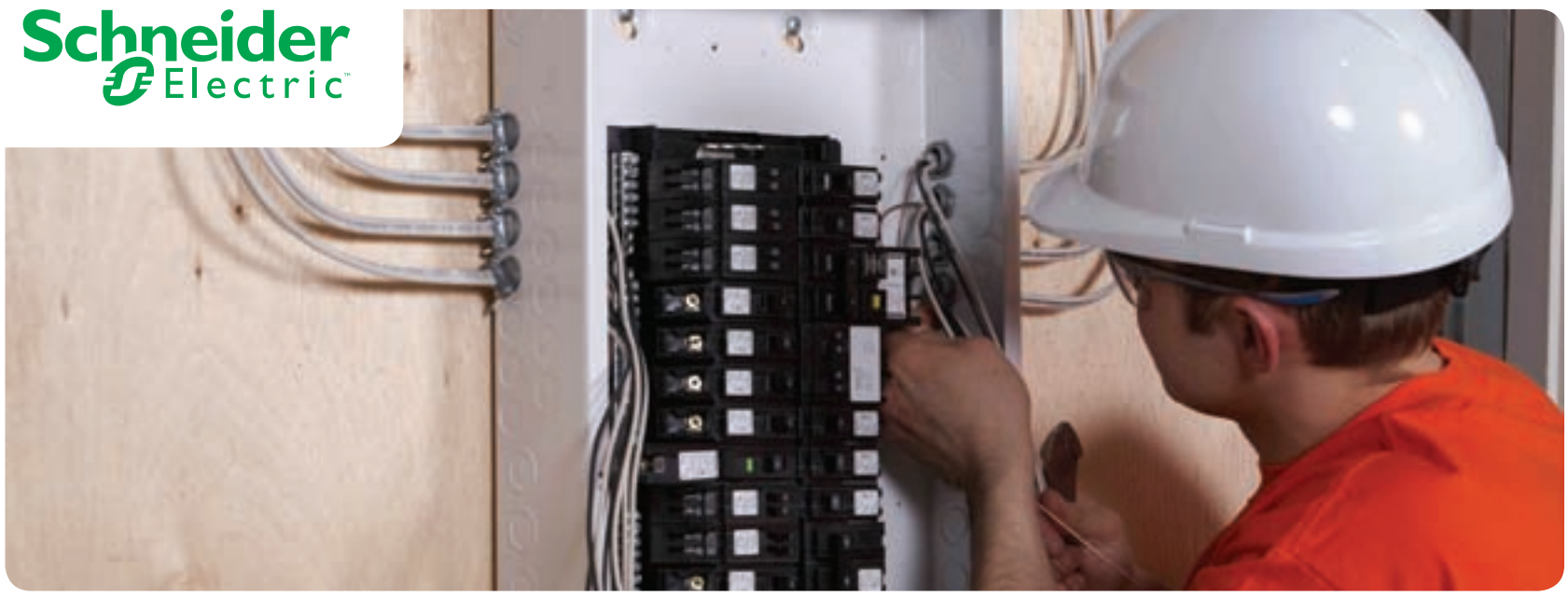

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For new construction or renovation, HomeLine™ loadcentres are easy to work with and install. The box is remarkably flexible, with convenient KOs, distributed neutrals, and multiple ground bar mounting positions to customize the panel to your needs. The appliance white panel and trim — a HomeLine standard feature — eliminates the need for painting.

The design-rich panel with features such as backed-out terminal screws, stud or keyhole mounting, hinged main breaker barriers, and self-adjusting surface/flush trims reduces installation time.

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Twin and quad breakers cut the breaker space to ½" per pole. We know breaker technology better than anyone. The same premium level, lifetime warranty offered on QO circuit breakers is also available on all HomeLine circuit breakers.

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New endwall knockouts for main feed flexibility, elongated sidewall mounting holes for easier adjustment in studs, and factory-removed main breaker twistout on our trim are the new features designed to speed up your installation. See the new features at www.schneider-electric.com/ca or visit your authorized Schneider Electric Distributor to learn more.

Make the most of your energy℠

The roof can be used to haul many things, such as ladders, conduit and sheet goods. Based on the items your drivers haul, assess which ladder rack fits your needs the best.

Determine which parts or tools are used most frequently to ensure they are easily accessed curbside.

Don't skimp on the partition, which is vital to the safety of your drivers and their equipment.

Zones 2, 3 and 4: Curbside and streetside
To maximize space, first measure these sections of your van to determine how much space is available. Next, check your inventory list to define the types of storage your drivers require.

Shelving is an organization staple, but consider how it will be used. Do you need open shelving? Divided shelving? Shelving that can be adjusted easily? Make sure the shelving makes sense for your drivers and their daily processes.

Another thing to consider is storage for tools and parts. Electricians generally carry small parts, so small parts storage is a must. Do your drivers need to be able to see these small parts at a glance? Or do the parts need to be secured in closing drawers? Do you have any items that need to be kept in locked storage? There are a variety of storage options open to you that can resolve each of these concerns.

Finally, determine which parts or tools are used most frequently to ensure these items are easy for your drivers to access while on the job.

Zone 5: Roof
Don't forget about the space on top of your van: the roof. The roof can be used to haul many things, such as ladders, conduit and sheet goods. Based on the items your drivers haul, assess which ladder rack fits your needs the best.

Do you have high-roof vehicles? If so, choose a design that lowers the ladder down so your drivers can reach it easily. Also keep in mind that your fleet drivers are of different heights. Make sure the ladder is easy for all drivers to access.

There are several ladder racks on the market designed to address many different needs, so do your research before deciding on what's best for your fleet.

Additional storage
Lastly, check your inventory list for specialty equipment, such as reel holders or lockers. Make sure you have a place inside your vans dedicated to this specialty equipment. Accessories such as hooks, document holders and mounts for safety equipment can be added for increased organization and efficiency.

Once your vehicles are upfitted, put in place a system to ensure the upfit is fully utilized. Organize your work vehicles in the same way, so that the same parts are stored in the same locations in each vehicle. Work with your drivers to determine the most efficient storage areas for all parts based on frequency of use. After this system is in place, monitor your drivers. Ask them how the upfit is working for them, and identify areas of inefficiency. Continue to streamline processes around the upfit for maximum efficiency and safety. EB

Article contributed by Adrian Steel (www.adriansteel.com), a provider of cargo management solutions.

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Standard Life

STOCK PHOTO

Why aren't we decarbonizing the energy sector, asks IEA

Clean energy finance has gathered speed this year, reports the International Energy Agency (IEA), but it is falling short of what IEA's "Energy Technology Perspectives 2014" (ETP 2014) calculates is needed to refit the energy sector so that average global temperature does not rise more than two degrees Celsius.

IEA's flagship technology publication warns that the energy sector will need an extra $44 trillion US in investment by 2050 to decarbonize the energy sector "sufficiently to limit climate change". The spending outlined for ETP 2014's 2 Degree Scenario will generate more than $115 trillion US in fuel savings and, even at a 10% discount rate, the return in net savings exceeds $5 trillion US.

So why, asks IEA, isn't there more investment in decarbonizing the energy sector?

The problem for the power sector, ETP 2014 explains, lies with how investors assess the risk and return of decarbonization.

To close on the financing of any project, a developer needs to convince investors of one thing: that they will be able repay the debt and the interest on the debt while also remunerating shareholders for the capital mobilized. For investors, financing low-carbon projects is relatively new territory, fraught with uncertainty.

So why, asks IEA, isn't there more investment in decarbonizing the energy sector? The problem for the power sector, ETP 2014 explains, lies with how investors assess the risk and return of decarbonization.

To assess whether the cash flows of a new project are sufficient to reimburse the investment and capital costs used to finance a project, investors calculate the net present value (NPV). These calculations are based on expected electricity prices and take into account their variation and uncertainty over time, explains IEA. A negative NPV implies the project will not deliver sufficient return and, thus, unlikely to proceed.

But while a positive NPV is a necessary condition for being financed, even this is not sufficient, notes IEA. Investors also appraise projects with other financial ratios, such as the internal rate of return, the payback period or debt coverage ratio under stress conditions to capture other dimensions of financial viability, and to inform investment decisions. Investors need to feel assured that a project with higher perceived risk is going to deliver a higher rate of return.

Low-carbon investments—whether large and financed by sophisticated large utilities or small-scale and financed by households—cannot escape this financing constraint, says IEA. Before deciding to spend $10,000 US for a rooftop solar PV or $5-$10 billion US for a nuclear power plant, investors seek to assess whether they will be able to get their money back and get a return.

Low-carbon projects, like other power plants, face regulatory risks, such as licensing delays and problems of public acceptance, plus the danger of construction delays and cost overruns. Then, once the plant is up and running, private investors face operational risks.

For new technologies, accurate operations and maintenance costs can be known only

when operations are underway; some installations of a given technology type can prove to be less reliable and with a lower availability factor than others. For wind and solar power, initial estimates of the quality of the resource can also be a source of risk, and yearly weather variability can affect cash flow, notes IEA. And renewable projects have the added risk of uncertain load factor, resulting from possible curtailment of their output due to grid integration challenges and in the situation of excess generation.

Finally, should a carbon price exist, it lifts wholesale electricity prices, thereby increasing the profitability of non-emitting power plants and providing incentives for their construction... then low-carbon projects must factor in carbon price uncertainty.

Attracting private investment in low-carbon electricity generation requires that governments learn to think like investors, finds IEA's ETP 2014.

Governments need to think like investors

To reassure investors, governments may need to spread related risks and associated costs to taxpayers and consumers, and they need to become more transparent when using such support mechanisms.

To date, low-carbon investments have been driven by support schemes, including feed-in tariffs, output-based subsidies and quota systems. Governments need to assess whether these mechanisms remain relevant or need to be replaced with new options.

ETP 2014 finds that current conditions suggest that it may be necessary to continue supplementing competitive markets to secure the low-carbon investments needed to decarbonize the electricity sector by 2050. ETP 2014 details various options to promote investment return, including direct capital subsidies, individual plant regulation and public procurement, plus feed-in-tariffs, quota systems and carbon pricing.

But the book concludes that no single option should be regarded as the perfect solution. Some are better for the uptake of technologies, but need to be replaced as technology matures, or should any progress be made on implementing carbon prices. Other options fit well for distributed generation that can be installed quickly, while large and long-term low-carbon projects may need long-term commitment by governments.

Governments should carefully apply the best option from their basket of instruments.

Caveats exist for all the options available to supplement markets, ETP 2014 notes. Each can have different implied costs of avoided carbon emissions. Most of the options are technology-specific, yet inefficiencies can arise when governments pick the winners. Promoting too-expensive technologies too early may be unsustainable in the long run and may increase the cost of climate change mitigation. Also, every option can have distortive effects on wholesale electricity markets, again to different degrees.

The key to stimulating investment in decarbonization, ETP 2014 concludes, is to supplement electricity markets while seeking to minimize distortions, and should rely on market mechanism for mature technologies while minimizing costs through timely technology deployment. EB

REFLECTIONS FROM THE 2014 IEEE ESTMP

Anthony Capkun

EBMag has been attending a uniquely (to our knowledge) Canadian event called the IEEE IAS Electrical Safety, Technical & Mega Projects workshop (a.k.a. ESTMP or Mega Projects) for several years, and this niche event just keeps growing.

This year, the workshop welcomed a record attendance of 281 attendees, representing all facets of the electrical industry, including major EPCs, end users, contractors and vendors.

The workshop provides a forum for exchanging and advancing industry knowledge in the areas of electrical safety, engineering design and system reliability, as well as the implementation and execution of mega projects. It aims to share innovative concepts, successes and lessons learned in the areas of: advancing the application of state-of-the-art knowledge and best practices; stimulating innovation in creating the next generation of technology, and; design and implementation of mega projects.

The 2014 installment saw the presentation of 16 papers, with topics ranging from "Saving Money through Innovative Cable Design" and "CSA Z462 3rd Ed." to "Upgrading Generator Protection & Grounding" and "Electrical Maintenance Essentials and CSA Z463".

A two-session vendor exhibition offered us the opportunity to mingle with major solutions providers, while evenings were enhanced with various hospitality suites that helped amplify networking opportunities.

For EBMag's full photo gallery from the 2014 ESTMP, visit EBMag.com's Photo Gallery (under Industry News), and scroll down to "GALLERY: IEEE Mega Projects ESTMP Workshop (March 2014) Calgary".

Watch EBMag's VIDEO ***"Mega satisfaction at Mega Projects Workshop"*** *from the 2012 ESTMP, and discover why you should attend.*

The next ***IEEE IAS Electrical Safety,*** *Technical & Mega Projects Workshop is being held March 2016 in Edmonton, Alta. Visit* ***ewh.ieee.org/soc/ias/tmp,*** *and keep watching* ***EBMag*** *and* ***EBMag.com.***

George Morlidge of Fluor and **Blair Sackney** of Southwire challenged delegates to "Save Money through Innovative Cable Design". Cable is often estimated at 10% of the electrical budget, they noted, yet often overlooked at the cost-savings phase. After going through several cost comparisons, the presenters asked delegates to consider cable products that employ the latest technologies and designs; whether mechanical protection is needed in all areas; the use of protection by location to remove mechanical and environmental risks; 8000 series aluminum products; single-conductor medium-voltage cables for long/high ampacity runs; and UL alternatives.

Duane Grzyb of Magna IV Engineering asked delegates whether they believed that "installing a bigger, more expensive cable [can] save you money?". Without getting into the details of Duane's base case assumptions (there will be more on that in an upcoming edition), he explained to delegates that—in a best-case scenario—it is possible to recover the cost of a large cable in 6.7 years while saving $954/annually in energy afterward and eliminating 9.3 tons/year of CO2 emissions from Day One of operation.

Terry Becker of Electrical Safety Program Solutions (ESPS) Inc. was on-hand to give delegates a heads-up on CSA Z462, 3rd Edition "Changes & Impacts", which is expected to be published for 2015. "The core of Z462 is the same," Terry noted. "Deenergize is the first choice", and he pointed out some additional information on emergency response. "You don't use, for example, a running tackle or a 2x4 to release a frozen victim." One of his points, however, is the importance of *educating* workers, and not just trying to "scare the crap out of them".

workshop

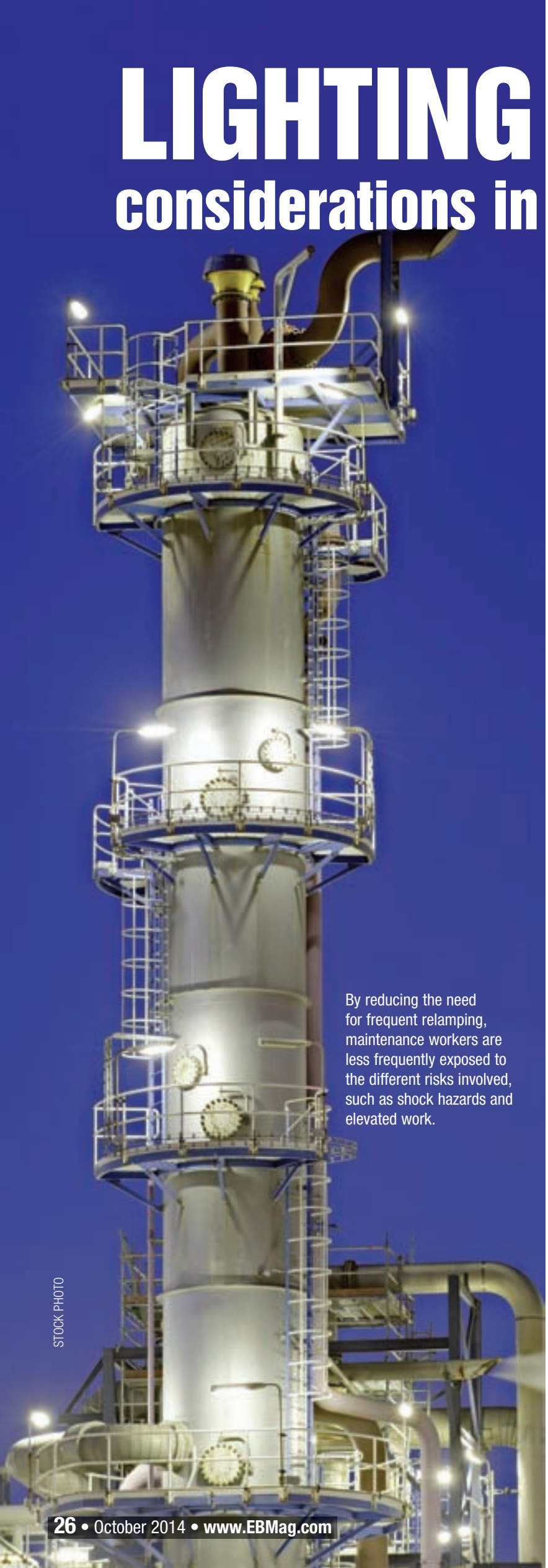
For years, Schneider Electric's **Daniel Roberts** has been pushing the notion of "Integrating Occupational Health & Safety Management, Risk Management & Electrical Safety". The risk management process and principles ensure that risk control methods are systematically identified and applied in a hierarchical approach, and electrical hazards—when all is said and done—are not so unique that the risk associated with those hazards needs to be managed differently than any other safety risk.

One of the problems with CSA Z462 was confusing and inconsistent use of terminology: What exactly did *risk* mean, anyway? Did it mean "likelihood" or "greater hazard"? Daniel said risk is actually a combination of *possibility and severity,* and focused delegates' attention on ISO 31000, which provides common principles and guidelines, approaches and processes for any risk—electrical or otherwise. He also noted CSA Z462-15 will prohibit a mixture of old labelling requirements with new ones, so take heed.

An excellent panel discussion was delivered by leading experts on fire safety versus life safety systems (FYI, this discussion prompted the article in EBMag "Essential electrical & life safety systems: is there a difference?", April 2014, p. 35). It's no wonder this topic causes so much confusion in the market... it's pretty darn confusing!

For example, fire alarm systems must be installed to CAN/ULC S524, *but verified* to CAN/ULC S537. A smoke alarm, for example, is not part of a fire alarm system, but is part of a life safety system. We learned most life safety systems do not pass the initial verification process, usually due to issues such as bad wiring, bad devices and/or bad drawings. Unfortunately, when investigators cannot find the cause of a fire, they often blame it on electrical. EB

LIGHTING SAFETY considerations in industrial settings



By reducing the need for frequent relamping, maintenance workers are less frequently exposed to the different risks involved, such as shock hazards and elevated work.

STOCK PHOTO

Matthew F. Leong and Scott Seaver

A 'safety factor' is an aspect of design that increases strength or protection beyond that suggested as needed by calculation or other basic assessment. For example, engineering calculations might suggest a bridge needs a certain amount of strength in a support beam. That number would be increased by, perhaps, 20% as a safety factor were it to be stressed beyond its design, or in case some basis for the calculation was in error.

Recent advances in lighting technology have caused many industrial organizations to evaluate the replacement of lighting fixtures in their facilities, as many of these fixtures have been in place for years, if not decades.

Some questions to consider when deciding to perform lighting upgrades and installations include:

- What is the age of existing fixtures and how much light degradation has already taken place?
- Are the current light levels appropriate?
- Should fixture locations be moved, increased or reduced? Are there locations that may be more appropriate and available for installation?

This article will explore potential safety issues involving lighting in an these settings, including safety factors that help mitigate such those concerns. The article will highlight lighting design, maintenance, location, installation, maintenance ergonomics and hazardous location concerns, with the goal of helping end users during the design, operation and maintenance stages.

Lighting safety issues: DESIGN

Adequate lighting

The purpose of industrial lighting is to allow for adequate performance of visual tasks. The most common question when it comes to design is "How much light is necessary?". Over-illumination is just as undesirable as inadequate illumination. Adequate lighting will improve the productivity of workers and reduce workplace accidents by increasing the visibility of moving machinery and other safety hazards.

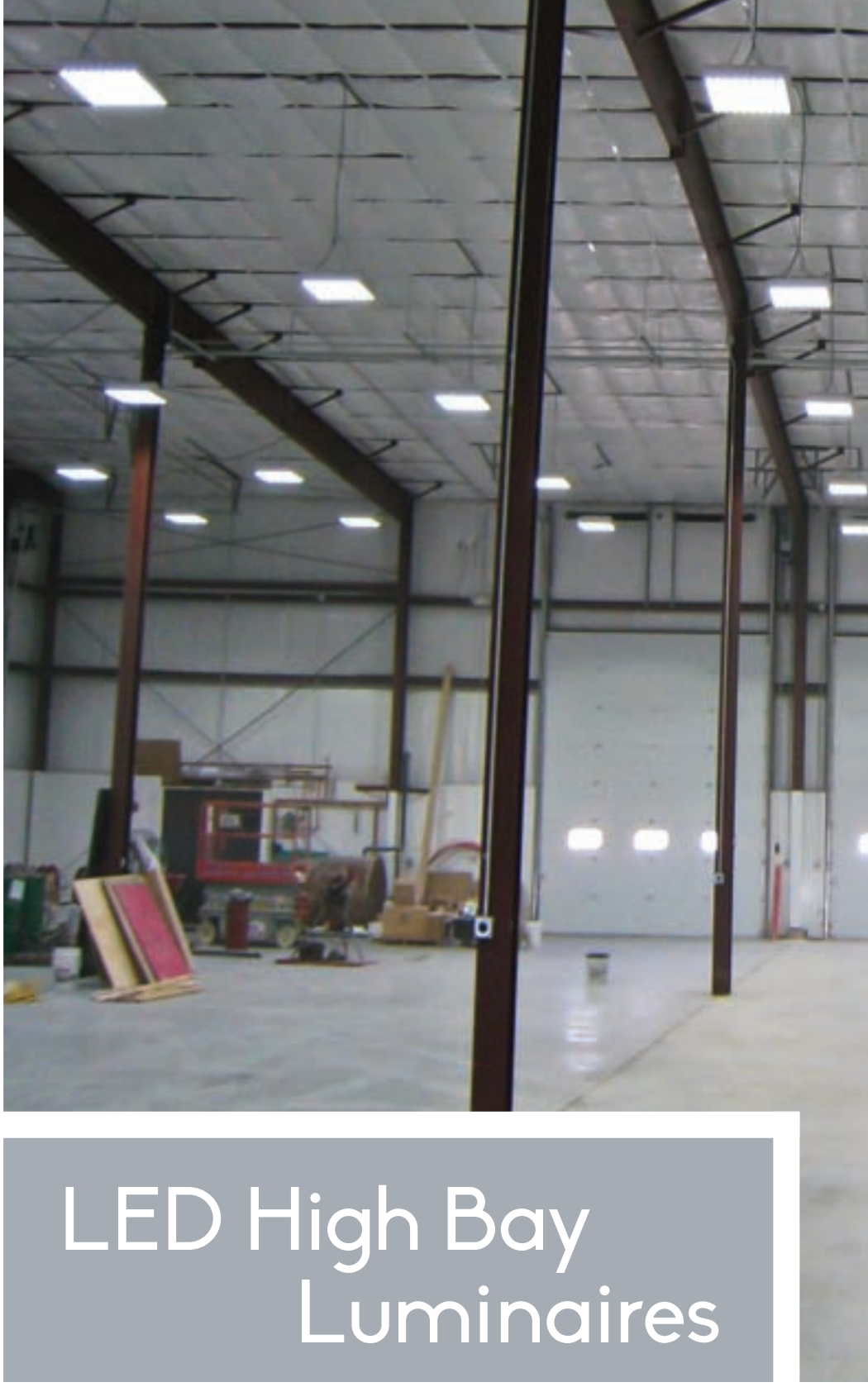
Lighting design calculations are based on recommended values depending on location and tasks. The recommended illumination levels are not to be interpreted as initial measurements but the actual in-service values. The system must be designed such that allowances are made for the collection of dirt on luminaries, lamps, walls and ceilings, as well as Lamp Lumen Depreciation (LLD).

LLD is characteristic of all light sources (but varies with the type of source) and affects both the design and economics of the system. Manufacturers' designs attempt to minimize LLD. From a designer's perspective, a light source with a low LLD will be able to provide adequate illumination levels over the life of the lamp. The design will not require an extra allowance compared to a light with a higher LLD, which may result in the system having more fixtures and possible over-illumination for much of the life of the lamp.

Lighting spectrum

One aspect of lighting design that has become increasingly important is the spectral distribution of a light source and its direct relation to visual acuity. The rods and cones of the eyes are the photoreceptor cells stimulated by visible light. Cones are used for photopic vision (well-lit conditions) while the rods are used for scotopic vision (low-lit conditions). Different light sources will have varying photopic and scotopic lumen outputs. It is important to be aware of the differences because photometric specifications are typically rated in photopic measurements.

Studies have suggested that changing the light spectrum incident on the eyes so that light excites the photoreceptor cells most effectively can allow light levels to be reduced without compromising visual performance. In other words, it is possible to achieve the necessary illumination with lower-wattage, better-spectrum lighting rather than simply choosing a



LED High Bay Luminaires

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STOCK PHOTO

Corrosion, moisture and dust can increase the maintenance frequency of the luminaire.

higher-wattage alternative. Not only is this an economic benefit, but a value in safety is achieved. Adequate illumination under both photopic and scotopic conditions is important for worker safety.

Lighting safety issues: MAINTENANCE

Relamping

It is not unusual to see multiple lamp failures in the same area of a facility due to batch or regular-interval relamping programs. The resulting inadequate lighting poses an increased risk for injury from unseen hazards. The degree to which the number of accidents can be reduced depends greatly extent on the type of industry and the prevailing environmental situation.

When it comes to traditional lighting, the most significant maintenance issue is replacing lamps at the end of their life cycles (the frequency between relamping varies, depending mainly on the type of lighting used). By reducing the need for frequent relamping, users gain both an economical and safety benefit. Maintenance labour and material costs are reduced. Maintenance workers replace lamps less often, and are less frequently exposed to the different risks involved, such as shock hazards and elevated work.

Another issue not always taken into account is the improper servicing of equipment during lamp replacement. Some examples include missed seals and gaskets, or not using internal components in accordance with manufacturer recommendations. These can be very serious concerns, especially in classified areas. Reducing the possibility of improper servicing is another benefit to using longer-life lighting technology.

The process of relamping or repairing fixtures in industrial, often hazardous, locations typically involves the removal of a protective guard, optic globe and the lamp to complete the task. The use of a guard tether allows the individual to remove the guard, let it hang by the tether and insert the globe into the guard leaving two hands free to replace the lamp. This is not only a positive safety feature but a labour-saving design, since relamping can be completed faster, and with ease.

Disconnect/de-energize

It is always a good practice to de-energize a lighting fixture prior to replacing lamps to eliminate shock and burn hazards. (Working on lighting circuits is one of the leading causes of work related deaths among electricians). The hazards of servicing luminaires are made worse by the fact that, by their very nature, they are elevated work tasks.

There are two methods of de-energizing a lighting fixture: removing power at its source or, ideally, removing power at the fixture itself. There are different types of devices that enable the fixture to be disconnected from live wiring without having to disable power at the source. Maintenance workers are now able to perform their field wiring/installation without being exposed to uninsulated energized conductors. Such devices provide a finger-safe female connection on the line side that prevents the worker from making contact with line voltage. Providing a local disconnecting means at the fixture eliminates the need to identify the correct source and shut off the entire circuit.

Some safety designs are more robust, allowing a quick disconnect of the entire fixture. This allows the safe and quick replacement of the fixture and the convenience to maintain the removed fixture on a workbench. The end user may choose to stock spare fixtures of the same type, and simply exchange bad ones for good ones to maintain the appropriate lighting level at all times.

Environmental factors

Another concern that can impact the frequency of maintenance are environmental factors, which are often overlooked when selecting lights. Corrosion, moisture and dust can increase the maintenance frequency of the luminaire.

Lighting fixture corrosion is quite common in any outdoor application. Today, manufacturers use specific alloys to construct their enclosures to provide the best corrosion resistance (usually copper-free aluminum). The exterior may also be finished with an epoxy powder to provide additional corrosion-resistant properties.

To combat moisture issues, choosing a fixture with a NEMA 4X rating is ideal. Also note that design requirements for NEMA 4X are similar to Division 2 and, therefore, provide better ingress protection. In an environment prone to dust, one preventive method is to choose a cone top fixture, minimizing dust buildup on top of the fixture.

When dealing with LEDs, it is very important to consider dust, especially when the fixtures utilize an external heat sink. Dust build up will insulate the cooling fins from the air, inhibiting the heat exchange. The inevitable result is reduced lumen output and a shortened life cycle.

Lighting safety issues: LOCATION

When designing a new lighting system or retrofitting an existing one, consideration should be given to the frequency and accessibility of future maintenance requirements. In industrial facilities, it is common to see light fixtures installed in hard-to-service locations. In many of these cases, new equipment was installed but the existing lights were not relocated. In other situations, fixtures may be placed over equipment or on structures that are impractical to maintain. While this may have achieved the necessary illumination level, maintainability was not taken into account.

Expensive and time-consuming scaffolding or manlifts may be required to reach such fixtures. In other cases, it may not be possible to reach a fixture without putting worker safety at risk.

Other location considerations include space restrictions and temperature conditions. Lighting fixtures that are confined to a small restrictive area experience a reduction in air flow, which does not allow them to operate at their designed condition. Shortened fixture life is likely due to the inability to dissipate heat.

Ambient temperature must be considered when specifying lighting because different sources are affected by low and high temperatures. Some fixtures may not be able to start, have reduced output or experience reduced life. This may introduce a safety risk

by not providing adequate illumination levels when required. LEDs, for example, can have operational temperatures rated as low as -40C without any reduced lumen output, but an equivalent fluorescent light would.

Lighting safety issues: INSTALLATION

Installation is another safety and economic aspect manufacturers continue to address in their designs. Some examples of minimizing field installation time include the use of adapter rings, factory sealing and improved temperature ratings.

An alternative to replacing a fixture's back box is using an adapter ring. Typically, the most costly portion of a fixture retrofit is the removal of existing conduit and mounting boxes, which may have been in place for years. Adaptor rings, if available, can significantly reduce installation time and cost.

You should take advantage of factory sealing where it is available. When fixtures are located in areas that are difficult to access, pouring a seal in tight areas or areas high over equipment could be costly and/or dangerous. Factory-sealed fixtures eliminate this concern.

Using a fixture with a proper T-rating is crucial in hazardous areas. With advances in the LED industry, we are seeing lighting options with much improved and broader T-ratings. Flexibility in the selection of fixtures without any economic downside is great for end users.

Lighting safety issues: ERGONOMICS

The importance of maintenance ergonomics is often overlooked when designing lighting systems. Fixtures placed in hard-to-service locations place workers in difficult and strenuous positions that increase the likelihood of injury while performing maintenance.

Musculoskeletal disorders (MSDs) include a range of inflammatory and degenerative conditions affecting the muscles, tendons, ligaments, joints, peripheral nerves and supporting blood vessels. Some common risk factors associated with MSDs include rapid work pace, forceful exertions and non-neutral body postures.

The three major factors that contribute to work related MSDs include static load, awkward working positions and body postures and tissue compression:

A *static load* condition is when muscles are kept tense and motionless for a long period. Some examples include holding the arms elevated and extending the arms forward or sideways. The weight of an object held in an outstretched position will add to the static load exponentially.

Awkward working positions and body postures occur where space is limited and access is difficult. These non-neutral positions stretch the physical limitations of the body and can cause muscle fatigue or micro-trauma to tendons or ligaments, and compress or stretch soft tissues and nerves.

Tissue compression occurs when a firm grip is required for an extended period. The resulting compression of soft tissue in the palm and fingers may obstruct blood circulation, resulting in numbness and tingling.

Many lighting fixtures today make use of a hinged system, which allows the installer to tighten the fixture with a variety of tools without supporting the weight of the fixture during installation. Such designs can greatly reduce costs during installation and maintenance. In a typical example, the base of the fixture is installed first. The body is then hung from this rigid base while the wiring is completed. There is no need for the installer to exert any force in supporting the body, lamp and other accessories. With the base being relatively lightweight compared to the body of the fixture, the stress due to static load is reduced, as well as the time spent under static load.

Many manufacturers use modular-based designs for simplifying installation. This is ideal for both new construction and retrofits. By employing the same or adaptable mounting modules, component maintenance, replacement and future upgrades are made simpler to perform. Product knowledge is essential, and manufacturers should be consulted when necessary. It is the designer's responsibility to account for any ergonomic issues.

Lighting safety issues:
HAZARDOUS LOCATION

Flameproof (Ex d) and explosion-proof

Flameproof and explosion-proof luminaries are similar, yet different, but we will focus on the similarities. Both are designed to contain an explosion within their enclosures. Their construction utilizes flame paths to cool escaping gases to below the ignition temperature of the external atmosphere.

The entire fixture assembly (lamp, driver/ballast and connections) is housed in a flameproof or explosion-proof enclosure or device. The light is transmitted through a heat- and impact-resistant lens. Flameproof technology may allow the use of non-metallic materials, which may be useful in corrosive environments. Some other features may include flameproof contact chamber, increased safety terminals and sand-filled ballast.

Restricted breathing (Ex nR)

Restricted breathing is a method of protection designed to prevent flammable gases or vapours from entering the fixture housing. This is achieved through gasketing or sealing, which restricts the flow of air both into and out of the fixture.

Luminaire designs with restricted breathing protection have their T-Ratings determined by the hottest point externally. Even though internal components may operate at a higher temperature, combustible gases and vapours will not be subjected to those temperatures. The benefit of restricted breathing is it allows industry to specify higher-wattage luminaires and reduce the number of fixtures required while maintaining the necessary temperature class.

Non-sparking (Ex nA) and non-incendive

Non-sparking equipment is defined as equipment that, under normal operation, will not produce arcs or sparks capable of ignition. For non-sparking luminaries, the globe chamber at the lamp socket is sealed. No gases or vapours may enter the globe chamber of the unit, but can possibly enter the ballast housing. The temperature class reading is now taken by measuring both the surface of the globe chamber and internally on the ballast. The higher of the two readings establishes the T-Code.

Getting lighting done right... from the start

Lighting design is not as simple and straightforward as one may think. It involves more than just achieving the desired lighting levels. Designs need to start with a safety-centred approach. Safety is affected by the reliability, longevity and maintainability of the designed system, which is why it is important to research available products and consult manufacturers and suppliers to achieve the best and safest design possible. Lighting technology changes rapidly, so do your research but don't settle for an inferior design. EB

Matthew F. Leong received his BSEE degree from the Polytechnic Institute of New York University, and currently works at DuPont in the Electrical Technology Consulting Group. Scott Seaver received his MBA from Bentley College and is a senior member of IEEE. He is a 14-year veteran with IEEE, ESW and PCIC, and is currently working on his 18th year with Hubbell/Killark. He is also a founding member of the IEEE Electrical Safety Committee. This article is based on the paper "Lighting safety considerations" from the IEEE IAS Electrical Safety Workshop (ESW) 2014. Reprinted with permission ©2014 IEEE.

Mike Doherty

What number would *you* pick?

A few years ago, I was shown an old Ontario Hydro safety rules booklet dating back to 1979—published just three years after my first year within the nuclear generation division (1976). On page 3, under the section "Policy on corporate performance standard with respect to occupational fatalities", the booklet states:

It is the policy of Ontario Hydro to ensure that the necessary actions are taken to reduce fatalities in the work force to as low as is reasonably achievable. The corporate performance standards on a ten year rolling average is to achieve less than six fatalities per hundred million manhours worked.

It is also policy that major work groups will establish performance standards with respect to fatalities that are consistent with the achievement of the corporate standard.

Ontario Hydro was one of the top electrical safety performers in Canada—if not North America—at that time. To think they had a policy on fatalities that was *acceptable*, and that it was published in an official corporate document, just boggles the mind in 2014. Back in 1979, the prevailing culture of "we just can't do any better" was backed by statistics of the day.

The really interesting part of the 1979 policy is the second paragraph about the "major work groups". Not surprisingly, the electrical sector went far past that standard value as established in 1979.

(It's important to mention that two offshoots of the original Ontario Hydro—Ontario Power Generation and Hydro One—are top leaders in electrical safety in North America. Their commitment and dedication to electrical safety are second-to-none, despite thousands of challenging work tasks over the years.)

History is important. It tells us we *can do better;* that we must strive for continual improvements in safety.

It's just not in the DNA of competent, high-end electrical workers and managers to accept anything but Zero Injury or incidents. It will take time to improve; it does take time to learn, and that takes effort and commitment, but must never go back to the point where we truly didn't know the goal should be—and could be—Zero.

Leadership expert Walter Bennis once said:

Excellence is a better teacher than mediocrity. The lessons of the ordinary are everywhere. Truly profound and original insights are to be found only in studying the exemplary.

In the electrical trades, we must insist on safety excellence—not mediocrity. We don't want to be ordinary. We want to be the very best at what we do. When we put in the effort to study the exemplary in electrical safety, we find profound and original insights everywhere. Strong electrical codes & standards and the continuing efforts of leading-edge companies combined with a shared passion among all individuals will lead to Zero Injury and incidents in our sector.

The goal is Zero. To have any other target is unacceptable to workers, their families and the businesses that employ them. How can it be any other number? As we send our spouses, sons and daughters off to work, answer the question:

If not Zero, what number would *you* pick? EB

A well-known subject-matter expert and speaker on electrical safety, Mike Doherty is a health & safety manager/consultant with PowerTel Utilities Contractors Ltd. He is a licensed electrician and an IEEE senior member. Mike has served as the Technical Committee chair for CSA Z462 since its inception in 2006. He is a member of NFPA 70E Technical Committee and official liaison between Canada (CSA) and the U.S. (NFPA) for electrical safety. His specialties include electrical safety and health & safety management, consulting, training, auditing and electrical incident investigations. Mike can be reached at mdoherty@powertel.ca.

EB calendar

IN CASE YOU MISSED IT...

VIDEO AND PHOTOS • The 14th annual Electro-Federation Canada Golf Tournament saw EFC and NAED (the National Association of Electrical Distributors) members face off in a game of golf to capture the coveted Waterman Cup. **Visit bit.ly/1qA1vlv.**

PHOTOS • EBMag has returned from the 2014 Milwaukee Tool New Product Symposium and The RedShirts have more than a few new tools (power and hand) and storage solutions to start making out your Christmas wish list. **Visit bit.ly/1unFtnH.**

BCEA/IESBC Lighting Education and Expo
British Columbia Electrical Assoc. and Illuminating Engineering Society B.C.
October 16, Coquitlam, B.C.
Visit bit.ly/1trlWFy

Certi-Fire Instructors and Training Conference
October 17-19, Port Credit, Ont.
Contact Lyndsy Miceli at lmiceli@ecao.org or (416) 675-3226

Power of Water Canada Conference
Ontario Waterpower Association
October 19-21, Niagara-on-the-Lake, Ont.
Visit conference.owa.ca

EHRC National Forum
Electricity Human Resources Canada
October 24, Toronto, Ont.
Visit electricityhr.ca
EB WILL BE THERE!

CanWEA Annual Conference & Exhibition
Canadian Wind Energy Association
October 26-29, Montreal, Que.
Visit www.canwea.ca
EB WILL BE THERE!

"ElectriCITIES: Move Electric" - Electric Mobility Canada's EV2014
Electric Mobility Canada
October 28-30, Vancouver, B.C.
Visit www.emc-mec.ca
EB WILL BE THERE!

ECRA Licence-Holder Meeting
Electrical Contractor Registration Agency
November 4, Mississauga, Ont.
Visit bit.ly/1uHm54o
EB WILL BE THERE!

EAM LED Lighting Show
Electrical Association of Manitoba (formerly Manitoba Electrical League [MEL])
November 4, Winnipeg, Man.
Visit www.meleague.ca

5th International Conference on Ocean Energy
Marine Renewables Canada
November 4-6, Halifax, N.S.
Visit www.icoe2014canada.org

BCSA Electrical Conference (inaugural)
BC Safety Authority
November 12, Coquitlam, B.C.
Visit tinyurl.com/ofr9ax5

IEEE Electrical Power and Energy Conference (EPEC)
November 12-14, Calgary, Alta.
Visit sites.ieee.org/epec2014

APPrO Canadian Power Conference
Assoc. of Power Producers of Ontario
November 18-19, Toronto, Ont.
Visit www.appro2014.com
EB WILL BE THERE!

HomeConnect Conference
November 20-21, Toronto, Ont.
Visit www.homeconnectcanada.com
EB WILL BE THERE!

The Buildings Show
December 2-5, Toronto, Ont.
Visit www.thebuildingsshow.com
EB WILL BE THERE!

Solar Canada
Canadian Solar Industries Association (CanSIA)
December 8-9, Toronto, Ont.
Visit www.cansia.ca
EB WILL BE THERE!

IEEE IAS Electrical Safety Workshop (ESW)
January 26-30, 2015, Louisville, Ky.
Visit www.ewh.ieee.org/cmte/ias-esw/index.html
EB WILL BE THERE!

EIAA Technical Conference
Electrical Inspectors Association of AB
February 6-7, 2015, Edmonton, Alta.
Visit www.eiaa2004.com

LEDucation 9
March 5-6, 2015, New York City, N.Y.
Visit www.leducation.org

Visit EBMag.com's Upcoming Events on the homepage to see an extensive list of industry events.

Standard Products unveils Ambiance amber lamps

The Ambiance amber lamps from Standard Products promise to deliver warm lighting while creating a comfortable and cozy atmosphere. Completely dimmable, the lamps claim to minimize energy and maintenance costs compared to incandescent equivalents. The Ambiance amber family includes: MR16, PAR20, PAR30LN, PAR38, A19OMNI and BR30.
STANDARD PRODUCTS
www.standardpro.com

LED high bay luminaires from Standard Products

Standard Products says its new family of 0-10V dimmable LED high bay luminaires is the perfect option for new and retrofit applications. Delivering 115° wide distributions, it claims to use up to 60% less energy than metal halide and fluorescent fixtures while delivering similar or greater light output. It also boasts reduced loads on cooling systems by emitting less heat, saving money on cooling costs and protecting LED lifetimes.
STANDARD PRODUCTS
www.standardpro.com

Lutron debuts Quantum Vue software with mobile capability

EBMag was there at Lightfair 2014 when Lutron introduced the Quantum Vue software for its Quantum Total Light Management system. According to Lutron, facility managers can use the software to manage lighting controls from any smartphone, tablet or desktop computer, as well as monitor and track all lighting energy used in a space. Users can view and adjust lighting levels and automated shades in different areas of a building to optimize energy savings.
LUTRON
www.lutron.com

Soraa SNAP System now available on PAR30, PAR38, AR111

Soraa added PAR30, PAR38 and AR111 LED lamps to its SNAP System line, saying its SNAP System is the industry's first magnetic-attach LED lamp and accessory system for lighting, allowing users to customize the light directly on lamps, rather than on fixtures. Unveiled at Lightfair 2014, the lamps can accept a magnet in the centre of the lens, enabling a simple accessory attachment mechanism without major impact on light output or efficiency, it adds.
SORAA
www.soraa.com

Ram launches 2015 models of 2500 and 3500 heavy duty

Ram launched the 2015 model year for the heavy-duty 2500 and 3500, with the latter boasting an increased torque rating of 865 lb-ft and payload capacity of 7390 lb while maintaining a maximum tow rating of 30,000 lb. Besides a 6.4L HEMI V8, other engine options include the 5.7L HEMI V8, standard equipment for the Ram 2500 and 3500 (SRW). The engine produces 383 hp at 5600 rpm and generates peak torque of 400 lb-ft at 4000 rpm. The 5.7 is mated to a 6-speed automatic transmission. The 6.7L Cummins Turbo Diesel I-6 is available in three versions. Chassis controls on the HD promise to reduce noise, vibration and harshness, and improve ride and handling characteristics. Visit bit.ly/1w8kqZj for more info.
RAM
www.ramtruck.ca

Terex Hi-Ranger cobra-style jib promises ease-of-use

Terex now offers an end-/top-mount cobra-style jib on its Hi-Ranger TL and LTM series aerial devices. Available on all 24 x 48-in. platforms, it says the jib is engineered with hydraulic articulation and extend, enabling operators to achieve a greater range of motion. The cobra-style jib boasts a 16-in. profile, as well as a 600-lb platform capacity and 1000-lb maximum lift capacity. Operators can rotate the jib thanks to an additional bearing at the bottom; this rotation offers linemen more versatility at the pole, says Terex, and better accessibility between lines.
TEREX
www.terex.com/utilities

VIDEO: Southwire SIMpull CoilPAK payoff receives 2014 MEET award

The SIMpull CoilPak payoff from Southwire claims to eliminate the need for heavy, cumbersome spools. Its moulded handle promises easy carrying and increased versatility on the jobsite, while NoLube SIMpull T90 wire is contained neatly in a sturdy package. When pulling wire from the package, it can lay flat or be stacked directly on the floor (or lift) for a tangle-free pull. The unit received the Innovation award at the 2014 MEET (Mechanical, Electrical, Electronic and Technology) show; watch our video at bit.ly/1usGafn to learn more.
SOUTHWIRE
www.southwire.ca

Klein Journeyman gloves promise increased safety and comfort

Klein Tools has expanded its personal protective equipment (PPE) offering with its Journeyman gloves made specifically for trade professionals who may encounter cuts, scrapes, impact injuries and vibration injuries. Promising advanced technology, tougher materials and enhanced features, the gloves claim to provide better hand-protection on the job in addition to more comfort and durability. Six models are available: Extreme, Utility, Camouflage, Cold Weather Pro, Grip, and Leather.
KLEIN TOOLS
www.kleintools.com

Buyers Products releases LED floodlight

Buyers Products has introduced an LED floodlight with adjustable stainless steel stud mount for trucks and trailers, which featuring six LEDs that produce 1350

lumens. Rated IP67, the waterproof floodlight boasts a cast-aluminum housing and adjustable mount, making it ideal for use in rugged applications, says the company.
BUYERS PRODUCTS
www.buyersproducts.com

ABB launches "breakthrough" 525kV HVDC cable system

ABB has announced what it calls a breakthrough in cable technology after successfully developing and testing a 525kV extruded high-voltage direct current (HVDC) cable system that, says the company, will make renewable energy installations more efficient and cost-effective. This cable promises to more than double the power capacity to about 2600MW from 1000MW, and expands the HVDC cable's reach to distances of 1500 km while keeping transmission losses under 5%. Visit bit.ly/1oYK2ze for video.
ABB
www.abb.ca

A.R.E. debuts CargoGlide bed units with 70-100% extensions

A.R.E. has debuted CargoGlide bed units with extensions that range from 70% to 100%, placing tools and cargo stored in even the furthest corner of the truck bed at the fingertips of the user, it says. Boasting a strong steel frame and sturdy side-thrust roller bearings, the units promise a smooth slide, even on uneven ground. The offering features five models: CG1000, 1500HD, 2000HD, 1500XL and 2000XL.
A.R.E.
www.4are.com

ADVERTISER INDEX

David Pilon

Design spec versus Section 0

One of the most-forgotten sections of the Canadian Electrical Code is Section 0, which informs us of the code's purpose, and explains how to read it and where it can be used. The code is written to establish (minimum) safety standards for the installation and maintenance of electrical equipment, and for the prevention of fire and shock hazards.

I often get calls regarding the design of installations in relation to the code, yet the CEC is *not to be used* as a design spec... but why, then, does it include so many design specifications?

The use of electricity has changed dramatically over the years, and perhaps no place more than in our own homes. In the 1950s, when the Prairie Provinces where installing the Rural Underground Distribution system, most farmers didn't even own a lamp. A washing machine was big on the list of what to get first, and wiring the residences themselves was next.

This led to a number of unsafe conditions: people would install a plug in each room and a light with a pullchain in the centre; stoves were directly connected; extension cords were used for in-wall wiring; and work was often performed by unqualified personnel.

To ensure that installations were as safe as possible, permits were issued to farm owners with the hope that an inspector would follow-up on the installation, but this wasn't always successful.

Despite society finding even more uses for electricity, installers were, at times, still installing only one pullchain light and plug in each room. No one was asking for drawings on houses and, even if they did, there were no standards! This would have left it to the designer and the owner to decide what equipment went where, and how many outlets they wanted.

While this may not seem like a safety concern, look at it from the point of view of overall safety.

Walking into the middle of a dark room to find the pullchain can lead to trips and falls—especially when stairs are around. So-called 'octopus' receptacle expanders have been photographed with more octopi and extension cords connected than approved. Extension cords were being used for loads for which they were not intended, and permanently run through walls.

By 1972, the code had started to evolve the rules around the installation of outlets in a residence to eliminate the use of extension cords, and to ensure that kitchen loads did not trip breakers or blow fuses on a regular basis. The light fixtures near damp locations, grounded metal or near the basement stairs needed to be controlled by a wall switch, with the code dictating those locations. Lighting equipment in closets started to require location approval to avoid a fire hazard caused by a hot bulb.

So while the CEC is not a design spec, we nonetheless continue to see its rules evolve to keep up with technology and market demands as it works to help us maintain the safety of our homes and worksites. EB

David Pilon has been an electrical inspector with SaskPower since 2000, and is currently the vice-chair of the Canadian Certified Electrical Inspector (CCEI) committee of the International Association of Electrical Inspectors (IAEI), Canadian Section. David can be reached at dpilon@saskpower.com.

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 November'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

Where insulated neutrals are used, the insulation on the neutral conductors shall have a temperature rating not less than the temperature rating of the insulation on the ungrounded conductors.

a) True **b)** False

Question 2

Consumer's service conduit connected to an underground supply system shall be sealed with a suitable compound to prevent the entrance of moisture or gases.

a) True **b)** False

Question 3

Luminaries installed in Class I Zone I shall be:

a) approved as complete assemblies
b) clearly marked to indicate maximum wattage of lamps to be used
c) protected against physical damage by a suitable guard or by location
d) All of the above

Answers: EBMag September 2014

Q-1: Receptacles in basic care areas and located in areas that routinely cleaned using liquids that normally splash against the walls shall be installed not less than [____] above the floor.

b) 300 mm. Ref. Rule 24-106(2).

Q-2: Bare conductors or insulated conductors not enclosed in grounded metal shall be used in electrical equipment rooms accessible only to authorized persons.

a) True. Ref. Rule 36-100.

Q-3: All receptacles of CSA configuration 5-15R and 5-20R installed in child care facility shall be tamper resistant receptacles, unless rendered inaccessible behind a stationary appliance.

b) False. Ref. Rule 26-700(12).

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