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# Electrical Business

DECEMBER 2012

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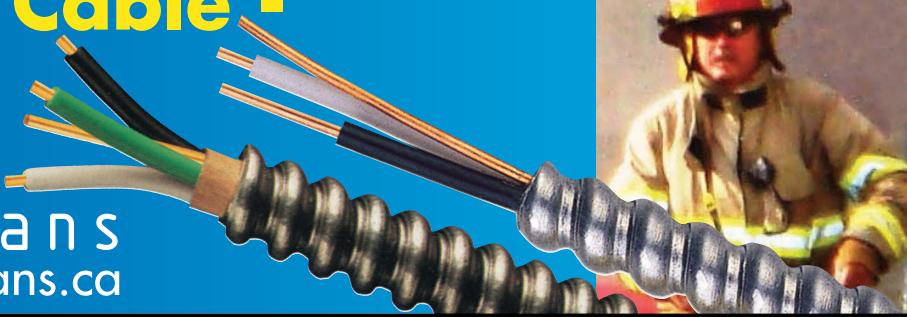
## electric vehicle charging

### ■ Also in this issue...

- Electric vehicle charging station market offerings
- New CEC wiring rules
- OLED panels

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Can technological advances create new fruit?

## Is all the low-hanging fruit gone?

**E**lectrical Business was recently invited to attend the Schneider Electric (U.S.) 2012 Editors' event in Chicago, Ill., where we were afforded a detailed preview of how and where the company is investing in product innovations and solutions.

I cannot think of another event in the electrical industry where the company's top brass are essentially put at our beck-and-call to answer questions, subject themselves to interviews, and share their food with hungry editors and reporters. So what do they hope for in return? Free press.

Now, let's be truthful: not every company warrants free press. I remember speaking with a utility pole manufacturer several years ago at CUCE (Canadian Utilities Equipment & Engineering Show), and I asked the guy at the booth, "So, is there anything new or exciting going on that you'd like to talk about?". He kind of shook his head and said, "Nope, nothing new... nothing interesting. It's been the same for the last 40 years".

Well, you can imagine my enthusiasm (or lack thereof) with his response. Clearly, nothing worth talking about here!

But the Schneider event always sheds new light: not just on what's happening with the company, but what's going on in the marketplace and where the company sees the market heading. As a company that sells itself as a

"specialist in energy management", Schneider is investing heavily in becoming an outsourced energy manager.

And that energy management strategy extends into the residential space, too. When I asked how the company will penetrate that market (i.e. Home Depot?), Allan Breeze—the company's senior vice-president of the North American Power Business—answered that the move into residential will be dictated by the way homeowners buy.

Take from that answer what you will, but it's clear to me that, where some companies believe all the low-hanging fruit is gone, proactive firms believe technological advances continually create new fruit. And while the public debates the amount of oil left in the ground, or whether wind turbines are good or bad for our health, no one can question the validity of investing in energy efficiency.

I go back to Houston Neal's article from our May 2010 edition where he writes: "In the next 10 to 20 years, *electrical contractor* will no longer be a suitable job title for electricians. They will transition into *energy contractors...*". It's time to reach for the next low-hanging fruit by better promoting and selling energy efficiency to your clients. **EB**



On the cover  
and page 11

### What you should know about electric vehicle charging

The uncertainty surrounding at-home and public charging infrastructure can be a serious impediment to the acceptance of electric vehicles.

Photo A. Capku.

## Contents

### 16 Electric vehicle charging station market offerings

This article compiles a number of electric vehicle charging stations from some of the market's top manufacturers into one handy file. Regardless of the specific EV model, there's a charger for that.



### 20 Are OLED panels ready for prime time?

OLED (organic light emitting diode) technology is often referred to as the next big thing in lighting, and some even say it will be even better than standard inorganic LEDs. However, the big question for those in the decorative and commercial fixture market is "Can it do anything we can sell today?". The answer: Yes and No.



There is a ton of additional information at [EBMag.com](http://EBMag.com), and be sure to follow our Tweets ([twitter.com/ebmag](https://twitter.com/ebmag)) to learn about web updates, live event reporting and more!



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## Without EECOL, IED to merge with Affiliated Distributors



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Affiliated Distributors (AD, [www.adhq.com](http://www.adhq.com))—a North American wholesale marketing/buying group—announced it has entered into a letter of intent to merge with Canadian electrical buying group, Independent Electrical Distributors (IED, [www.ied.ca](http://www.ied.ca)). The merger significantly strengthens the market position of electrical independents in Canada and commands 23% of the total market.

"AD's model has always attracted market leaders and quality distributors," shared Bill Weisberg, AD's chair and CEO. "The merger with IED will strengthen the entire AD group and we are excited to welcome these great companies and people to the AD family."

According to AD's president of the Electrical Divisions, David Oldfather: "The synergy between the two groups is a natural fit as former IED members will have the opportunity to take advantage of increased earnings, cost reductions, access to AD's financial tools, new marketing programs, best in class networking, and North American relationships."

Jim Milne, current President of IED, will manage

the newly combined Canadian group as AD's President of the Canadian Division, reporting to David Oldfather. Milne states: "We've always had a great deal of respect for the AD Canada distributors and now that we have the opportunity to join into a single entity, the collective strength of this group will allow even further market penetration and growth beyond what would be possible by the two separate groups. As IED, we also bring to the group a long-standing, successful Customer Rewards Program, a well-known differentiator in the contractor community, and a proven way to gain and retain mindshare."

Chris Scott will report to Milne and continue to support the Canadian Affiliates and Suppliers as the VP of AD Canada. Meantime, a reconstituted Canadian Divisional Board, made up of AD and former IED members, will make all Supplier- and Affiliate-related decisions.

AD's Canadian Electrical Division, was formed in 1992 by a merger with Copel, a Canadian Electrical group and currently includes 16 distributors, representing 143 branch locations with a sales volume of about \$750 million. The roots of IED go back to 1965. IED (less EECOL, which will operate outside of AD Canada, yet their volumes will be included in the combined group through 2013) currently consists of 36 companies with 90 branch locations and a reported volume of about \$800 million, for a combined volume total for AD/IED of over \$1.5 billion in Canada.

## SEPAQ joins Quebec's Electric Circuit to install EV charging stations



The Société des établissements de plein air du Québec (SÉPAQ) announced it is joining The Electric Circuit ([www.lecircuitelectrique.com](http://www.lecircuitelectrique.com)), a partnership involving the Agence métropolitaine de transport (AMT), Hydro-Québec, Metro, Rona and the Rôtisseries St-Hubert, whose goal is to deploy a network of public charging stations for electric vehicles (EVs) in Quebec.

SÉPAQ intends to install seven charging stations for its clientele: two at the Parc de la Chute-Montmorency, one at the Aquarium du Québec, another at the Station touristique Duchesnay, and one each at the Mont-Saint-Bruno, Îles-de-Boucherville and Oka national parks. The cost to recharge an EV has been set at \$2.50, regardless of the time it takes.

## WARNING: Counterfeit UL Mark on portable cabinet light Model T505-01

UL ([www.ul.com](http://www.ul.com)) is notifying consumers and retailers that a portable cabinet light bears a counterfeit UL Mark for Canada and the United States. The item has not been evaluated by UL to the appropriate standards for safety, and it is unknown whether it complies with safety requirements.

The product is a portable cabinet light, model T505-01, and bears a label with the following marking:  
**C  
E210130  
US LISTED  
9G98**  
The product bears similarities to a product that is authorized

to bear the UL Mark. The authorized construction is provided with six (8-mm diameter) vent openings and is provided with a lamp replacement marking. The unauthorized construction does not have the six (8-mm) vent openings, and may not have the lamp replacement marking.

## Calling energy efficiency champions for 2013 CIPEC Leadership Awards

EBMag has learned from Partners in Project Green ([www.partnersinprojectgreen.com](http://www.partnersinprojectgreen.com)) that the 2013 CIPEC Leadership Awards ([bit.ly/TJ1UQN](http://bit.ly/TJ1UQN)) are officially "up for grabs". Industrial companies, students and graduates that have completed energy efficiency projects or initiatives between 01 June 2011 and 01 June 2013 are now eligible to apply for this award.

The awards aim to showcase the achievements of CIPEC (Canadian Industry Program for Energy Conservation) companies that have distinguished

themselves in their work to improve energy efficiency and reduce greenhouse gas emissions. Since 2011, the awards have also honoured post-secondary students and graduates whose projects or initiatives demonstrate energy efficiency improvements in industrial settings or applications.

In addition to presenting an award to recipients, NRCan will recognize all winners in the CIPEC Annual Report and national news releases. Recipients will also be featured in CIPEC's twice-monthly newsletter "Heads Up CIPEC". Interested in applying? Visit [bit.ly/PZcoeh](http://bit.ly/PZcoeh).

# Electrical Business

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C-A-N-A-D-A

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BUSINESS

## Northstar Hospitality GP fined 70K after genny amputates worker

Northstar Hospitality GP Inc. was fined \$70,000 for a violation of the Occupational Health & Safety Act after a worker was injured at the Toronto Hilton.

On August 9, 2011, a worker was doing a weekly test of the Hilton's emergency generator equipment. The worker saw a leak under the radiator at the back of the genny and leaned over near the fan box to get a better look. The worker's hand inadvertently entered an opening at the bottom of the fan box, and his fingers were amputated.

Northstar pleaded guilty to failing to ensure the generator was guarded to prevent access to its moving parts. In addition to the fine, the court imposed a 25% victim fine surcharge, which is credited to a provincial government fund to assist victims of crime.

## ABB develops world's first HVDC circuit breaker



ABB ([www.abb.com](http://www.abb.com)) says it achieved a breakthrough in the ability to interrupt direct current, developing what it claims is the world's first circuit breaker for high-voltage direct current (HVDC). It combines "very fast mechanics with power electronics", and will be capable of interrupting power flows equivalent to the output of a large power station within five milliseconds.

ABB says this removes a 100-year-old barrier to the development of DC transmission grids, which will enable the "efficient integration and exchange" of renewable energy. DC grids will also improve grid reliability and enhance the capability of existing AC (alternating current) networks, the company insists, adding it is in discussions with power utilities to identify pilot projects for the new development.

"ABB has written a new chapter in the history of electrical engineering," said Joe Hogan, CEO of ABB (in photo). "This historical breakthrough will make it possible to build the grid of the future. Overlay DC grids will be able to interconnect countries and continents, balance

loads and reinforce the existing AC transmission networks."

HVDC technology is needed to facilitate the long distance transfer of power from hydropower plants, the integration of offshore wind power, the development of "visionary solar projects", and

the interconnection of different power networks says ABB.

Deployment of HVDC has led to an increasing number of point-to-point connections in different parts of the world, says the company, arguing the next logical step is to connect the lines and "optimize the network".



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## Eaton powers Baka Mobile's electric vehicle fleet

Baka Communications Inc. has collaborated with Eaton ([www.eatoncanada.ca](http://www.eatoncanada.ca)) to power its electric vehicle (EV) fleet with what it says is one of the largest commercial solar charging stations in North America.

Baka—which celebrated the installation of the eight-car public access station with a ribbon-cutting ceremony at its Toronto HQ—says it has converted 60% of its fleet to Chevrolet Volt. The solar charging car port system was developed by Renewz Sustainable Solutions Inc. and combines equipment from Eaton and Giulio Barbieri SpA of Italy.

The Isola 20kW solar carport project was managed and developed by Renewz and

features solar and EV charging solutions from Eaton. The station includes a combination of EV charging stations as well as a unique solution that enables the complete solar-power distribution system to be integrated into one structure. The modular structure also includes Heliene Ontario-made solar panels, LED lighting and security equipment. It is designed to be 100% waterproof and fully wind, snow and seismic code compliant.

This solar-powered EV charging station is intended to generate enough clean, renewable energy to recharge Baka's Volt fleet for 25 years, says the company.

"This project addresses one of our era's greatest challenges: delivering power to help business grow, but doing so in a more efficient



and sustainable manner," said Rob Farrell, director of marketing, Canadian Operations, Eaton's Electrical Sector. "The collaborative solution Baka is implementing will not only help control costs and reduce its carbon footprint, but will serve as a green business model for other companies."



## Alstom Grid completes \$6-million St-Jean-sur-Richelieu expansion

Alstom ([www.alstom.com/grid](http://www.alstom.com/grid)) says it has strengthened its position in the North American electrical market by completing a \$6-million expansion of its power transformer manufacturing facility in St-Jean-sur-Richelieu, Que. The company's investment in increasing capacity at the 45,000-sf facility means customers will see their orders delivered faster, says the company, "with an emphasis on high-quality and more efficient on-site production".

"This investment ensures Alstom has the capacity to engage the growing market in Canada and the U.S., giving access to our global know-how while benefitting from local manufacturing. Our factory in Saint-Jean-sur-Richelieu is a modern unit with a skilled workforce and state-of-the-art manufacturing capacities to fully satisfy our current and future customers," said Lars Martinsson, VP Power Transformers, Alstom Grid.

Alstom acquired the St-Jean-sur-Richelieu site from Megatran Electric Ltd. in 2009 to provide local manufacturing capability for North American customers. The plant extension includes a new high-voltage laboratory, as well as a vapour phase oven, a thermovacuum oven, horizontal winding machines and other production and testing equipment. The site's new production layout, along with these capital investments, allows Alstom to produce transformers up to 166 MVA and 330 kV. This increased capacity also has created jobs for an additional 40 workers, says the company, in areas such as engineering, quality, testing, and contract management, bringing the St-Jean-sur-Richelieu site's total staff size to about 105.

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## IAEI Ontario Chapter supports St. John's Rehab and Camp Bucko



PHOTO COURTESY MALCOLM BROWN

At the recent annual general meeting of the Ontario Chapter of the Canadian Section of IAEI (International Association of Electrical Inspectors, [wwwiae.org](http://wwwiae.org)), the chapter decided it would make donations to a couple of organizations that support persons recovering from electrical and burn injuries. The two organizations selected were Camp Bucko ([www.campbucko.ca](http://www.campbucko.ca)) and St. John's Rehab ([www.stjohnsrehab.com](http://www.stjohnsrehab.com)).

On October 16, two chapter reps met with reps from each organization, presenting each with a cheque of \$5000.

St. John's Rehab was selected for its world-class research and care into the treatment of electrical injury, says the chapter, adding the hospital and Dr. Joel Fish ([bit.ly/UGtPjo](http://bit.ly/UGtPjo)) have provided electrical burn victims with innovative treatments in a state-of-the-art facility with caring staff, helping them along their long road to recovery.

Camp Bucko is a camp for children from ages 7 to 17, and has done "excellent work in helping children with serious burns regain confidence and 'forget' about their injuries in a week-long camp experience". **EB**



Mark Borkowski

# The 10 most common pricing mistakes

Is it time to reevaluate your pricing policies?

**P**rice strategy "is emerging as the most important resource for companies to increase their competitive advantage," said Dennis Brown, a partner at California-based Atenga Inc., which finds price optimization can often raise prices while improving sales volume.

The vast majority of companies have spent years achieving gains through cost-cutting, outsourcing, process reengineering and the adoption of innovative technologies. However, the incremental benefits from these important activities are diminishing, and companies are looking at other areas to improve business results.

Brown believes companies are looking to serve well-defined market segments with specialized products, messages, product variants and services while earning superior profit margins. Savvy companies are implementing price optimization schemes and focusing on building their organizations to serve their most profitable customers. Many are seeing improvements by 'firing' unprofitable customers.

Too many companies, however, use simplistic pricing processes, and some cannot even identify their most profitable products, lines, customers or customer segments. This lack of information means too many management teams have their sales staff focusing the bulk of their time servicing the least profitable of their customers. Some companies even embrace policies and pricing strategies that drive away their best customers; then they wonder why profits are not growing.

Over the years, Brown has seen examples of good and bad pricing policies. Here are 10 of the most common mistakes companies make when pricing their products and services:

1. Basing prices on costs, not customers' perceptions of value. Pricing based on costs invariably leads to prices that are too high or—more often—too low.
2. Basing prices on 'the marketplace'. Management teams must find ways to differentiate their products or services to create additional value for specific market segments.
3. Attempting to achieve the same profit margin across different product lines. For any single product, profit is optimized when the price reflects the customer's willingness to pay.
4. Failing to segment customers. The value proposition for any product or service varies across different market segments, so pricing strategy should reflect that difference.
5. Holding prices at the same level for too long, ignoring changes in costs, competitive environment and customers preferences. Most companies fear the uproar of a price change and put it off too long. Savvy companies acclimate their customers and sales forces to frequent price changes.
6. Incentivizing salespeople on revenue generated, rather than on profit. Volume-based sales incentives create a drain on profits when salespeople are compensated to push volume at the lowest possible price.
7. Changing prices without forecasting competitors' reactions. Smart companies know enough about their competitors to predict their reactions and prepare for them.
8. Using insufficient resources to manage pricing practices. Cost, sales volume and price are the three basic variables that drive profit.
9. Failing to establish internal procedures to optimize prices. The hastily called 'price meeting' has become a regular occurrence: a

last-minute meeting to set the final price for a new product or service.

10. Spending a disproportionate amount of time serving your least profitable customers. Most companies cannot identify their most profitable customers. Know your customers! 80% of a company's profits generally come from 20% of its customers. Failure to identify and focus on the 20% leaves companies undefended against wily competitors.

Brown thinks one other big mistake is when "companies rely on salespeople and other customer-facing staff for intelligence about the value perceptions of their customers". Such people are an uncertain source, because their information-gathering methodology is usually haphazard, and the information obtained thereby can be purely anecdotal. Such information is neither precise nor quantifiable. A customer will rarely tell the complete truth to a salesperson, so any information the customer may volunteer will be biased—often to get the company to lower its prices.

Salespeople can readily identify those anecdotes that advance their interests e.g. lower prices lead to higher sales (regardless of profitability) and those that operate against them. Savvy companies employ trained professionals to collect and analyze the data to identify and evaluate the value perceptions of their marketplace. Large companies have entire departments doing this full-time; smaller companies may outsource it to a specialist. EB

*Our guest columnist is Mark Borkowski, president of Toronto, Ont.-based Mercantile Mergers & Acquisitions Corp., which specializes in the sale of mid-market companies. Visit [www.mercantilemergersacquisitions.com](http://www.mercantilemergersacquisitions.com).*

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## Flying cows sink fishing boat

I heard an entertaining story at the Finepoint circuit breaker conference in Pittsburgh about a flying cow sinking a fishing boat.

Apparently, some Russian soldiers herded several cows grazing near their airfield into the back of their transport plane. While over the Sea of Japan, the cows got loose and went crazy. Worried about losing the plane, the soldiers opened the back door and pushed the cows out.

The story went on to say that a Japanese fishing boat was in the path of one of these Kamikaze cows, which went straight through the hull of the boat, sinking it. When rescued by the authorities, the fishermen were promptly thrown into jail: no one believed that cows fell from the sky. Later, the Russian Embassy grudgingly admitted the story was true.

While a very entertaining story, googling Russians, Cows and Japanese Fishing Boats exposes this as yet another bogus fish story that never happened.

However, a true story was that of a flying shark dropping on a California golf course. I recently heard a CBC interview with the groundskeeper who found the 2-foot shark. He said there were many claw marks on the side of the fish, so he figured a large bird of prey snagged the shark in shallow water. Somehow, the shark twisted free, and landed on the golf course. The groundskeeper put it into a bucket of water, took it several miles back to the ocean, where it swam away.

I always engage my students in the concept: Can all accidents be prevented? If you happened to be on that golf course, a 10-lb shark falling from the sky may very well break your neck. How on earth could you have prevented that accident!



### How on earth could you have prevented that accident!

Although you couldn't imagine being hit by a flying shark, there are certain instances in electrical systems where an inappropriate action can have dire consequences.

A significant example is with switches, which are rated as either load break or non-load break. A load break switch is designed to be opened under load and interrupt the current flow with no dire consequence. A non-load break switch is not.

Designed to interrupt current, non-load break switches are intended as isolators, providing an additional lockout point, generally close to the load. Before they are operated, it is critical the load be de-energized.

Look inside a non-load break switch and you will find no arc chutes or spring to assist during operation. With no spring assistance, the arc that is created over the centre snap action during opening will not be quickly extinguished. With slow opening, no arc

extinguishment and no arc chutes, it is easy to draw an arc that goes phase-to-phase then phase-to-ground when opened under load.

Rarely does it indicate on the front cover the switch is not to be opened under load. Often, the only way to tell externally is by the initial movement of the operating handle. You should be able to tell within 10° or 15° of handle movement whether the mechanism is spring assisted. When you don't feel spring resistance, then it's highly likely you are dealing with a non-load break switch, and you need to move the switch back into the closed position and make sure your load is de-energized.

Discuss this important difference during your electrical safety meetings. We suggest non-load break switches be identified with a distinctive paint colour. What matters is that someone can tell from 50 feet away the switch must not be operated under load.

I have been fortunate to never have a switch blow up on me, but remember the ancient adage: A smart person learns from their mistakes; a wise person learns from the mistakes of others.

I have had many people describe switches exploding, so please learn from the mistakes of others. Switches can fly apart and, if you get hit, you will be hurt.

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

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


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**GE Lighting** ([www.gelighting.com](http://www.gelighting.com)) has announced **John Strainic** will head the business's North America Consumer Lighting operation. In

  
John Strainic  
this newly created role, Strainic will be responsible for driving growth for GE Lighting's North America consumer business. "John's new role positions

GE to better help retailers think strategically about lighting. His passion and competitiveness will help retail customers move with greater agility as they push to educate consumers and drive up sales in a lighting aisle that's increasingly difficult to navigate," said **Maryrose Sylvester**, president and CEO of GE Lighting. Strainic has been general manager of Global Lighting Product Management since April 2007. In this role, he was responsible for all global lighting strategy, including product development and capacity planning.

EBMag has learned that **Normand Belanger** retired

  
Francis Audet  
after 30 years of service to **Bel Products** ([www.produitsbel.com](http://www.produitsbel.com)). "Normand's 30 years' experience was instrumental in the success of the company,"

said **Real Belanger**, president. "He was a beneficial member of Bel Products and we wish him all the best in his future endeavours." Stepping into the role of national sales director is **Francis Audet**, who spent the last eight years supervising Bel's Mississauga, Ont., location.



Michel Dagenais



Martin Piette

**Michel Dagenais** will be retiring from **Iplex Electrical Inc.** ([www.ipxelectrical.com](http://www.ipxelectrical.com)) on December 31, 2012, after 32 years of "outstanding service". "Michel will leave a lasting legacy within the electrical industry, and has earned the respect and admiration of his customers, colleagues, and industry friends," continued Iplex. "On behalf of all of

his many colleagues and friends at Iplex, we want to say thank you, and wish both Michel and his wife Christiane nothing but happiness and good health as they embark on their retirement years." Effective January 1, 2013, **Martin Piette** will assume the position of sales manager, electrical products, for the province of Quebec. Piette, a third generation Iplex employee, has been with the company for 16 years, with the past eight servicing the Southeast region.



Jerry Kalb

**Halco Lighting Technologies** ([www.halcolighting.com](http://www.halcolighting.com)) welcomes **Jerry Kalb** to the position of director of business development, bringing with him more than 30 years of knowledge in the lighting industry. Most recently, he served as the national sales manager for Toshiba LED Lighting Systems Division. In this new position, Kalb will assist in the development of client relationships and promote Halco's products to new channels and markets.

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**GALLERY** • See these Canadian electrical flyboys in action at CANEW Canadian Airports National Electrical Workshop. Visit [bit.ly/UKfy9Y](http://bit.ly/UKfy9Y).

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### Smart Cities Canada Summit

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### NEMRA Annual Conference

*National Electrical Manufacturers Representatives Association*

**January 30-February 2**, Chicago, Ill.

Visit [www.nemra.org](http://www.nemra.org)

### EIAA Electrical Industry Annual Technical Conference

*Electrical Inspectors Association of Alberta*

**February 1-2**, Edmonton, Alta.

Visit [www.eiaa2004.com/conferences.html](http://www.eiaa2004.com/conferences.html)

### EFC EC Ontario Region Gala

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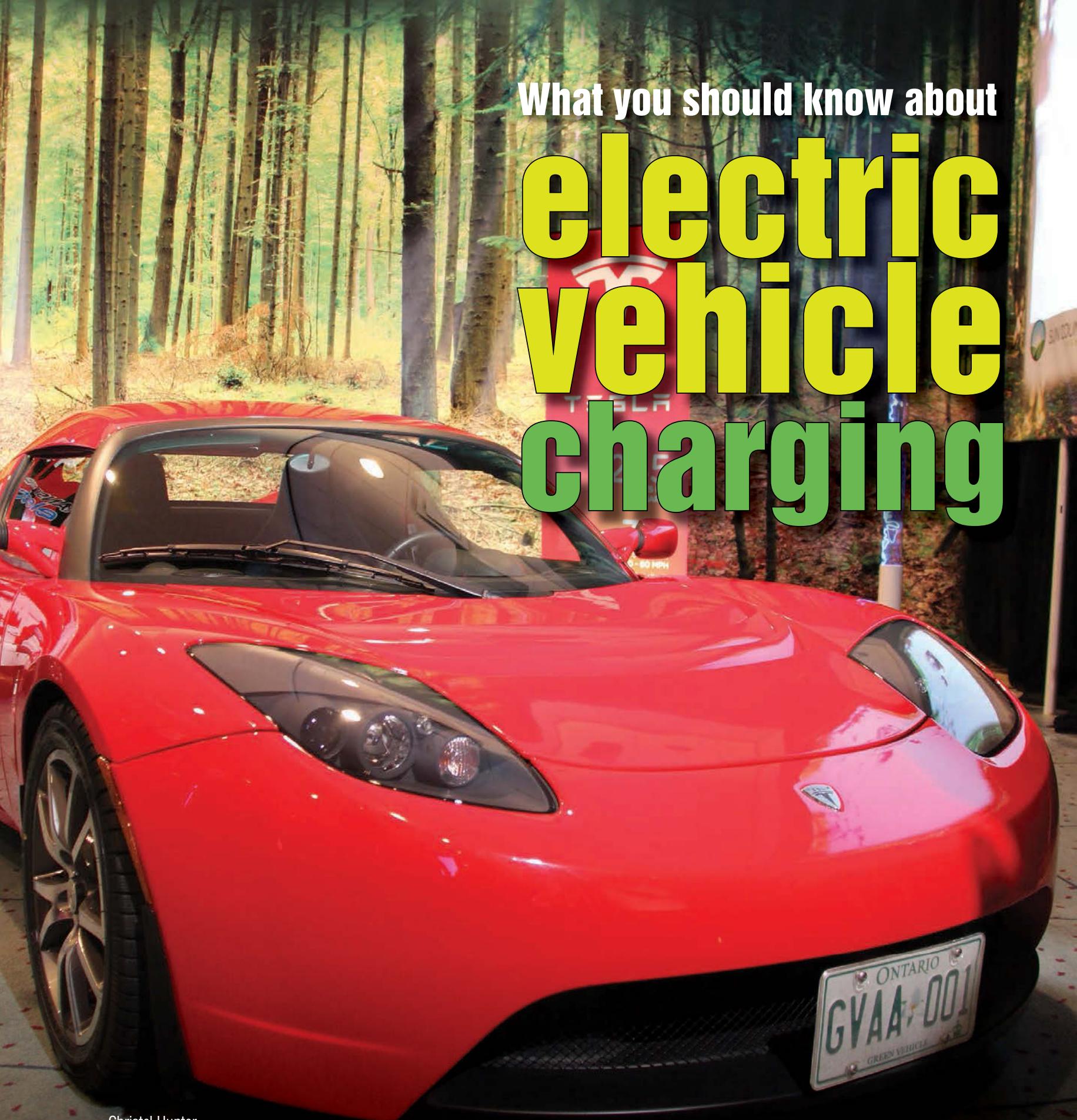
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# What you should know about electric vehicle charging

Christel Hunter

PHOTO A. CAPKIN

**C**ar buyers who wish to take advantage of new technology electric vehicles—either battery electric vehicles or plug-in hybrid vehicles—have several choices. With no additional electrical system upgrade to their home, battery electric vehicles and plug-in hybrid electric vehicles can be charged using a standard 120V, 20A receptacle. This is referred to as Level I charging.

Unfortunately, a full charge at this voltage can take quite some time, generally estimated at between 8 to 20 hours. When a shorter charge time is desired, a 240V charging station can be installed, which cuts charge time approximately in half. This is referred to as Level II charging, and connections are achieved using a standardized connector manufactured to SAE J1772. For an even faster charge, Level III chargers operate at 480V and can charge a vehicle in less than half an hour. However, Level III chargers are presently rare, not fully standardized and only available in non-residential locations.

Although the majority of initial battery EV purchases will probably be to those who have the ability to charge their vehicle via 120V or 240V connections at their residence, public charging stations will be absolutely essential for certain EV owners. Those buyers who live in locations that either do not have the capacity in their residential electrical system to plug in a continuous load or add a Level II charging station, or that do not provide physical access to the electrical system to plug in even at 120V, will need quick, convenient public charging options.

Public charging will also be essential for long-distance travel, such as travelling on vacation, relocating or commuting long distances. Since battery sizes are currently kept small to reduce weight and cost, pure EVs are impractical for anything other than short-distance commutes or running errands close to home.

Existing multifamily housing may not have adequate electrical access or capacity for easily charging EVs. Even units with garages or dedicated parking are not likely to have receptacles accessible for charging an electric vehicle, and a 240V receptacle is especially unlikely. New multifamily projects might plan for EV charging, especially in green construction projects. Retrofit installations might also be possible, but will require a significant investment and careful evaluation of the electrical system.

For those who do buy battery EVs, it is likely that

a combination of in-home and public charging will make the most sense, with most charging done at home. Those fortunate enough to work in places where battery charging facilities are available will likely take advantage of them. Green buildings that provide spaces and charging facilities for electric vehicles will likely influence employees and encourage the purchase of battery EVs, particularly where the consumer has a second vehicle for extended travel and tends to commute every day between home and office.

## What's the charge for a charge?

Charging patterns can affect the cost per mile for battery EVs. Most utilities have a time-of-use (ToU) rate that significantly reduces the amount paid during off-peak hours. The impact on utilities of electrically charged vehicles is still uncertain and depends on charging patterns of vehicle owners.

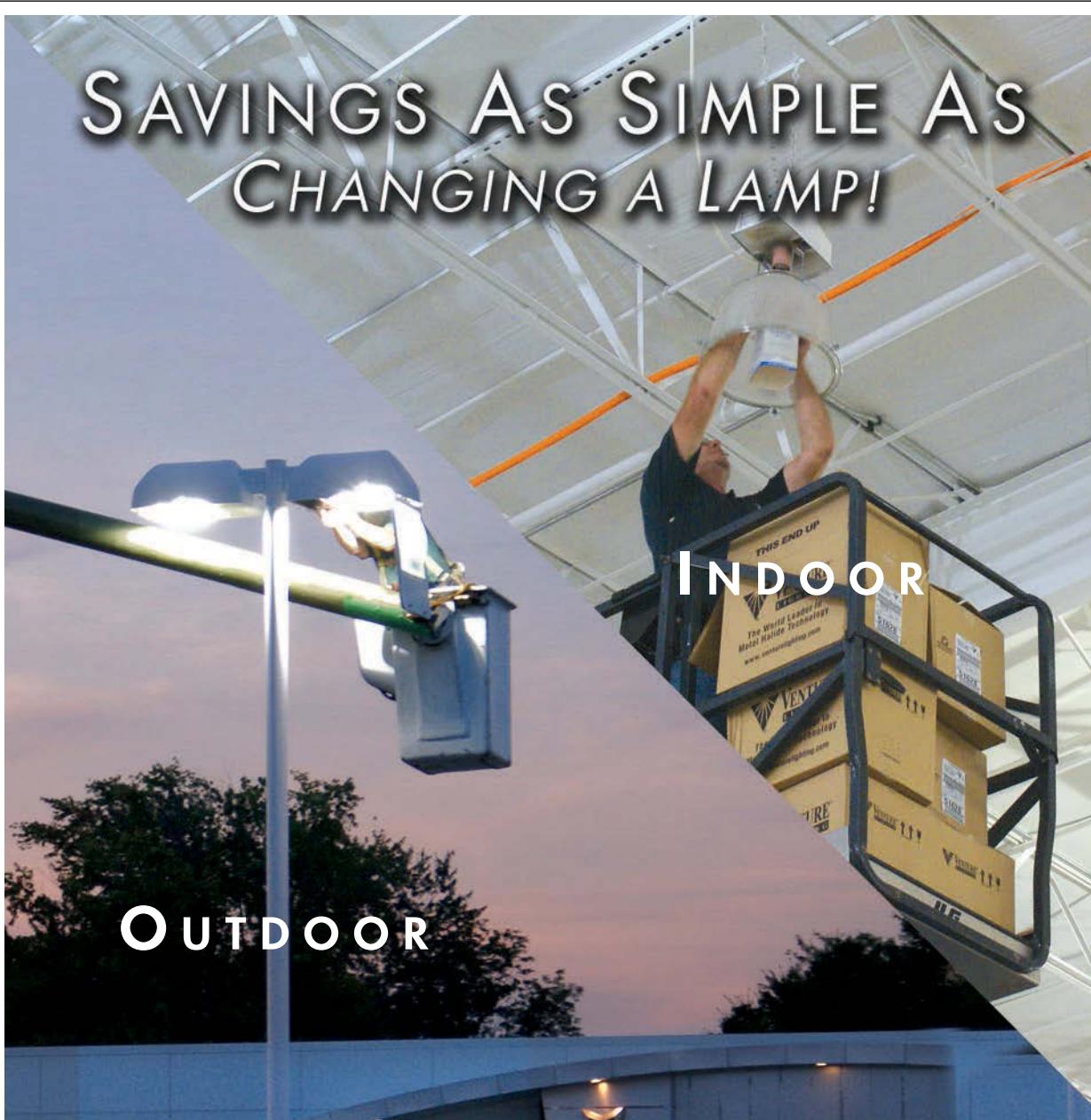
Peak and off-peak rates, home or commercial charging, 120V or 240V, and utility-controlled charging can all be influencing factors. Many charging systems are being designed to communicate with the utility system to optimize vehicle charging—either to minimize cost to the consumer or impact to the utility.

There are differing estimates of how much it will cost to operate an EV, and much of the variability comes from the impact of how the vehicle is driven. Drivers who take short trips and use only the battery will pay less than those who rely on an assist from a gasoline engine. Temperature also affects battery performance, and electricity prices vary from utility to utility. What sources do agree on is that fuel costs for electric or plug-in hybrid vehicles will be substantially less than gas-fuelled vehicles, and the environmental impact of EVs is also less than that of gas-fuelled vehicles.

## What should inspectors look for?

Inspectors will have to be aware of the impact of 240V (and 480V) charger installation on existing and newly constructed electrical systems. Some charging units are permanent and hard-wired, while others are meant to be cord-and-plug-connected. In truth, even the cord-and-plug-connected units are not truly portable; they are meant to be installed permanently and only moved when the owner changes residences.

The inspector will not be involved when an electric vehicle is purchased unless the owner decides to install a 240-volt charger at home or a commercial battery charger is installed on either public or private property. When a Level II charging station is installed in a residence, there are several safety considerations. Capacity is the number one concern. Many homes may not have the capacity to add a 40A or higher circuit breaker in the existing electrical panel, which would require the homeowner to upgrade the service to add the charger.



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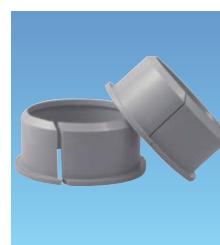
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All charger manufacturers recommend or require a licensed electrician, and many of the EV manufacturers require an installer certified by the manufacturer.

The location of the charger is also an issue. Some chargers are intended only for indoor use and have a NEMA 1 enclosure, while others are listed for outdoor use with a suitable enclosure. Temperature operating range is typically -40°F to 122°F. Installation instructions for home chargers have installation height requirements and other specific instructions that must be followed for safe operation. The electrician should have the manufacturer's instructions available for the inspector to review at the time of the inspection. GFCI breakers are generally not recommended for charging stations with built-in ground fault protection.

A major concern is the growth of the public charging infrastructure. There are efforts underway to rapidly install charging stations for public use. Infrastructure growth is occurring on both state and municipal levels, and is often funded by public money. One example is Coulomb Technologies, which has a network of charging stations across the States that currently includes 50 geographical locations with hundreds of charging facilities. These are part of a program called ChargePoint America ([chargepointportal.net](http://chargepointportal.net)), which was funded by a grant from the American Recovery and Reinvestment Act. Their website allows the user to find charging locations and even map trips with the locations of charging stations.

San Diego, Chicago, Houston and other major cities are all installing networks of charging stations that can be used to charge EVs in public places. San Diego's public chargers are expected to cost \$50 to \$60 for a monthly, unlimited subscription for charging during non-peak hours. Redmond, Wash., is installing public chargers that will be billed per session at a cost of \$4 to \$5 per six-hour session. Oregon currently has about 50 public charging stations installed, but that will grow quickly. PGE plans to install 1150 in Oregon, and the state also plans to install additional stations.

Project Get Ready is an initiative led by the Rocky Mountain Institute in partnership with many sponsors and technical advisors. The goal of Project Get Ready is to prepare cities for the influx of electric vehicles, and there is a wealth of information available on their website at [projectgetready.org](http://projectgetready.org).

### Level II chargers

Many companies are offering Level II chargers for residential or commercial use. Car manufacturers may also manufacture charging equipment, but more often will contract with a separate equipment manufacturer. There are also independent companies offering charging solutions, which is only possible due to the increasing standardization of connectors and equipment.

One example of a non-automotive company entering the charger market is Schneider Electric, who is now offering a Level II indoor residential charger for about \$1000 that provides a full charge in 6 to 8 hours. The company provides a network of trained contractors for installation. When the customer uses one of these certified installers, the charger warranty is extended. The charger operates at 240V and 30A, and includes ground-fault protection and automatic recovery after ground-fault interruption or a power outage. A two-pole, 40A breaker is required, and the conductor size is required to be a minimum 8 AWG copper or 8 AWG aluminum.

As with all electrical installations, Schneider requires that the charger be installed by qualified electrical personnel, and warns that the torque requirements on the equipment must be followed to avoid heat and fire damage. To properly tighten the connections, a torque screwdriver must be used. The residential charger also has the ability for delayed charge scheduling, and options include advanced metering capability.

Although most Level II chargers operate at about 30A, the range can extend up to 80A. The Tesla charger operates at 208V to 240V, and requires a 90A circuit breaker. The maximum current is 72A, so determining the capacity of the electrical system is critical. Many homes have only a 200A service; even with normal residential diversity, a device that requires a continuous demand of 35% of the service can be significant. The Tesla home charger has ground-fault protection with self-testing and automatic reclosure that operates in case of a ground fault detection or power loss.

### An uncertain future?

Although electric vehicle options and sales are increasing, there are still many questions in the minds of potential EV buyers. EPRI (Electric Power Research Institute) conducted a survey of southern California residential customers (published in 2010) to explore the general

perception of EVs and charging. They found that many respondents had questions or concerns about where they would charge their vehicles and what the payback period would be.

The recommendation from the study is to create a strong public education program that addresses the uncertainties (including safety and range anxiety) and reassures potential buyers. The results of the survey also included the following findings, which are mostly positive:

- Consumer charging preferences: Virtually all respondents indicated they expect to charge their PHEV primarily at home.
- Accessibility of at-home charging locations: Almost two-thirds of respondents indicated they had a conventional (120V) outlet within 25 feet of where they park at home.
- Vehicle acquisition interest: Over 50% of hybrid owners, compared to 28% of conventional vehicle owners, indicated the next new vehicle they acquire would probably or definitely be a PHEV.
- Gasoline prices: As gasoline price rises to \$4/gal (from a reference price of \$3/gal), consumers stated intentions to acquire a PHEV also rise.
- At-home charging plan preferences: Nighttime charging was acceptable to over 80%.
- Social networking influences: The vehicle acquisition decision is influenced more by what co-workers, friends and neighbours drive than by dealers or promotional materials.

Many questions are still unanswered: what is the failure rate of electric vehicle chargers; how much maintenance will be required; how long would it take to get a replacement unit if it failed; how would the car owner charge the vehicle if the unit needed repair or replacement? For public charging, questions centre around availability of stations and the cost of charging. The uncertainty surrounding both at-home and public charging infrastructure can be a serious impediment to the acceptance of electric vehicles.

Car travel is an ingrained part of daily life for the majority of North Americans, and many are reluctant to take a chance on new technology without assurance that the reliability of all aspects of electric vehicles will be equal to that of traditionally fuelled vehicles. Nevertheless, sales of EVs are expected to grow in the future, and the electrical grid and charging infrastructure are going to have to rapidly adjust to accommodate the market. **EB**

*Christel Hunter is a senior engineer with Alcan Cable, and has worked in the electrical industry for 16 years, including positions with the utility, regulatory and manufacturing sectors. She holds Bachelor of Science degrees in Engineering Physics and Electrical Engineering, and a Masters in Business Administration. Christel serves on NEC CMP-6 and CMP-7, CEC Section 4, chair of CANENA THSC20, and many other industry committees. She is an associate certified standards engineer, master electrician and LEED accredited professional.*

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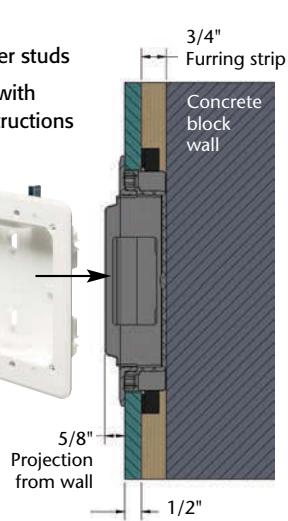
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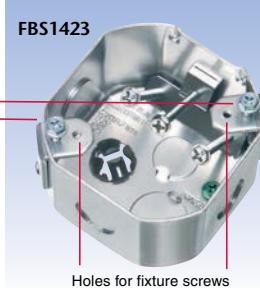
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# Electric vehicle charging station

## market offerings

Alyssa Dalton

**W**hat's holding us back from purchasing an electric vehicle (EV)? Is it "range anxiety"—the nervousness that stems from running out of electric power when driving an EV? This has long been named one of the top—if not *the* top—concerns when purchasing an EV. Here we present (in no particular order) a number of EV chargers (electric vehicle supply equipment, or EVSE) from some of the market's top manufacturers into one handy file. Regardless of the specific EV model, there's a charger for that!



### Eaton

Eaton Canada ([www.eatoncanada.ca](http://www.eatoncanada.ca)) currently offers three types of chargers under the Pow-R-Station family: Level 1 residential, Level 2 residential and commercial, and the DC Quick EV Charger.

The Level 1 is a 110VAC station, capable of replenishing a car's battery within 10-12 hours, while the Level 2 240VAC charging station powers up the car's battery in 4-6 hours. The Level 2 240VAC commercial charger can be used as a solo power station, or networked with other power stations to be managed by one entity. All three models named here are SAE J1772 compliant.

Earlier this year, Mitsubishi Motor Sales of Canada installed the DC Quick EV Charger

(Level 3) at its Mississauga, Ont., headquarters for powering its electric i-MiEV hatchback, making it the first DC Quick Charger station in the country available for public use. The charger utilizes a CHAdeMO-compliant power connector, representing the proposed global industry standard for high-voltage DC quick charging. The 400VDC unit charges an EV in 20-30 minutes, and Eaton says the unit not only supplies power to the electric vehicle, but peace of mind to anxious EV drivers.

Eaton's Level 1 and Level 2 charging stations and Level 2 commercial charging station are cETL listed, CSA Standard 22.2 and No 107.1. The DC Quick Charger is CSA Standard 22.2, and No. 107.1. All Eaton chargers are NEMA 3R-rated.

### ABB

ABB ([www.abb.com](http://www.abb.com)) recently entered the U.S. market for EV charging solutions with its Terra 51 DC charger, which boasts charging times from as little as 15 to 30 minutes. The Terra 51 was initially launched in Europe in 2010 as the region's first commercially available DC charging station.

"Our Terra 51 fast charger has proven to be a rock solid solution in Europe and we are now certifying this web-connected charger for the U.S. market to serve the fast growing base of CHAdeMO cars such as the Nissan Leaf and Mitsubishi i," says Hans Streng, senior vice president and general manager of ABB's Product Group EV Charging Infrastructure. "The ability to quickly recharge enables drivers to



use their electric vehicle throughout the day without experiencing the typical range anxiety; fast charging will initiate further adoption of electric mobility."

The Terra 51 comes standard with a range of cloud-based services that provide connectivity,

security, applications and support, and enable operators to get the most out of their charging infrastructure. All Terra chargers are connected to an IT network providing software upgrades, remote maintenance, servicing and monitoring. Connectivity also puts more analysis and control functions in the hands of grid operators to help them ensure better power quality in the grid.

"To be successful, we believe the U.S. electric vehicle charging infrastructure needs to be open to any kind of electric car. Our connectivity solutions are designed to support all existing and future connection standards in the same network. The first Combo cars will be available at the end of 2013 and we're ready to support that," Streng says.



### Legrand Canada

Legrand Canada ([www.legrand.ca](http://www.legrand.ca)) has launched a line of portable, wallmount and pedestal EV chargers. The outdoor-rated Level 1 portable charger (L1EVSE) allows consumers to recharge from any standard 15A receptacle. Auto-Reset allows the L1EVSE to retry after a minor electrical fault, preventing lockout and low-charge situations. Vehicle leakage current compensation prevents nuisance GFCI trips, and it is compatible with all plug-in EVs (SAE J1772 plug).

The outdoor-rated Level 2 charging station (wallmount and pedestal, L2EVSE16) features Auto-Reset and supplies a full charge in 3-6 hours. Like the L1EVSE, it boasts built-in GFCI protection with Self-Test feature, and detects the lack of ground (Ground Continuity Monitoring). Communication with the vehicle confirms electrical connections prior to charging. The pedestal unit provides support for up to two charging stations.



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## Schneider Electric

In North America, Schneider Electric offers EVLink Level 2 (240V) residential and commercial (basic and advanced) charging stations, and Level 3 quick chargers (600vDC).

The residential unit is housed in an indoor-rated enclosure, boasting Auto-ON operation and a convenient time delay feature, which allows owners to take advantage of off-peak billing rates. The 18-ft cable is protected by an integral ground fault interrupter. In case of ground fault or power outage,

the unit provides automatic recovery and restart. Intuitive status LEDs allow the user to quickly identify Power On, charging time, delay time and fault situations. EVlink meets CSA, UL and SAE1772 standards. With an output of 240V, 30A (7.2 kW), this product provides significantly more power (for faster charging) than Level 1 charging stations.

Schneider Electric offers EVlink commercial stations in standard (non-networked/non-billing) and advanced (networked/billing capable) formats. The advanced EVlink commercial stations are connected to a network, which allows users to locate the stations on web-enabled devices, reserve stations, process payments via credit cards or prepaid access cards, and receive status information.

For station owners, the networked stations allow for remote monitoring, maintenance and rate adjustments. Available as pedestal-mount single- and dual-cable units, they feature an 18-ft cable and integrated cable management. A high-resolution LCD screen provides the user and owner with instructions, energy usage, billing charges and status information. Advanced EVlink stations allow owners to define rate structures and may be programmed to offer the benefits of a networked device. The products are Level 2, 240V, 7.2kW output and meet applicable CSA, UL and SAE1772 standards.



The manufacturer describes the Level 3 EVlink DCQC as a complete power transformer/charging station/communication/programming package housed in one enclosure, allowing for a single pad construction and installation process. The CHADEMO-compliant station is also equipped with RFID access and credit card billing. Available with the options for 208V, 240V, 480V or 600V input voltage, the EVlink DCQC will provide up to 500Vdc output, 50kW, capable of charging current passenger EVs to 80% charge in under 30 min, says Schneider.

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## GE

Last Christmas, GE Energy reached an agreement with Amazon.com to sell its WattStation wallmount Level 2 EV charger directly to consumers through the online retailer's website ([www.gewattstation.com](http://www.gewattstation.com)). By making it easier for electric vehicle drivers to purchase its EV charger, GE hopes to "lead the creation of the 'end-to-end' charging infrastructure needed to electrify transportation in the future". The charger delivers a full-cycle charge to a 24-kWh battery in four to eight hours. In addition, WattStation comes equipped with built-in fuses to provide overload protection in the event of a fault occurrence. Measuring 24 x 16 x 6 in., WattStation is suitable for both indoor and outdoor installations, and is rated NEMA 3R to resist rain, sleet and ice.

GE Energy's Industrial Solutions business has unveiled its Ecomagination-approved WattStation and WattStation Connect, an EV charging station and software platform. The solution allows WattStation owners to manage charging stations remotely, along with the ability to manage and set customer pricing for EV charging, provide access control at their facilities and generate reports. According to GE, the WattStation Connect platform helps meet a variety of EV needs, whether it is a retailer looking to attract new customers, a commercial property manager in need of information on electricity usage



or a fleet owner in search of better cost-allocation data. EV drivers can also view and locate GE's WattStations, obtain directions to charging stations, access pricing details and determine whether a unit is available for charging. In addition to global positioning systems (GPS), the GE WattStation Connect data will be available through the internet, mobile app/device and future in-vehicle (built-in navigation) systems.

WattStation and WattStation Connect EV solution have also teamed up with PayPal to enable drivers to securely and conveniently pay for charging fees through the WattStation Connect mobile app and PayPal. With the app, now available at the Apple iTunes Store, EV drivers scan the quick response (QR) code on the WattStation charger to get pricing details then pay with PayPal.



#### Hubbell Canada & PEP

Hubbell Wiring Device Kellems, a division of Hubbell Inc. ([www.hubbell-wiring.com](http://www.hubbell-wiring.com)), and PEP Stations LLC ([www.pepstations.com](http://www.pepstations.com)), have a strategic alliance under which Hubbell has exclusive representation and marketing rights for PEP's products in North America.

PEP's stations provide pay-per-use and access control functionality. EV charging and user access are fully automated and self-guided, providing the driver an "electric refuelling experience similar to that of self-serve gas pumps".

At this time, PEP only makes one unit style—the Commercial Level 2 Dual Vehicle charging station, which features a 8-in. weatherproof full-colour touchscreen. The card reader is user-configurable for different types of access, and a pedestal design helps reduce unsightly bollards, while complying with ADA requirements for accessibility, says Hubbell. The cord, strategically coloured bright yellow, acts to minimize damage and trip hazards.

The station contains an on-board computer that can be reprogrammed remotely to meet future requirements.

"PEP Stations are the premium solution to electric vehicle charging," says Sean Creighton, product manager of Hubbell Canada's Commercial Wiring Devices. "Their distinctive styling provides the property owner with a design that is complementary to building architecture, adding value and curb appeal while supporting a green commitment to reducing emissions."

Each PEP Station is a Level 2 (208-240V/30A) commercial charge station that comes standard with two J1772 connectors.

public charging systems.

The portable Level 1 charger allows drivers to choose between charging at home, plugging in at stops along the way, or at their final destination. The charger can be plugged into any standard 15A- or 20A-, 125V-grounded receptacle. The unit also includes a dockable holder for the connector.

For Toyota RAV4 EV drivers,

Leviton offers the Level 2 40A, 240V charging station. With 9.6kW output, it is designed to charge the vehicle in about 5-6 hours. The Level 2 30A, 240V station is also available for the RAV4 EV, powering the EV in about 6.5-8 hours. The 30A, 7.2kW output device is only available with the Leviton-certified installation package.

Toyota Prius Plug-in owners,

meantime, enjoy a Level 2 240V home charging station providing up to 16A and 3.8kW output.

The Evr-Green Level 1/Level 2 Combination and Level 2 Public Use charging stations offer municipalities, corporations, fleets and utilities options for plug-in EV charging. The Evr-Green Dual Port Level 2 charging station can charge two vehicles simultaneously. **EB**



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#### Leviton

Leviton's ([www.leviton.com](http://www.leviton.com)) charging portfolio features the Evr-Green line of residential, commercial and



# ARE OLED PANELS READY FOR PRIME TIME?

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**O**LED (organic light emitting diode) technology is often referred to as the next big thing in lighting, and some even say it will be even better than standard inorganic LEDs. In fact, OLED lighting technology is on the DoE's (U.S. Department of Energy) roadmap of emerging SSL (solid-state lighting) technologies and, given their predictions, it is going to be an incredible lighting source.

We currently see many custom architectural OLED fixtures with high numbers of low brightness panels in exciting and sculptural forms at tradeshows, in design magazine spreads and artistic installations as architectural focal points. The big question for many of us participating in the decorative and commercial fixture market is "Can it do anything we can sell today?". The answer: Yes and No.

General white lighting technology for OLED is available today as a very thin panel; some are round or rectangular, and some are square, but most are about 3-mm thick. The panels are available from only a handful of providers: LG Chem, Mitsubishi, Osram and Philips Lighting are some that currently provide OLED lighting panels to the industry, although in limited volume. Although the technology is still being perfected, the rapid rate of introduction of newer and better-performing OLED light sources is even more dramatic than standard LED light sources.

Unfortunately, OLED technology is not as efficient as its standard LED cousin. OLED panels available today are about 4 x 4-in., generate only about 75 lumens, are dramatically expensive, and their average lifespan is only about 10,000 hours.

So why would a manufacturer be interested in using this light source today? The answer is twofold: first, OEM's must examine the unique characteristics of the OLED panel to discover where it has advantages over traditional light sources as well as standard LEDs; second, OEM's must understand where we are in the OLED development cycle and how quickly we will have a high-efficacy OLED panel at prices that will make it viable to a mainstream customer base.

## OLED features

OLED is a panel source, not a point source of light like LEDs. The advantage of this is especially beneficial in general illumination applications where an even light distribution and low glare are important. Using a multiple panel light source creates a surface

of light that can widely and evenly distribute light within a space. The wide luminous surface has a low surface brightness that, with enough panels, can light up a room, but can also be easily viewed directly without blinding the observer.

Low heat is another achievement of OLED technology. The low input wattage and wide surface area of the panel creates very little heat and allows installation with only a small concern about creating a proper heat sink as with LEDs. This panel can be safely mounted to many different types of materials.

The feature that some argue makes current OLED panels most desirable is the thinness. While the performance of most OLED panels can be duplicated and even exceeded by standard LEDs and other light sources at the moment, none can duplicate the combination of low-glare surface brightness, low heat and thinness.

Add the ability to be easily dimmed, and certain versions are available that can provide controlled colour-changing capabilities and you have the recipe for exciting designs.

## OLED performance

As OLED technology advances, certain standards are starting to appear. OLED lighting panel sizes are starting to emerge that are becoming common to several of the OLED panel suppliers. Standardization in module size helps create fixture platforms that can be updated at a later date with the latest and most efficient panels.

Fortunately, OLED panel makers and innovators are focused on producing panels with higher output and a longer life. Expect the next generation to achieve 80 lm/W and run for up to 20,000 hours as early as 2013. LG Chem projects its panels will reach 135 lm/W and 40,000 hours by 2015. Philips also is projecting its panels will deliver up to 140 lm/W. The development roadmap for many OLED panel developers also includes exploiting characteristics that are different than traditional light sources, but unique to OLEDs, such as flexibility and transparency of the light source panel. But maybe the most interesting characteristic that fixture makers and designers will watch is cost.

## OLED cost

According to DoE's current SSL multi-year program plan, the OLED milestone goal for the industry is to achieve at least a \$25/thousand lumen cost (OEM price) for OLED panels by 2015. This is a daunting

goal considering that we are around \$200 for just about 100 lumens in 2012. However, LG Chem feels it will be able to provide the predicted performance goals and drastically reduce panel pricing via investments in production processes and high-volume production lines. Depending on who you ask, it looks like we will see OLED panels double their efficacy from 2012 in 2013, and cost about half.

To judge the credibility of this claim, you can look at the rate of cost reductions and performance improvements that we have seen in the last 10 years with standard inorganic LED manufacturing. The current OLED development roadmap shows that OLED panels are on track to achieve the same cost reduction and performance improvement rate, but in half the time! The good news is that, although we are still at an early stage, the OLED development rate is generally keeping this pace.

#### OLED applications

The OLED panel technology has finally reached a point where it is not just a glowing surface but can start delivering real output appropriate for some of its first lighting fixture applications. The lighting fixtures developed in 2012 will be able to use the next improved-performance generation of OLED panels available in 2013. While today's OLED panels can start to be used in some fixture types, the next generation that's just around the corner promises to bring us closer to a light source that can be seriously considered against other sources in several real applications.

One important part of developing lighting products is the ability to deliver the correct amount of fixture lumens the end user needs within a fixture size and shape that is appropriate for the application. For instance, recessed fixtures need to generate high amounts of lumens in a small 6-in. or 8-in. diameter fixture size, whereas linear fluorescent fixtures could have equal luminous output but deliver these lumens from a fixture that is sized approximately 2 x 4-ft.

To be effective, the OLED has to deliver the appropriate lumens for the fixture type for which it is specified, and should not require the fixture to grow significantly larger to accommodate this light source. The current OLED panels do not deliver a high luminance (intensity) of light. At the current 100-120 lumens per 4 x 4-in. panel, there are numerous applications that would require too many panels to achieve the needed lumen

output. Even for those applications where OLEDs have the ability to deliver the proper performance and function, the large number of panels could unduly elevate the price beyond what is reasonably expected in the market. With a current life limited to 10-15 thousand hours, OLED panels are not yet generally appropriate for many commercial applications.

Fortunately, several lighting

applications can initially absorb the higher price of this new technology with moderate life span and still become viable products. For now, OEMs need to highlight the unique features of this technology, such as its unique thinness, low heat and low glare characteristics to justify its cost. Ideal applications that showcase these features and can accept the current lumen output of these panels would tend toward

decorative and task-oriented fixtures where price and value are more shaped by appearance and less on life and performance.

The ones that could work best with the current OLED performance and the price points (and those of the coming next generation) seem to be: 1) low brightness exterior fixtures; 2) task-specific fixtures; and 3) higher-end decorative fixtures.

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#### *Exterior fixtures*

Exterior lighting, at a residential entry way, needs only limited intensity to illuminate the immediate area at night. The common mounting height at eye level requires the fixture to have less glare so as not to blind visitors at night. Lower exterior illumination levels and low glare applications are a perfect match for OLEDs. In

residential and commercial exterior fixtures, they can be made to stand out in a unique and decorative ways to create a new contemporary coach light application.

Most fixtures would be mounted traditionally in front of a recessed junction box. However since OLEDs are low voltage, they can also be installed as a flush-mounted retrofit, even after the architecture

is built. A flush-mounted OLED step light, decorative wall luminaire or even OLED pathway lighting can be mounted this way. They could be easily attached to many surfaces in existing exterior applications with low-voltage wiring and a remote driver.

#### *Task-specific applications*

Lower-brightness general task

applications, where the light source is closer to the surface being illuminated, are well-suited for current OLED panels. These panels can be placed in routed recesses in a cabinet shelving material to make an invisible flush faced undercabinet light, or attached to the underside of a display shelf to illuminate a case. A thin-profile task application like a wall-mounted bed light would also be an ideal fixture type to show off the thin profile of this light source.

The OLED panel can also be incorporated into consumer-lighted products, such as a whisper thin, lightweight, portable illuminated make-up mirror. Portable table lamps are the next place we will be seeing this light source used. When the end user is willing to pay a premium for the beauty of the thinness of the application, all of these examples show off the technology well.

#### *Decorative interior fixtures*

One of the best applications that can take advantage of the extraordinarily low profile of the OLED panel would be decorative fixture applications. Higher-end decorative fixtures have long been a useful vehicle for the introduction of many new light sources. Halogen lamp technology was first seen in very expensive task lamps and suspended fixtures before the price was sufficiently lowered and they became commonly available to the masses. Many consumers and lighting specifiers will pay a higher cost for that which is considered unique and different. The thin OLED light source delivers this wow-factor.

Of the most popular decorative fixtures in this category, the suspended pendant and chandelier stand out. Since the lighting performance characteristics of these types of fixture are very subjective, few broadly agreed performance requirements exist. The fixture is most often situated in a room with other supplemental lighting. These decorative fixtures are usually purchased based largely on the appearance, and become a visual focal point for the environment.

Since the performance characteristics of the OLED panel are not yet as compelling as its thinness characteristics, it is therefore the highly decorative fixture (such as the chandelier) that can best show off this low-profile feature and attract the early adopters of the technology. Other higher-end decorative fixtures, like wall sconces, will also be a great showcase for this

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new technology and, in turn, will show the mass market how best to use this new and exciting lighting technology when prices come down.

#### The time is now

Analysis of the rapid improvements in OLED technology gives some OEMs confidence in getting involved with OLED lighting fixtures now. Although there is risk of the technology not keeping pace with projections, it can be minimized by choosing the right OLED panel provider, understanding the best lighting applications for currently available panels, and having realistic expectations of initial market sales. A desire to gain experience in this exciting light source technology and an expectation of a longer-term return on investment is also required.

The general public is still very positive and interested in all things LED. After the recent introductions of the latest flatscreen TV technology into the market, knowledge of OLEDs is starting to spread. There are many lighting

applications that OLEDs cannot fill right now, and there are many more fixture types where this technology is not practical.

However, when you focus on lighting product areas that strongly promote the great features of this light source, then you will start to see the advantages OLEDs currently have over other sources. The opportunities will only grow for this light source as performance and cost catch up to the standard inorganic LED. For companies that want to get in on the ground floor of OLED lighting, the time is now. **EB**

*Stephen Blackman is the president of Blackman Design Associates ([blackmandesign.com](http://blackmandesign.com)), a three-time winner of the Lighting for Tomorrow energy-efficient lighting competition, and the first winner of the Lighting for Tomorrow LED lighting competition 2006. Blackman Design Associates was founded in 1988, providing turnkey design services: from concept through optical, thermal and mechanical engineering. Article © Stephen Blackman.*

#### Standard Products debuts dimmable LSG luminaires

Standard Products has announced dimmable LSG luminaires to its product offering, featuring the perimeter, high bay, low bay, post top, wallpack, flood, and linear varieties. The luminaires boast immediate on/off functionality and are designed for optimal light output, and efficiency and thermal management, adds the company. The luminaires are cULus and ETL certified.

#### STANDARD PRODUCTS

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#### GE debuts GE Energy Smart

##### 27W LED bulb

GE Lighting has introduced the GE Energy Smart 27W LED bulb, delivering 1,600+ lumens, 3000K colour temperature and 25,000-hour rated life. Featuring the standard A-19 bulb shape, the incandescent replacement bulb boasts of smooth dimming, instant full brightness and 60+ lumens per watt. The bulb also features a synthetic jet— a method



to move air to cool LEDs using an oscillating membrane, which fits within the envelope of the A-19 bulb shape.

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#### Cooper Lighting expands Lumière line with Eon LED luminaires



Cooper Lighting has added the Eon family to its Lumière line of architectural indoor and outdoor LED luminaires. The Eon family includes wall- and ceiling-mount fixtures, sign lights and bollards, and boasts of up to 30% in energy savings over traditional lamp sources. The dimmable luminaire offers three beam patterns: forward throw, lateral throw and flood, and carries an IP66 rating.

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## EB products



### Lenox unveils 2012 and 1512 medium-tension hacksaw frames

Lenox introduced two medium-tension hacksaw frames complete

with T2 blades that promise longer blade life "and a superior cutting experience". The 2012 compact hacksaw features an aluminum beam that tensions to 20,000 psi; also, users can mount the blade at a 45° angle for flush-cutting applications. The 1512 hacksaw has an adjustable aluminum beam that tensions to 15,000 psi, features a

rubberized grip, and accommodates 10-in. and 12-in. blades (ships with a 12-in. blade installed). All Lenox hacksaw frames include a blade with T2 Technology, which promises longer blade life and faster cutting in a variety of metal materials. With the 2012 and 1512, the full family of Lenox hacksaw frames now includes: the

high-tension HT50 (50,000 psi); low-profile 5012 (40,000 psi); and lightweight 88300 (30,000 psi).

### LENOX

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

### Ideal Industries develops Twist-a-Nut Pro screwdrivers



The new Twist-a-Nut Pro screwdrivers boast unmatched performance, rugged design and value for electricians. The screwdrivers are available in the four slot designs: #2 square, 1/4-in. slotted, #2 Phillips and 1/4-in. cabinet. Each screwdriver has the Ideal Industries Wire-Nut connector wrench in the handles to help install twist-on wire connectors, as well as the Ideal Industries Accu-Loop wire looping hole to create loops for connecting devices like switches and receptacles. The handles also feature a textured Santoprene grip, combined with six torsion bars, which claim to result in superior torque.

### IDEAL INDUSTRIES

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

### Milwaukee releases M12 cordless 1/2" SDS Plus Rotary Hammer



Milwaukee Tool has announced its M12 cordless 1/2" SDS Plus Rotary Hammer, measuring 3.9-lbs (1.77kg) and 9-in. (23cm) in length. Claiming to be up 65% lighter, the tool delivers 0-800 RPM and 0-5,350 BPM and is suited for drilling in tight spaces and all-day use. The Electro Pneumatic Design allows for drilling of up to 1/2-in (13mm) holes in concrete and masonry. Users can choose between 2-Mode Operation, Rotary Hammer and Hammer-only.

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# New wiring rules in Sections 4 and 12

The 2012 Canadian Electrical Code introduces some real changes, many of which can be found in Sections 4 and 12 for wire and cable installations. No doubt we are already comfortable with the increased wire and cable ampacities in listed Tables 1 to 4, but there is more.

Rule 4-006 is spanking new: it's a big adjustment that will make everyone stop and think twice. For the first time, CEC requires that, when electrical equipment is marked with maximum conductor temperatures, conductor ampacities must be based on the corresponding columns in Tables 1 to 4. Where equipment is unmarked, the 90°C temperature ratings can apply. When, for example, a circuit-breaker has a maximum 75°C marking, the connected conductor ampacity will be based on the ampacities shown in the 75°C column. And don't forget: this requirement applies at both ends of the cable.

Rule 4-024 deals with minimum neutral conductor sizes. We are well aware that computers and other non-linear loads produce harmonic currents that impose additional loads on the neutrals of 3-phase, 4-wire systems. Engineers and designers have forever and a day taken steps to ensure that electrical system neutrals are adequately sized and, therefore, not overloaded.

This issue is now recognized by Rule 4-024(2)(a)(ii) by the following amendment: "there shall be no reduction in the size of the neutral for that portion of the load that consists of non-lineal loads supplied from a 3-phase, 4-wire system". There are other ways of fixing this problem, but this change serves notice that the problem needs fixing and provides minimum requirements for shared neutrals.

Earlier versions of Rule 12-510(3) have long permitted fishing non-metallic sheathed cable through concealed spaces. A change to this rule adds some new restrictions: for obvious reasons, fishing is no longer permitted where metal cladding, joists or plates are within the walls.

A new requirement, Rule 12-510(4), specifies that when receptacles or switches come complete with approved integral outlet boxes (separate outlet boxes not required) and an internal clamp, cables must be supported within 300-mm of the wall opening, and there must be a minimum 300-mm loop of cable or 150-mm of cable end left in the wall to permit replacement. This ensures that, should there be a failure, there will be enough cable remaining for reconnecting a new receptacle or switch.

There is also a series of new rules for installing armoured, jacketed cables in conduit or tubing. This narrative begins with Rule 12-602(6),

which confirms that such installations are permissible. It takes us to Rule 12-614(3), which provides minimum bending radii for armoured, jacketed cable in conduit or tubing as follows:

- 10.5x cable diameter for low-voltage cables
- 18x cable diameter for high-voltage cables
- As specified by cable manufacturer

This lengthy tale reaches its conclusion with Rule 12-902(2), which says one of two following conditions must be met to avoid damage:

1. The cable length must not exceed the calculated cable pulling tension
2. The conduit or tubing must not have more than two 90° bends between draw points, and a minimum cable radius of .944-mm for cables up to 1000V and 1.524-mm for cables over 1000V with maximum cable lengths of:
  - 15 m for 3-conductor copper
  - 45 m for single-conductor copper
  - 35 m for 3-conductor aluminum
  - 100 m for single-conductor aluminum

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## Tackle The Code Conundrum... if you dare!

Answers to this month's questions in January'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

Manually operated, general-use switches intended for alternating-current systems shall have an ampere rating not less than the current rating of the load when they are installed in branch circuit supplying non-inductive loads.

- a) True      b) False

### Question 2

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

- a) 250mm    b) 300mm  
c) 500mm    d) 600mm

### Question 3

Isolated non-current-carrying metal parts of outline lighting equipment shall be permitted to be bonded together by a [ ] conductor of copper or of equal conductance if of other metal, protected from mechanical injury.

- a) #14 AWG    b) #12 AWG  
c) #10 AWG    d) #6 AWG

### Answers: EBMag November 2012

**Q-1:** Type FCC systems shall not be used for branch circuits exceeding:  
c) 30A. Ref. Rule 12-806.

**Q-2:** Unless the ground fault circuit interrupter is an integral part of an approved factory-built hydromassage bathtub, or located behind a barrier, it shall be installed not closer than:  
c) 1.5m. Ref. Rule 68-068.

**Q-3:** Connections to portable motors shall be permitted with flexible cord of a serviceability not less than that of Type S cord.  
a) True. Ref. Rule 28-102.

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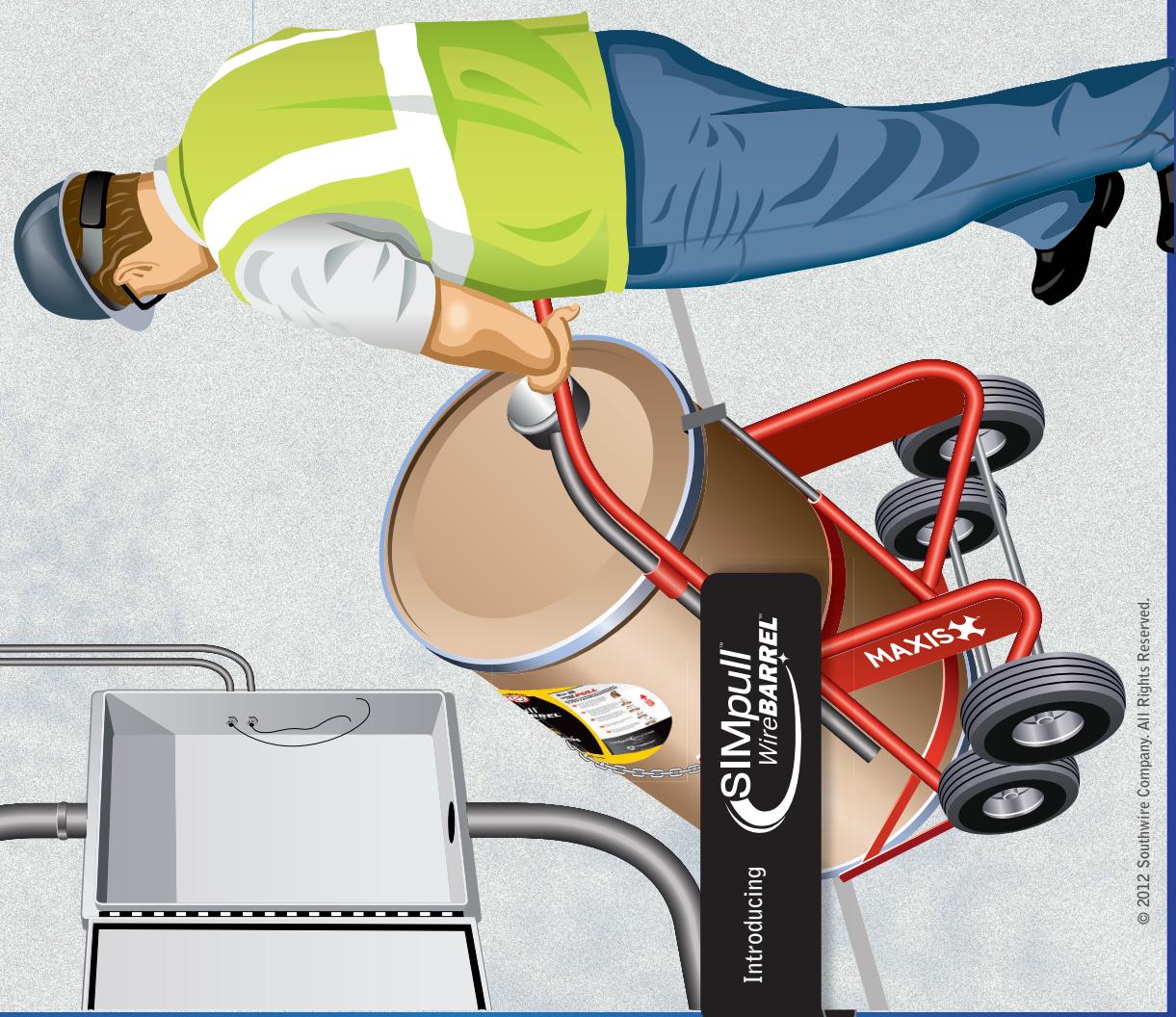
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