“IN THE CLOUD” GETS LITERAL AT YORK U

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When will provincial energy policies start making sense?

The Province of Ontario’s energy policy seems to work like this: If at first you don’t succeed, try, try again... then try again. And again... to the point where you hope no one even cares any more.

Back in February, Ontario’s auditor general Bonnie Lysyk called out the provincial government after discovering the latter had a process in the Electricity Act and regulations for drafting and approving a long-term technical plan for Ontario’s electricity system, and they didn’t bother following it!

But they were called out on it so, clearly, something had to be done.

And so Ontario recently passed new legislation (Energy Statute Law Amendment Act, 2015) to establish a long-term energy planning framework “that is efficient, supported by robust community engagement and responsive to emerging technologies in the energy sector”.

But how is this any different from what Ontario has seen before?

“We found that the planning process had essentially broken down over the past decade, and Ontario’s electricity power system did not have an overall technical plan in place for the last 10 years that was reviewed by the [Ontario Energy Board], as required by legislation,” said Lysyk in her 2015 Annual Report.

Yet Ontario feels this new act will be different, saying it will ensure long-term energy plans in the province that “balance the principles of cost effectiveness, reliability, clean energy, community and Indigenous engagement, as well as conservation and demand management”.

Hmm, conservation, eh? Despite having an over-supply of electricity, Lysyk says the province spent about $2.3 billion on conservation programs to 2014, and is committed to spending another $2.6 billion over the next six years. That doesn’t sound cost-effective.

Over in Alberta, meantime, ENMAX is terminating its Keephills power purchase arrangement under the PPA’s Change in Law provision citing a change in law that makes the agreement unprofitable or more unprofitable.

Keephills burns coal, and the provincial government there, as in Ontario, has declared war on the stuff. No wonder ENMAX is pulling out.

A plan is a detailed proposal for doing or achieving something, but I question whether anyone in government is actually planning anything. Instead it seems they are just recklessly careening from one half-cooked energy experiment to another. For their own long-term planning, ratepayers and businesses want energy stability—which is becoming increasingly hard to find in Canada, as our politicians are too busy posturing to do any planning.

ANTHONY CAPKUN

Taking the grid off-grid... an Alberta perspective
Certified Master Electrician and Hydronic Designer Erhard Hermann dissects the challenges of replacing conventional generation with renewables, drawing from his own off-grid power system experience. He cautions Alberta to “look before it leaps” when it comes to these ideas of grid modernization.

“In the cloud” gets literal at York U
The Bergeron Centre, the new home of the Lassonde School of Engineering in Toronto, may be an architectural gem with its 8000, shining dichromatic panels, but it is also full of “every kind of outlet” and energy-efficient highlights. Plus, the impressive amount of blue data cable means it has some interesting high-tech systems.

Trucks with power, productivity & savings
We have even more Work Truck Show 2016 coverage to share in this roundup of feature-packed trucks, from the electric Fuso E-Cell to Isuzu’s 2018 FTR. Whether it’s horsepower or fuel savings you’re after, you can be sure there is a truck for you.

ANTHONY CAPKUN acapkw@annexweb.com
Shelly Woods is the new products manager in marketing for Eaton Electrical Canada (www.eatoncanada.ca). Woods will be located in Burlington, Ont. and report to Rob Farrell. Previously she was the manager of distribution and control with EatonCare.

Jonathan Clarke has been appointed industrial sales manager for Thomas & Betts (www.tnb.ca) in Alberta. Clarke has been a member of the industrial sales force since 2014.

Shirley Coyle has assumed the office of president of the Illuminating Engineering Society (IES), succeeding Mark Roush (www.ies.org). Coyle is president of Cree Canada (creecanada.com) and has been a member of the IES for 31 years. She is also a committee member for several CSA Group standards committees on lighting.

Schneider Electric (scheider-electric.ca) has appointed Annette Clayton as president and CEO of North America operations—the company’s largest operating region. She replaces Laurent Vernerey, who has led the region for the last three years and is wrapping up a 30-year career at Schneider Electric. Clayton joined the company in 2011, after serving as VP of Global Operations at Dell.

Donning helmets and shirts reading the team name “Power4”, 46 employees from four of Ontario’s utilities came together for the 2016 Enbridge Ride to Conquer Cancer (to16.conquercancer.ca), a two-day cycling charity event. The employees from Enersource (enersource.com), Horizon Utilities (horizonutilities.com), Hydro One Brampton (www.hydroonebrampton.com) and PowerStream (www.powerstream.ca) pedalled over 200 km from Toronto to Niagara Falls, raising over $138,000 in support of the Princess Margaret Cancer Centre.

Congratulations to Polad Zahedi, the electrotechnical professional who has been selected by the Standards Council of Canada (SCC, www.scc.ca) to attend the International Electrotechnical Commission (IEC) Young Professionals Workshop during the IEC General Meeting in Germany this fall. As an assistant technical engineer/office at Ontario Power Generation (www.ogp.com), Zahedi works as a process control specialist in the computers and control design department.

For the latest industry news, reviews, products, stories and people in the electrical industry, go to EBMAG.COM

EXCLUSIVELY AT EBMAG.COM

EBMag was fortunate enough to be at the international Light+Building Show in Frankfurt, Germany earlier this year—a special danke to host Messe Frankfurt for the invite! There we stumbled upon the Ubiquilux booth, a Canadian company that claims the world’s first gesture control light switch as its brainchild. Visit tinyurl.com/h7nyura for a video with the Ubiquilux team showing off this e-Motion switch.

The Ontario Electrical League hosted its 2016 Electrical Industry Conference outside of London, Ont. Some deserving members were recognized during the Awards Dinner, particularly Dwight Dyke, winner of Inspector of the Year, and Louis Violo, winner of the Richard Cullis Award. Al Merlo was given special mention; he was recently recognized by the City of Hamilton for running his business for 60 years! See all the photos at tinyurl.com/gumr4p6.

For the latest industry news, stories, products, videos, photo galleries and industry events, visit EBMAG.COM
WORK SAFER AND MORE EFFICIENTLY with the new FLIR® CM174 clamp meter with built-in thermal imaging camera. Featuring Infrared Guided Measurement (IGM) technology, the CM174 visually points you to the precise location of potential electrical issues. You’ll find problems faster, get more done, and boost your credibility.

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AD energyFORCE Summit launches 30-day product challenge

AD hosted its energyFORCE Summit (www.adenergyforce.com) in Raleigh, N.C. for its electrical members and supplier partners who have a focus and commitment to energy solutions. The event takes its name from AD’s sister company, supplyFORCE, which helps independent distributors secure and service large MRO contracts.

AD (adhq.com) announced a 30-day challenge at the summit to encourage their members to implement product learning opportunities, as the main focus of the event was education on AD supplier partners’ “Peak” products, which are “energy focused and have sales growth potential”.

In addition to networking opportunities, learning tracks, and one-on-one tabletop sessions, the event also included a panel discussion with experts on lighting, switchgear, automation and control, and energy generation topics.

Laptops for Calgary’s Syrian refugees thanks to Siemens

Decommissioned laptops have received a second life with Syrian refugees in Calgary, Alta. Siemens employees, charity representatives and Syrian families volunteered at a workshop to complete the refurbishment of 230 computers that began at Siemens’ Canadian headquarters in Oakville, Ont. The workshop was conducted by Corporations For Community Connections (CFCC), a registered Canadian charity founded by Siemens employees, and the laptops will be distributed by the Centre for Newcomers and Calgary Immigrant Women’s Association.

Over the last four years, Siemens (www.siemens.ca) has partnered with CFCC (c4cc.ca) to donate and refurbish 1371 computers valued at $325,000. More than 300 Siemens Canada employees have volunteered 2700 hours participating in the workshops, the company adds.

Lumen opens 2nd branch in Moncton, N.B.

Lumen (a division of Sonepar Canada) celebrated the opening of a new Moncton, N.B. branch, the company’s 34th branch.

The 12,000-sf facility is located at 1070 St George Blvd. and is managed by branch manager Glenn Leaman. The site showcases Lumen’s “classic open concept and features specialized services,” the company said.

NETCO Training Conference lays out future

The National Electrical Trade Council (NETCO), also known as the “voice of Canada’s electrical industry on workforce development issues”, hosted a training conference in Vancouver on June 4, 2016, to consider the industry’s response to emerging technologies and related skills requirements.

NETCO is a joint national partnership of the Canadian Electrical Contractors Association (CECA, www.ceca.org) and the International Brotherhood of Electrical Workers (IBEW) Canada (www.ibewcanada.ca).

Things kicked off with an opening plenary session, “Green Skills Training and Certification,” on workforce requirements related to electrical vehicle infrastructure technology, photovoltaic solar energy technologies and conserving lighting system controls. A second session featured a preview of the “Canadian Electrical Installation Standards”—a new series of national standards developed by CECA that will soon be released through Orderline.

Save the 2017 NETCO Training Conference date: August 19-20 in Montreal, Que.
Ontario’s Darlington Nuclear rated world’s best again

An international industry assessment has recognised Ontario Power Generation’s (OPG) Darlington Nuclear Generating Station as one of the “safest and best performing nuclear stations in the world” for the third time in a row. It is the first time a plant outside the United States has received the recognition three times, according to OPG.

The assessment team recently evaluated Darlington Nuclear against standards for operational excellence applied to nuclear plants around the world, and recognized a number of strengths, including management and leadership, operator knowledge and skills, and equipment performance and condition.

The station currently powers about one in five homes in Ontario, OPG says, and a planned refurbishment this fall means it can provide power beyond 2055.

Don’t assume you don’t qualify for manufacturing funding, says EMC

According to the Excellence in Manufacturing Consortium (EMC), Canada Revenue Agency’s (CRA) SR&ED tax credit program and other funding has provided billions of dollars to support innovation. Need help getting your share?

You are probably eligible for significant tax credits or government funding (like the Scientific Research & Experimental Development [SR&ED] Program) to offset the expenses associated with your innovation activities for developing new products and processes, insists EMC (emccanada.org), and you may qualify whether you are:

• a start-up or century old manufacturer,
• a small company or part of a large multinational,
• are in growth mode or working to sustain current sales and profitability,
• in the food & beverage or automotive or aerospace or pharmaceutical or any other manufacturing sector,
• in the Maritimes or on the West Coast or somewhere in between.

For more information, contact Ross Cooper, senior advisor, Value Added Programs, at rcooper@emccanada.org or 705-528-7207.

Unlicensed electrical contractors can’t hide on Kijiji

Roberto Spada was sentenced in a Windsor, Ont. court recently on 16 charges, including performing unsafe electrical work and advertising to do electrical work without an electrical contractor’s licence.

The Electrical Safety Authority reports Spada was placed on two years’ probation, is required to perform 75 hours of community service, and pay $27,085 in restitution to his victims and fines of $500.

This story actually starts three years ago (2013) when ESA (esasafe.com) received information that Spada—who is not licensed to conduct electrical work for hire in Ontario—was doing electrical work at multiple locations, and advertising his electrical services on Kijiji (an online classifieds site).
With Alberta’s push to replace coal power plants with renewables and natural gas plants—and, on a larger scale, heat homes with renewables, charge electric vehicles and move to a greater distributed energy generation model—some serious challenges will need to be addressed.

Even further down the line, the move to a 100% renewable energy grid will take way more effort, and will be virtually the same as being off-grid.

The articles and studies I have read so far seem to focus on generation and high-voltage transmission, average values and computer modelling, but little is being written about the local distribution network.

The local network was designed and built according to historic usage patterns. As an example, a pole-mounted 50kVA (208A) transformer will typically service about 10 Alberta homes. That works out to about 5kVA or less per home (about 21 amps). We typically have 100A services here; we use electric ranges and dryers, and because these are cyclical loads that do not usually operate simultaneously, the local distribution network sizing has worked quite well.

So what happens when we start to add electric heating, EV charging, geothermal heat pumps and the like? What happens when we start to push in power from the consumer’s service and raise the voltage at that point?

Don’t get me wrong: I’m neither opposed to renewables nor going off-grid. I have relied totally on renewable energy for my power needs since 2001 without using any type of backup generation. I’ve done a lot of research in and on my own home and shop; my renewable energy system is among the most complex off-grid systems around, and serves as a testing ground for equipment.

My power system has two independent, standalone systems that are also connected as a microgrid for sharing power. The solar thermal heating system consists of a combination of flat plate collectors, and single- and double-wall evacuated tube collectors. These are integrated with wood-fired and gas-fired boilers, with a control system of my design.

My experience in relying totally on renewable energy for my power requirements gives me certain insights when integrating a large amount of renewables into the present power grid (and the challenges of doing so). I’m also a certified Master Electrician and certified Hydronic Designer; with my boots firmly on the ground, I try to offer realistic and practical information.

### Can 100% renewables realistically serve Alberta?

Let’s look at a typical summer and winter day’s demand in Alberta (based on Alberta Electric System Operator [AESO] data), then consider what would happen were we to add about 4000MW of solar power to the grid. The Blue is the summer loading while the Green is the winter loading.

Note the highest demand is in the winter around suppertime. Solar power does not help during the period of maximum demand, and it forces natural gas generators to back off during solar production. In the winter, flush-mounted residential solar arrays could be snow-covered for weeks, or even months. See Figures 1 and 2.

Figure 3 (courtesy AESO) shows wind generation for December 2015. Note the wind is not “always blowing somewhere”. In fact, for about five consecutive days, there was virtually no wind generation in the entire province! Typically, when renewable energy advocates talk about the price per kWh of renewables and achieving grid parity, the true cost of renewables is not really so low.

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**Figure 1 Summer production for 4000MW of grid-connected solar generation on a bright day.**

**Figure 2 Winter production for 4000MW of grid-connected solar on a bright day.**
addressed. The price quoted is for the actual generation per kilowatt-hour, whereas the true cost would need to include either massive amounts of storage or backup generation so that it could be accurately compared “apples to apples” with conventional generation (which is available on demand).

Additionally, solar power generates most of its power during the summer months when demand is lower, not during peak demand. So the first challenge is to match the load to generation in conjunction with a significant amount of storage. There is going to be a lot of work done on this front, especially in jurisdictions that have a high penetration of renewables.

Braging about Net Zero homes or “no tailpipe emissions” makes for clever headlines, but when we look at the actual operation of Alberta’s grid, we can see that we have a problem. Without significant storage, solar is typically not going to charge an EV when solar power is available, especially in the winter.

(For example, I built an off-grid charging system for a customer who wanted to drive an electric vehicle that is exclusively solar-powered, and be able to say that no power company was involved in generating or transmitting the power. In the end, the cost of the PV system far exceeded the cost of the vehicle itself and, with the cold winters we get here, his driving range is considerably reduced.)

Consider that, in most cases, an EV will be plugged in when the driver gets home, which is around suppertime and the time of highest demand. Next, look at a Net Zero home with electric heating. Now picture this scenario during an Alberta winter, when there may be weeks of cold, overcast weather and minimal solar power generation. Those customers are going to require massive amounts of energy when it is least available. Wind would be more effective in the winter, but it is still variable, and we may experience several days without it.

So, as we look at the effects these various items would have on the local distribution network, let’s consider Figure 4. We normally heat with natural gas here; were we to heat electrically with renewable energy via the grid, we would see some interesting results. (These are real numbers based on a couple of homes here in Didsbury from this past December, which was warmer overall.)

- My household consumes about 1/3 the electricity of the average Calgary household.
- 1/3 of a charge for a Tesla consumes about 1.5x the average.
- Heating a home takes about 6x the average Calgary consumption.

A customer of mine drives a Tesla, and he uses about 1/3 of a charge for his daily commute. His EV wall charger has the capacity to draw 80 amps at 240V.

He mentioned he had to dial down the charger for it to work properly.

Being out on a rural site, he has his own dedicated upgraded transformer rated at 10kVA (41.7A), which supplies his house and outbuildings, as well as the EV charger. The standard 240V, 50A Tesla charger still draws 40 amps so, with the normal house loads, the standard 100A service may have issues, and the local distribution network could easily become overloaded. (In his case, the transformer was definitely overloaded.)
York University’s Bergeron Centre rises up in the middle of the Toronto campus, its mathematical Penrose pattern of metal, dichromatic triangles and trapezoidal windows glinting in the sun. It doesn’t follow any particular shape, seeming to hover above its geometrically groomed landscape, scoping out the nearby pond.

Not bad for a structure that was supposed to model a cloud.

Part of the Lassonde School of Engineering, the Bergeron is the “first building of its kind purely for engineers,” says Svetan Veliov, the senior electrical engineer with Arup, the design and consulting firm involved in the 169,500-sf project.

The building was designed by Toronto’s ZAS Architects+Interiors and built by UK-based construction firm Laing O’Rourke, in partnership with Gillam Group. Symtech Innovations Ltd. (Markham, Ont.) was selected as the design-assist electrical contractor and was responsible for installing systems like the lighting, security, fire alarm, power distribution, integrated cabling and emergency backup.

The $113-million, five-storey centre is home to civil, mechanical and electrical engineering students and was completed on time in September 2015 after just 19 months of construction. The school celebrated its official grand opening this past spring.

“The idea was that students can play with and develop it, too,” Veliov says. “Revit and BIM is a huge part of engineering and it’s still somewhat new—I’ve only been around it for five years and we see it becoming more and more automated.”

Over 50% of energy lost by exhaust air is recovered by air-side economizers

Over 20 types of plugs

BIM strong
“The building wasn’t built for 2017; it was built for 2050,” Veliov notes. He’s referring to the intricate web of systems and data cabling within the walls and floors.

There is about 300 km of copper cabling, and more than half of that is just data, he says.

“Having that much data, that’s new to me. There’s a lot of blue cable here.”

The entire project was developed using BIM (building information modelling) with Revit software, meaning it followed a virtual prototype, or 3-D model, embedded with information such as water pump pressure, materials, costs and job schedules. Symtech then took this model and updated it as information changed (e.g. receptacles changed locations) during the construction stage.

Many of the pipes, cables and systems in the ceiling are left exposed and clearly labelled to encourage questions and cultivate learning for the students, Veliov adds.

“The vision York had was that students would be able to walk around with an iPad, point it at a spot on the wall, and see what is going on behind it in 3-D and real-time through our BIM model,” he says.

(While that application isn’t yet available, campus services is looking into any legal issues with giving students access to something like that, explains Irina Arsenie, the construction project manager with York’s facilities department.)

Beyond toaster plug-ins
“I’d like to say it’s a building that revolves around electrical engineering,” Veliov says, simply because of the hundreds—if not thousands—of pieces of equipment that need power.

“This isn’t just any equipment; this is high-powered stuff. Some of it hasn’t even been made and the university hasn’t even procured it yet. So planning to connect this equipment to a power source was a challenge.” An example of this is the CNC machine in the school’s Mechanical Workshop area.

Moreover, staff wanted to be able to move and use these high-tech tools in different rooms. The solution was installing receptacles in a way to make them adaptable—plug-n-play—so “you can’t make the mistake of taking a wave generator and plugging it into a toaster outlet”.

About 30-40 different types of outlets were installed, like 347V, 208V
Also known as “The Rock” due to its appearance and underground location, Bergeron’s Mechanical Workshop area is a manufacturing lab. The design team says this area posed a particular challenge as the equipment had to be flexible, so it is powered from the ceiling.

The Bergeron Centre features the 10-m high “building within a building” High-Bay Structures Lab. Within you’ll find a 12.5-ton capacity overhead crane and a 1 m-thick floor. Beside the High-Bay Structures Lab is the concrete mixing lab, woodworking lab and instrumentation room.

and 600V. “I think we used every single type of plug they manufacture in this building,” Veliov says.

High-power receptacles that can be multiplied are popular as well, as the school brought in furniture with power bars and data connections already built in. So while there are 4000 outlets built into the centre, there are actually way more.

Room to grow electrically
Bergeron’s humming electrical room stands out in that, unlike many others we’ve seen, there is a large amount of unoccupied space.

“It’s because we’re already thinking ahead to when we expand,” Arsene explains, noting a Site B is about to start the planning process.

“This empty space will be able to fit an entire duplicate of the switchgear [from Schneider Electric] that’s already here,” Veliov adds. “Then, if you lose one side, you have a backup, too.”

Utility tunnels run throughout the entire campus, which is fed by Toronto Hydro through its Keele and Steeles substations. Two high-voltage feeders service the Bergeron Centre from a sub-substation outside Scott Library, which is right next door. Steam from heat generated on campus also travels through the tunnels, which all connect back to an control centre where devices, like breakers, can be remotely controlled. The power factor correction device essentially cleans up the power, Veliov says. “That means if you do have a line loss, this rectifies it, so the building won’t see dips in power.”

The electrical room also features a transformer with a 2000A capacity that takes the power from 13,000V down to 600V.

The day EBMag visited, the building was running at 270A. Occupancy levels were low because school was out, but it was still a hot summer day. “That’s because we’ve also made this building highly energy-efficient,” Arsene says.

Energy is king
Adhering to the Toronto Green Standard, Bergeron boasts two green roofs with native vegetation that doesn’t require irrigation and very little maintenance, Arsene says.

“It’s very cool and looks good but it does so much more,” Veliov adds. “You don’t have the sun heating up your roof and going through the insu-
All stormwater is collected in three retention ponds, which slowly leeches into the ground, Arsene adds. “The sewer system isn’t being overwhelmed, meaning water doesn’t have to be pumped places, saving energy,” Veliov explains.

Additionally, Veliov says all motors are energy efficient and over half boast VFDs, helping them play well into the building automation demand-response system.

The automation system was designed by Arup but put together by Johnston Controls, and consists of motion and carbon sensors, and more. “We walk into a room and the system knows we’re here, so it increases its fresh air intake,” Veliov says. “When you leave a room, the system won’t bring in as much fresh air. But it brings in just enough so that next time someone walks in, it’s not stuffy. It does that by a scheduling feature.”

Taking in fresh air requires a lot of energy, as it needs to be either cooled or heated to 22C at low humidity, he continues. Air-side economizers are “the key to recovering over 50% of the energy that we spit out of the building,” taking the heat or cold from the air going out and transferring it to the air coming in.

And, of course, lighting and IoT (Internet of Things) also has a role to play when it comes to efficiency.

Lighting up the cloud
Skylights—about 2 to 3 metres deep—bring natural light into the underground Mechanical Workshop, which is known as “The Rock”—a nod to the architectural dream of the Bergeron Centre looking like a cloud floating over the rock of Georgian Bay.

LEDs and T5s make up the lighting technologies. All exterior and high-priority areas are LEDs, Veliov says, and T5HOs are predominantly used in the classrooms/learning labs.

But it’s the lighting control system that keeps the smiles on energy usage. “We wanted to do a lighting control system like we’ve never done before,” Veliov says.

The system is 100% self-adapting, controls itself, and conforms to ASHRAE 90.1. “If you walk into the office during the day, the lights won’t turn on. You have to use the switch, and then they turn on 50%. If that’s not enough, touch the switch again to get 100%. 15 minutes after you leave, the lights drop to 50%. Ten minutes after that, they go off.”

In the labs, a Lutron lighting system connects with a Crestron AV system in the cloud, controlled by an iPad. It’s important to note Bergeron has no traditional lecture halls, meaning students can watch lectures online anywhere at any time.

Everything’s on occupancy sensors after-hours; there is no continuous nightlighting, and the corridors only light up when someone is there, Veliov notes. However, the fire alarm—which is also connected to the PA system—automatically turns on every one of these corridor lights when triggered.

Live learning lab
“Our biggest lesson was remembering who we were designing for,” Veliov says. “We get into this rhythm where we were designing for the client but, in the end, we weren’t designing [Bergeron Centre] for the faculty and school; it’s for the students. And as soon as that clicked, it was much easier to pitch what would yield better results for students.”

It was also a project that sparked more input from the younger electrical engineers on the team. They were the ones who recognized some of the newer equipment the school would want connected, Veliov notes, so they knew what power it needed and could suggest ideal locations.

“We don’t approach engineering like engineers. We approach it like total architecture, meaning electrical engineering isn’t the most important thing; mechanical isn’t the most important; not even structural. The most important thing is getting these disciplines to complement and meld with the architecture.”

The Geotechnical Teaching Lab is a bustling room, even in the middle of summer.

Arup’s senior electrical engineer, Svetan Veliov, shows off the Schneider Electric gear in the roomy electrical room.

York University says it wanted to “flip the classroom” at the Bergeron Centre, meaning there are no traditional lecture halls and online learning is supported “anywhere, anytime.”

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Do you work overtime nearly every day to get more sales because you believe the only way to get more profit is by working 10x harder than everyone else? Does it sometimes feel like you’re working for nothing? If you’re just hoping things will change for the better, I have to be blunt… they won’t.

Hoping for profits is a bad strategy.

There are literally dozens of strategies for increasing your profits. In fact, all areas of your business can be improved; it’s just a matter of getting the right knowledge, awareness and skills for that strategy.

When a profit strategy is applied properly, I guarantee you won’t have the same mindset as before. You won’t have to work 10x harder than everyone else because you’ll be able to see the opportunities that have always been right in front of you.

One of the top ways for taking back control of your profits is job costing, which is a very important strategy to implement in your business. Here’s why:

Job costing allows for accurate estimates
Making a profit starts way before your crews step foot on a jobsite; it starts the moment you do an estimate. The best way to provide profitable estimates and to protect yourself is by using previous data to calculate costs on labour, material, subs, equipment rental and any other variable costs that affect your profits.

Historical data also informs you of your losses and gains on previous projects.

When estimating labour rates and hours, make sure you consider the level of project difficulty for your crew, and how much time may be required to look after them onsite. You should also be mindful of indirect costs such as taxes and benefits.

Take your time to provide accurate estimates that help you stay profitable.

Job costing gives you a status update
One of the main purposes of job costing is to create a better schedule so you can manage your crew more effectively. You need to know exactly what the crew is doing on the project: how they start, run and finish a job directly affects your profits.

Download a handy one-page tool called “Maximize Control” to see how well you’re doing at each phase at tinyurl.com/zkl2q7.

Tracking each phase indicates where you are within your quoted budget. A schedule and job cost calculation will also indicate your progress with the project and whether you’re on track (and so you can make adjustments along the way). Make sure you’re tracking the status of the project by creating reports and setting up Red Flag alerts in the system to spot potential issues before they happen.

(The “Maximize Control” tool will give you insights on where to find cracks in your process.)

Job costing gets you more details from the field
Job costing is about creating actual cost categories (e.g. service, lighting, rough-in, etc.). Once created and shared with the crew, the information coming in from the field will be more relevant. The timcards will not just include time in and out, but also what tasks they performed that day.

In addition, those who have access to the budget in the field will also include actual costs to-date information in their invoices, inventory receipts and timecard. This field information will provide you with a better measurement of the actual costs associated with the categories you created.

Job costing will make you profit
It’s all about the details when it comes to job costing. You save money when you stay on top of the profits you want to make on each project. Job costing is especially useful when you are tight on cash because you will be gathering actual costs associated with your project.

This way, you are always aware of how much cash flow you have on-hand, and when you need to bill your clients so your cash doesn’t run out. The ability to predict cash flow and know where the money is going can determine how successful and profitable a project will be to your business.

Where do you learn more?
Job costing allows you to manage your jobs more thoroughly because it provides a complete picture of costs, but the system demands you look into every detail: from labour costs per task to costs per cost category on a job, to the performance of each crew member. The biggest benefit of job costing is that it puts you in the driver’s seat of maximizing your profits.

Electrical Business Magazine knows that your success is their success, so we are conducting an online seminar with me, Andrew Houston, of Profit For Contractors, on August 23, 2016, at 2 pm EST. The goal is to help business owners like you with topics such as job costing and any other areas in your contracting business that need improvement.

During the webinar, I will discuss how to plug the profit leaks in your business, provide insight on how to enhance your team’s efficiency by 50%, and show you how to get back 15 hours/week while increasing sales.

It’s all about giving you the right knowledge, awareness and skills to take your business to the next level.

Sign up at tinyurl.com/glp8nsa.

Andrew Houston is the owner and founder of Profit for Contractors. He has been consulting to trades business owners for nearly a decade, helping them improve their business skills so they can achieve their personal and business goals. A graduate of George Brown College, Andrew achieved Industrial Controls Licensed Electrician as well as Electronics Engineering Technologist. Visit www.profitforcontractors.com.
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“And we’re out of here!” hollered show attendee Ed Wodalski out the window as he took off in the Mitsubishi Fuso Canter E-Cell during the Ride-and-Drive... and not a puff of exhaust in sight.

The development of this all-electric, battery-powered, medium-duty cabover work truck is “well underway”, according to company staff based in Japan; it’s set for release in the Japanese market by 2017, with North America to follow shortly thereafter.

Mitsubishi Fuso Truck of America (www.mitsfuso.com) wrapped up a year of testing this past fall, and reports the E-Cell can generate a 64% savings in operating costs compared to an equivalent diesel-powered vehicle in the same service.

The trials also indicated these vehicles proved “adequate for everyday use in short range delivery and inner city transportation”. The trucks achieved a range of more than 100 km, Fuso says, and a payload of two tonnes.

The truck uses the same cab and frame as Fuso’s FE series, but the frame width has been slightly modified to accommodate the four 390V, 48.8 kWh, air-cooled lithium-ion batteries.

When the accelerator is released, current from the 110kW AC synchronous permanent magnet motor recharges the batteries as the truck drives, explained Fuso engineer Chris Burdett, giving it that extra amount of range.

E-Cell can be charged via:

- Standard 230V, 30A charger, which takes 7 hours to replenish the batteries.
- Proprietary 290V, 100A CHAdeMO 50kW DC quick-charger, which can fully recharge the truck in 1 hr.

Other features include ball-nut type steering with electric-hydraulic power boost and two-stage regenerative braking.

For more, tune into our video at tinyurl.com/hsetseb.

Continues on page 18.
When the pavement stops, the Mercedes-Benz Sprinter 4x4 doesn’t. Mud. Gravel. Sand. The Sprinter 4x4 handles it all. It’s the only van on the road with the ground-biting traction and dirt-churning power you need. The Mercedes-Benz Sprinter 4x4. Let nothing stand between you and your destination. See where it can take you at [Sprinter4x4.ca](http://Sprinter4x4.ca).

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FORD 2017 SUPER DUTY STOKES ENGINE COALS

In stark contrast to the plethora of white chassis models on display throughout the show, one of Ford’s new 2017 Super Duty options made its debut in Cherry Red.

Ford’s John Ruppert announced the 2017 Ford F-Series Super Duty chassis cab has earned a front gross axle weight rating of 7500 lb.

The series shows off a 6.7L power stroke V8 diesel engine, which Ford says increases ratings to 330 hp and 750 lb-ft of torque. That same engine is new for the Ford F-650, F-750 medium-duty truck line, and Ford claims it has a B10 design life that would cover “a round-trip to the moon” (about 804,672 km).

RAM LEANS ALL THE WAY LEFT

Left-side PTO capability on its 4x4s is now available from Ram (previously only available on 4x2 configurations).

“This system will allow a shaft-driven accessory system where we can run multiple devices, like a generator and compressor off the PTO,” said Dave Sowers, head of Ram Commercial. “That eliminates two other gas-powered accessories at the worksite.”

Ram chassis cab trucks offer a 60 hp of PTO output with the 6.7L Cummins or 6.4L Hemi V-8 gas engine while using four-cylinder mode, the company claims.

The truck line boasts 37,500 lb gross combined weight rating (GCWR) and towing capability of 29,600 lb, with a frame built from 50,000 psi steel.

“From an electrical perspective, we have an industry-exclusive vehicle system integration module that will allow the upfitter to tie into our electrical system in a seamless way without splicing,” Sowers said, elaborating on how Ram’s chassis cabs are upfitted “in a great way”.

All configurations of chassis cab can be ordered with a dual fuel tank capacity of 74 gal. 2016 models can be ordered with an optional ParkSense package, which now includes a new front park assist system.

Continued from page 16.
NEMA addresses issues with LED driver replacement

The National Electrical Manufacturers Association (NEMA) has published LSD 74-2016 “Considerations of Field LED Driver Replacement”, which discusses how several aspects must be considered to ensure that the replacement driver will function the same as the original driver. Download it for free at tinyurl.com/jjunxh7.

NEMA
www.nema.org

ABB expands fuse holders

Available in one-, two- and three-pole configurations, ABB’s E90 30A and 60A Class J fuse holder family was designed specifically for the North American industrial market. The product ensures safety during maintenance operations, ABB says, with the capability to be sealed in the closed position and padlocked in the open position.

ABB
www.abb.com

Fluke’s Ti450 with MultiSharp

Fluke says its Ti450 infrared camera takes focus to a new level of clarity with MultiSharp focus. The company says this technology rapidly takes multiple images and combines them to produce one in-focus image, enabling users to capture an automated, focused image of multiple targets at once.

FLUKE
www.fluke.com

Eaton’s Sunnector DC collection

Eaton says its direct current collection system—the Sunnector—includes wire harnesses and combiner boxes designed to support DC strings made with aluminum wire. Sunnector is designed for use with SMW and larger-scale, grid-tied solar PV projects that incorporate fixed-tilt ground-mount racking designs.

EATON
www.eaton.com

GE’s Lentronics JunglePAX

GE’s Grid Solutions has launched Lentronics JunglePAX, a packet switched networking solution designed for utility operations. GE says this solution will help enable the convergence of the many utility communications requirements and reduce cyber vulnerabilities.

GE
gegridsolutions.com

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Answers to this month’s questions in September’s Electrical Business.
Compiled by Ontario’s Electrical Safety Authority
www.esasafe.com

QUESTION 1
While it is permitted to use electrical non-metallic tubing (ENT) underground and in concealed locations, it is not permitted in exposed locations.
a) True  b) False

QUESTION 2
When installing receptacles for dwelling units, the CE Code requires that no point along the floor line of any usable wall space is more than ________ metres horizontally from a receptacle in that or an adjoining space.
a) 1 m  c) 1.8 m  
b) 1.2 m  d) 3.6 m

QUESTION 3
For a mobile home, the minimum length of #6AWG power supply cord measured from the attachment plug to the point of entrance to the unit is:
a) 4 m  c) 6 m  
b) 5 m  d) 7.5 m

ANSWERS
Electrical Business, July 2016

Question 1
Where the DC arc fault protection is not located at the photovoltaic module, mechanical protection is required for PV source circuit conductors installed on or above buildings to protect against rodent damage.
a) True. Rule 64-210(5).

Question 2
In buildings for residential occupancy, two or more heating fixtures are permitted to be connected to a branch circuit used for space heating, provided that the branch circuit overcurrent devices are rated not more than ________
c) 30A. Rule 62-114(2).

Question 3
When installed receptacles of configuration 5-20RA are exposed to the weather and facing downward (at an angle of 45 degrees or less from the horizontal), cover plates marked “Wet Location Only When Cover Closed” are required.
a) True. Rule 26-702(3).

How did you do? 3  •  Master Electrician 2  •  Journeyman 1  •  Apprentice 0  •  Plumber???
MEET CANADA’S 2016 ELECTRICAL SAFETY CHAMPIONS

P.10

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The building code defines a vapour barrier as “the elements installed to control the diffusion of water vapour”. Did you notice it says “control” not “eliminate”? C22.1-15 Rule 12-1414 now requires a bond wire in EMT when installed in concrete or masonry slabs that are in direct contact with the earth, or wet or outdoor locations.

When a vapour barrier is installed on a wall, it allows the diffusion of water vapour through the interior finish. So when a vapour barrier is installed below a concrete slab, does it mean the concrete is no longer interpreted as in direct contact with moist earth? Well, the vapour barrier is diffusing water vapour into or through the concrete; I interpret this as concrete being in direct contact with the earth.

Vapour barrier installation changes over the years, addressing questions around sealing, cutting and bleeding, and whether the aggregate will remain wet, therefore keeping the location wet. (With regard to the latter, an advantage with a completely sealed vapour barrier is a slower curing time.) Current thinking holds that concrete should be placed directly on a sealed vapour barrier. Now, we need to remember what we read earlier: the barrier controls the diffusion of moisture, but does not eliminate it. Therefore, a concrete slab should be considered in direct contact with the earth, regardless of a vapour barrier. This location requires a bond conductor, as this is a damp location and may be somewhat corrosive.

With this information, we can determine the type of conductor required when pulled into a conduit, installed in a concrete slab (with vapour barrier) in direct contact with the earth. Rule 4-008 tells us conductors shall be of a type (as per Table 19) for the specific condition of use, such as moisture, corrosion, temperature, type of raceway, exposure to mechanical damage, and harmful vapours or organic solvents that may contact the conductors.

Rule 12-1404 was added to define the restrictions on EMT, clarifying its use in a corrosive location. Note, Table 8 still specifies the maximum fill percentage for each raceway, and Rule 12-910 clearly explains the methods for calculating the conduit fill. Rule 12-910 directs us to Tables 9A-9J for each raceway type, and to Tables 10A-10D for single conductor dimensions. Other than the extra tables for each varying type of raceway (and the addition of a table for solid conductors and DLO cables), the math is the same.

Always consult your AHJ for more specific interpretations.

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.
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