

A Whole New World

The future is bright for electrical and communication systems

by NATALIE BRUCKNER

Like so many industries, the electrical and communications sector is becoming more connected, automated, and efficient. 2019 saw various technologies begin to have a larger role in the industry such as robotics and automation technologies, the smart grid, and of course the Internet of Things (IoT), which saw a network of devices connected to the internet exchanging data.

The sector is also seeing rapid integration, so whether it's utility and building generation power input sources, energy management, communications, or building automation, these days you can't talk about one without the other. But there are other changes happening in the sector that is putting electrical systems in particular on the map as one solution to meeting our future energy needs.

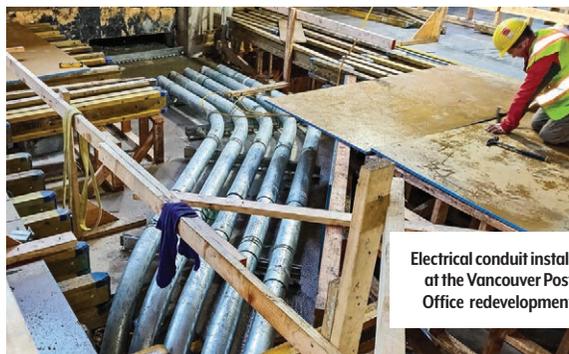
Derek Fettback, district manager at Western Pacific Enterprises Ltd., says one of the biggest changes he is seeing in the electrical industry is the use of 3D modelling. Revit, for example, is quickly becoming more desirable in the electrical realm as projects become more complex. It helps engineers and contractors quickly check the electrical design of a building for things like clash detection, as well as circuit loading to check breaker size, wire size, and load classification with all the information exactly as it is currently modelled.

"We are currently working on a project that has an extremely complicated bridge structure and one of our drafters is modelling out what it will look like to put our conduits through the structure, and if it will indeed fit," explains Fettback.

In fact the value that electrical contractors bring to a project is demonstrated by the fact that an increasing number of owners and general contractors are bringing electrical experts to the table earlier on. "It is a chance to point out and address issues before they actually become issues," says Fettback.

One state-of-the-art project that Western Pacific Enterprises Ltd. is currently working on is the Vancouver Post Office redevelopment with PCL. By working closely together earlier on they are able to streamline parts of the design, thereby saving the owner money and simplifying the installation methods.

As for what to expect this year, Fettback says that the popularity of smart buildings and integrated systems will continue to grow, while challenges with electric vehicle (EV) installation and in particular retrofits will continue as that market grows.



Electrical conduit install at the Vancouver Post Office redevelopment.

Over at Houle, one of the main changes they are seeing is the increasing demand on energy from buildings. This is resulting in a greater proportion of a total building's cost being set aside for electrical systems.

"As buildings become smarter they require more controls, more systems, and essentially more integration. B.C. is on the adoption curve for integrated buildings, which are becoming standard in the commercial world. Another factor affecting electrical is the rising demand for EV charger provisions," explains Jonathan Lashin, director – estimating at Houle.

The team at Houle is excited about the increasing focus on energy efficiency, the role that electrical has to play, and the positive impact it is having on the environment. "Sensors and building controls, as an example, are being used to help manage energy use with everything from lighting to climate," says Lashin.

One project that Houle is working on that showcases this is the Clayton Community Centre in Surrey that uses state-of-the-art electrical systems to help maximize energy efficiency and protect the natural ecosystems. "This will be one of the first community centres in North America to achieve Passive House certification and we are proud to be bringing all our specializations together for one Houle delivery," says Lashin.

As an industry leader, Houle has made it their mission to provide the best in integrated services for their customers. With teams specializing in electrical, security and life safety, networks systems, building automation controls, audio visual, communication, power quality, and 24/7 video monitoring, Houle works together as a team to serve the custom needs of its clients.

Michael Ablang, principal engineer, electrical at Williams Engineering agrees that one of the biggest changes affecting the industry right now is the growth of the EV charging infrastructure. "One of our



Modern building control systems maximize energy efficiency.

biggest concerns currently is the prevalence of EVs and the requirement by certain cities to have 100 per cent of all parking spaces for residential units capable of handling electric vehicle chargers," says Ablang.

While the number of EVs and plug-in hybrid electric vehicles (HEVs) is, at present, low compared to internal combustion engine vehicles (2.5 per cent of all vehicles sold in Canada), the switch-over is accelerating and the International Energy Agency outlook predicts there will be 130 million EVs on the road by 2030.

To meet the demand, in 2018 the City of Vancouver updated the Building Code Bylaw 10908 to increase the percentage of EV-ready stalls in new multi-unit residential buildings from 20 per cent to 100 per cent, and other municipalities are rapidly following suit.

"This poses challenges for electrical designers because these chargers require quite a bit of power, especially when we are talking about high-rise residential towers. The load that these chargers impose on the electrical system means we need to provide larger unit substations and in Vancouver, where real estate is expensive, we have a hard time locating space to accommodate this," says Ablang. Williams is working closely with BC Hydro and FortisBC to ensure these newbuilds have the capacity to provide the necessary power.

Looking ahead, Ablang is excited about this shift, as well as the shift away from natural gas to electric, but says the challenge will continue to be meeting demand, while balancing costs. "It comes down to how much owners can invest in sustainability and how much the end-users are willing to shoulder," he says. "It's an ongoing education."

At BC Hydro, one of the most significant trends the experts are seeing is the growth and impact of the group of technologies collectively referred to as distributed energy resources (DERs). "These include technologies that customers can use to generate their own electricity, like solar photovoltaic and wind. It also includes energy storage technologies, like batteries, flywheels, hydrogen fuel cells, and active [for example phase change] and passive [for example water heaters] thermal storage," says BC Hydro program manager Graham Henderson.

The challenge of storage is growing in importance due to the intermittent energy generating characteristics of renewable resources like solar and wind. Henderson adds that DERs are fundamentally changing the nature of the century-old utility business model in some jurisdictions, as

“prosumers” (customers that both produce and consume electricity) provide significant contributions of distributed generation, and the resulting drop in utility revenue poses a challenge to the traditional rate-based revenue stream for utilities who are still responsible for managing the safety and reliability of the electrical grid.

As for initiatives and programs, BC Hydro has a number of which to choose from. Aside from the electricity conservation programs and programs that help improve building operations, they are also supporting the Provincial Government’s CleanBC initiative to reduce greenhouse gas emissions. “In the commercial sector the program supports various offers targeting existing buildings, new construction and through transportation by installing chargers to support infrastructure to convert to electric vehicles,” says Oscar Ceron, manager of BC Hydro’s Power Smart New Construction Program.

As previously mentioned, there are a number of challenges ahead when it comes to the EV chargers, but as of September 26, 2019, there has been a EV Charger Rebate Program available in B.C. “Funded by the Ministry of Energy, Mines and Petroleum Resources and administered by BC Hydro and FortisBC, the CleanBC EV Charger Rebate Program provides rebates towards the cost of the purchase and installation of eligible Level 2 chargers for single-family homes, condos, and workplaces seeking solutions for their EV charging needs,” explains Reid Arkinstall, program manager at BC Hydro.

Looking ahead, BC Hydro is excited about the developments happening in the electrical realm

and is developing a strategy for the commercial sector to better understand the role buildings can play in supporting the grid of the future in terms of flexibility and sustainability. “The initiative is dubbed ‘Grid-interactive Efficient Buildings,’ and is primarily being supported by the US DOE. It is still in the early days, but questions are being asked regarding the appropriate mix of technologies that will meet the needs of the grid as well as contribute to cost-effective building operations,” says Henderson.

Of course, with the increasing power demands there are understandably concerns over the additional strain on the grid. Rather than take a “wait and see” attitude, the Independent Electricity System Operator (IESO) is launching Ontario’s first ever local electricity market in the York Region, with support from Alectra Utilities and Natural Resources Canada. The demonstration project is looking to both save costs and find affordable alternatives to building new transmission infrastructure.

“Over the past decade we’ve seen the challenges and opportunities from small-scale generation. The IESO’s Save on Energy programs for example have seen commercial building owners and operators putting in systems to reduce their energy demand. We also have a number of community-scale resources [about 4,000 megawatts] that went in under past procurement programs. We wondered how we can leverage these resources to better solve some of the challenges we are seeing for regional electricity planning and unlock these community assets as more cost-effective alternatives than a traditional transmission line,” explains Katherine Sparkes, director

of innovation, research and development, who has been involved in the pilot project from the start.

The York Region is one of the fastest growing regions in Ontario and is expected to grow and exceed system capability in the next 10 years. “We saw this emerging need and realized this would be a great chance to see how we could provide affordable alternatives,” explains Sparkes.

The big challenge of the project will be to figure out how to procure the local resources to meet peak demand. To solve this, the IESO has been looking at local capacity auctions. The other challenge, according to Sparkes, is how to operate these resources to meet wholesale and local system needs. “If I’m a building owner, for example, and I want to participate in both the local and wholesale market, I need to know that the local and wholesale grid operators have protocols in place to co-ordinate their use of my asset at a certain time to ensure I can meet the needs of both markets,” explains Sparkes.

The IESO is planning to release two White Papers over the next few weeks that will explore the various options for creation of the local market – including eligibility for asset owners who would want to participate in the market.

The first auction is expected to be held later this year with another to be held in 2021, and if they are a success, more will be sure to follow. “There is a huge potential here to avoid investment in more costly infrastructure. We can also leverage technologies that owners are already using, while they take a more active role in a providing a cost-effective local electricity solution. It’s very exciting,” says Sparkes. **A**

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