

Grid works

by Melanie Collison

Intelligent technology to monitor power systems

WHAT A DIFFERENCE a year makes. Shortly after the massive blackout in August 2003, when food was rotting in Torontonians' home freezers and awed New Yorkers were gazing at constellations in the night sky, the telephone was ringing off the hook at Powertech Labs in Surrey, BC.

Utilities anxious to avoid a repeat of the disaster called Powertech to learn more, when they heard the subsidiary of BC Hydro was developing some intelligent software to monitor power system security from moment to moment.

But inevitably the urgency generated by a crisis fades and day-to-day concerns return to centre stage. "At the time of the blackout, people were calling, but now they are busy with other things," says Ali Moshref, Powertech's principal engineer on the POSSIT project, a \$150-million, two-year collaboration of researchers from Powertech Labs Inc. (the research and technology arm of BC Hydro), IREQ (the research wing of Hydro-Québec) in Varennes, Québec, the Alberta Research Council in Calgary, and the University of British Columbia in Vancouver.

POSSIT, an acronym for Power System Security using Intelligent Technology, is an intelligent system prototype developed to monitor the transient stability of a power distribution system in real time to warn operators of any impending overload.

Incubated in a Canadian technology think tank, Precarn Inc., the project was released as a prototype on the heels of the blackout. It was touted as technology that could have prevented – or at least reduced the impact of – the blackout, had it been installed in the various affected utilities. "What they've come up with is a breakthrough, an online intelligent system that ... allows electricity systems to operate

securely closer to their limits, and helps avert power failures," Precarn said in a September 2003 media release.

Ottawa-based Precarn Inc. is a not-for-profit national consortium of corporations, research institutes and government partners supporting the development of robotics and intelligent systems, with a boost from Industry Canada. Intelligent systems are technologies that enable machines and devices to deal with complex and unpredictable environments by mimicking the human ability to perceive, reason, make decisions and act.

POSSIT "gives you much more time to isolate the system and take corrective action before you have a brownout or blackout. There's not so much delay in isolating [your grid] from a system that has broken down," says Anthony Eyton, president and CEO of Precarn. "To this point, operators of transmission grids have to take data off-line to analyze it and there's a delay factor." POSSIT, Eyton says, was "at the prototype stage, which is where we take [projects] to, at about the time the blackout occurred."

Precarn hands a prototype off to the principal company involved in the development partnership to refine and commercialize it, in this case Powertech Labs. Now it's up to Powertech's parent company, BC Hydro, to invest in POSSIT and generate the political will to exploit any opportunities.

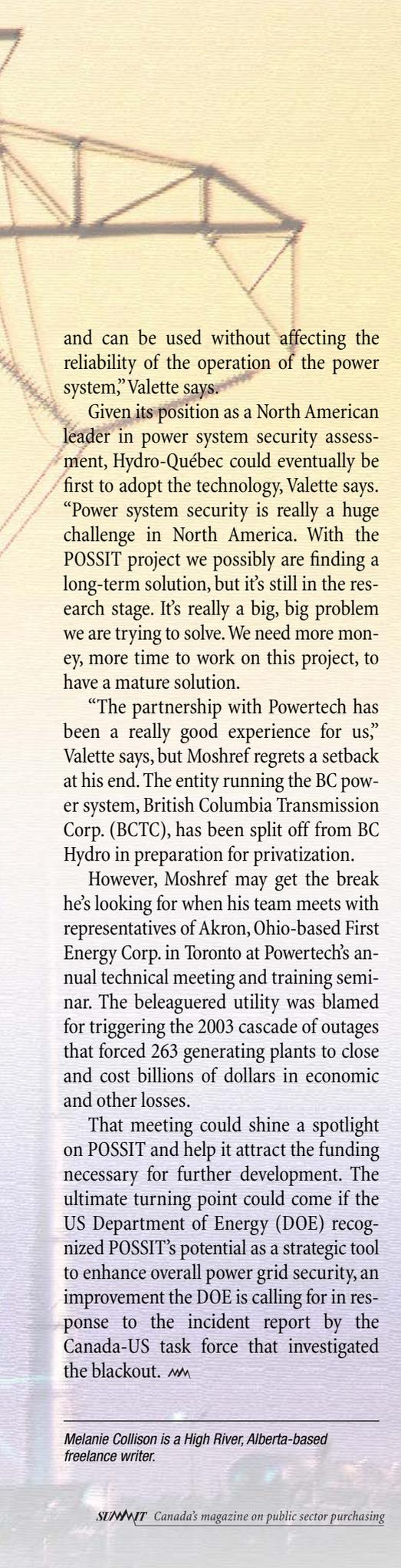
Moshref would like to see a utility step forward as sponsor to move POSSIT from prototype to commercial product. "We are talking, but it takes a long time." It is a major hurdle that, "The engineers in planning have the time [to assess the software but] the operators in the control centre of an electrical utility are busy running the system. The people who use this product have a high level of responsibility – two, three

or four million customers. They don't want to get distracted. It would be different if I had hardware people could see. People have to experiment with computer software before they put it in the system."

"A power system is a very complex thing, not easy to manage or understand," says Alain Valette, research engineer in the power system analysis and control division of the Institut de recherche d'Hydro-Québec, and closely involved in POSSIT development.

"What we have is a proof of concept. It's a new technology. We are trying, with intelligent systems, to define secure operating limits. [But] when we talk about security we need to be very careful. We don't want to change the way operators do things. You have to prove [reliability] to them if you want to use intelligent systems; prove that it will be secure and you will not have a power blackout." He points out there is no room for error.

Valette's personal assessment is that it could take another five years to move POSSIT to commercial acceptance. His team is working towards a demonstration for Hydro-Québec, but he cautions that introducing an intelligent system into a control centre would have to be very gradual. "A security assessment involves a lot of people. You always have to have continuity in the way people operate. You add some features, and gradually put more and more intelligent systems into the way they operate. You cannot change quickly. Regulatory authorities in the US [who control the way power systems operate] say you have to demonstrate that you can operate a real network with such a system." Such proof would require using the new technology in parallel with existing practices for a period for validation. "You must convince people it is mature as a technology



and can be used without affecting the reliability of the operation of the power system," Valette says.

Given its position as a North American leader in power system security assessment, Hydro-Québec could eventually be first to adopt the technology, Valette says. "Power system security is really a huge challenge in North America. With the POSSIT project we possibly are finding a long-term solution, but it's still in the research stage. It's really a big, big problem we are trying to solve. We need more money, more time to work on this project, to have a mature solution.

"The partnership with Powertech has been a really good experience for us," Valette says, but Moshref regrets a setback at his end. The entity running the BC power system, British Columbia Transmission Corp. (BCTC), has been split off from BC Hydro in preparation for privatization.

However, Moshref may get the break he's looking for when his team meets with representatives of Akron, Ohio-based First Energy Corp. in Toronto at Powertech's annual technical meeting and training seminar. The beleaguered utility was blamed for triggering the 2003 cascade of outages that forced 263 generating plants to close and cost billions of dollars in economic and other losses.

That meeting could shine a spotlight on POSSIT and help it attract the funding necessary for further development. The ultimate turning point could come if the US Department of Energy (DOE) recognized POSSIT's potential as a strategic tool to enhance overall power grid security, an improvement the DOE is calling for in response to the incident report by the Canada-US task force that investigated the blackout. ❧

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