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excerpt:

Industry Buzz: Centennial College and REGEN Energy Inc. Use ‘Swarm Logic’ to Achieve Power and Cost Savings for Ontario Businesses

What would the average homeowner do if the household hydro bill were \$80,000 per month, with “demand charges”—charges for use of electricity during peak periods—accounting for about half the bill? Probably turn out the lights, turn down the heat, and hide under the covers.

“This kind of bill isn’t uncommon for a commercial building,” says Herb Sinnock, Manager of Centennial College’s Energy Institute, “in part because commercial operations have particular obligations to keep their processes or machinery operating and their employees comfortable year round.” Businesses consume a lot of electricity and want to find sustainable ways to reduce both their consumption and their costs—effectively, many want out of the peak-usage business.

Since 2007, Sinnock and his student team have been working with a new Toronto start-up, REGEN Energy Inc., to do just that. The Ontario Centres of Excellence (OCE) has funded their collaboration, with REGEN and Centennial contributing expertise and resources.

It was OCE that originally connected the two partners. The agency determined that Sinnock's expertise in integrating energy technologies into urban infrastructure would mesh with REGEN's goal of testing its prototype electricity load-management device, now patent-pending under the name EnviroGrid.

The partners began by choosing a pilot site, the Canadian Federation of Independent Business, which was interested in trying the novel controller technology. REGEN installed its small, lightweight electronic device, one each, on the building's baseboard heaters. Based on an algorithm developed by REGEN, the controllers communicate wirelessly with each other, without the need for a central command unit to network them. REGEN calls this process "swarm logic." The controllers are akin to worker bees that monitor how often each unit is running, how often each needs to run, and what combination of operating schedules the controllers can set to result in the lowest power usage.

Centennial's role in this first pilot installation was to verify REGEN's predictions of cost savings and to validate the controllers' functionality. The college team developed a baseline mathematical model that accounted for environmental factors affecting the building's heat use, such as wind and temperature, and that recreated the existing running cycles of the CFIB heating units.

Sinnock and his team then integrated the heaters' operating cycles with the controller devices' signals and analyzed the controllers' ability to regulate and disperse the power demand across the various heating units. "Data analysis showed conclusively," says Sinnock, "that the REGEN controllers' decisions save energy and money when attached to resistive heating loads, like baseboard heaters." In the case of the CFIB building, savings on the organization's electricity bill could range from 25 to 50 percent monthly, (seasonally adjusted)...