

Seniors' home the first to use cogen for backup and regular supply

by **Stephen Kishewitsch**

"In just a few moments," OZZ Corp. President and CEO Steven Muzzo says, "the controller will disconnect the building from the grid and drop all but the emergency building loads, the engine will start up, and the controller will begin taking up the loads again." And when he presses a key on his laptop all the lights go off, then within seconds begin coming on again, as on the overhead projection screen a steadily rising green graph from the system control software shows the building's own power unit smoothly taking up the load.

The demonstration took place before a crowd of dignitaries at the brand-new Villa Colombo Vaughan, a long-term care facility on Highway 27 just north of Toronto, where the province's first natural-gas-powered emergency backup generator has been installed. In addition to generating a lot of local excitement, the installation represents a number of breakthroughs. It is the first time in Canada that a long-term care facility has been powered by cogeneration. It is also the first time that any facility in Canada has relied on cogeneration to meet its legal requirements for emergency backup power. And it is the first time that a set of new regulations establishing the technical requirements for such backup power have been put into practice. (See "CSA allows natural gas for standby power," in IPPSO FACTO, January 2006, page 32, for details of the new regulations.)

Support for the project seems to be almost universal. Prominent figures at the opening ceremony included the Mayor of Vaughan, the Deputy Minister of Energy, representatives of the federal government, local power distributors, the gas utility, Ontario's Chief Energy Conservation Officer, and several local councilors. Michael Di Biase, the mayor of Vaughan, delivered a speech in which he stressed the City's hopes to establish a reputation for environmental leadership with projects of this nature. He said that "Vaughan has more green buildings than any other city in North America."

Being rated for continuous operation, this unit can

strated." Brooks noted that "Although we have worked together on many occasions, this letter to Minister Duncan represents the first time that these four organizations have formally enunciated a common position."



Cutting the ribbon at Villa Colombo: (Left to right) Villa Colombo Vaughan Chair, Sam Ciccolini; Villa Colombo Vaughan Construction Committee Chair, Jim DeGasperi; Villa Charities Vice-Chair, Nina Perfetto; Villa Colombo Vaughan Fundraising Committee Chair, Fred DeGasperi; Deputy Minister, Ontario Ministry of Energy, James Gillis; OZZ Corporation CEO, Steven Muzzo; Chief Energy Conservation Officer, Conservation Bureau, Peter Love; and Mayor of the City of Vaughan, Michael Di Biase.

run steadily, unlike backup diesel generators of the past, which generally sit idle waiting for the infrequent electricity supply outage. Operating at thermal efficiencies as high as 88.3%, the 335-kW, natural gas-fired GE Jenbacher reciprocating engine-generator set will supply space heating, domestic hot water, and electricity for the facility. If the unit happens to be operating during a grid power outage, the supply of power to life safety emergency loads will not be interrupted. Once stabilized on these emergency loads, an innovative OZZ-designed Load

Shed Control System will begin to add other building loads, on a predetermined priority basis, close to the maximum capacity of the genset. Thereafter it will maintain the supply of power to priority loads, all the while ensuring the generator is not overloaded, by shedding/adding loads. When grid power returns the system automatically resynchronizes with utility power and returns to parallel generation operation. If the system is not operating when a grid power supply outage occurs, the genset will start up and supply power to emergency loads within 15 seconds as required by code, and then as before, it will add other loads.



The control system takes over the load, in order of priority.

The project is the first child of a revised regulatory standard, adopted only a few months ago by the Ontario Building Code. Previously, backup generators – which are mandated for large buildings – had to have a minimum of two hours of on-site fuel storage. This effectively meant diesel, since very few wanted or could afford to have the equipment that was then required for that kind of natural gas or propane storage. Beginning with the revised CSA-C282-05, the National Standard for Emergency Electrical Power Supply for Buildings, and then its acceptance into Ontario codes, that obstacle has been removed. It is now permissible for natural-gas fired engines, running on utility-supplied natural gas, to operate as emergency generators.

Seniors' home uses cogen for backup *Cont.)*

Design and installation of Villa Colombo Vaughan's new "Combined Heat and Emergency Power" (CHeP) system was provided by OZZ Corporation, an energy technology and service company based in Concord, Ontario. Senior Energy Engineer Vito Casola explains that incorporating a factory-packaged pre-engineered cogeneration module, which recovers high temperature hot water from the engine's oil and jacket-water cooling systems and combines this with heat from the engine's exhaust, offered special advantages. It allowed them to integrate the system's thermal energy into a single interconnection point within the building's hot water heating system, where it can then be used for space heating or for making domestic hot water via a heat exchanger.

The control system is a marvel of system intelligence. To maximize system use without getting into the additional complications of exporting power to the local grid, the controller keeps the system's output at 5 kW less than the building's total demand, so the building is always drawing some power from the grid. If the system has to take over load from the grid, it knows which loads in the building are most important and will supply them first. OZZ will be able to monitor and control the system remotely from their offices through an internet connection, and will also monitor prices in real time, so that if wholesale prices begin to climb, it can run the system at higher electrical outputs to displace more of the grid-supplied power.

This kind of project is exactly what efficiency advocates have been calling for. Capturing the waste heat from a power plant and putting it to useful work, for the same amount of fuel burned, is such an obvious thing to do the idea should sell itself. It throws less climate-changing carbon dioxide into the atmosphere for a given amount of useful work. Using natural gas rather than diesel fuel produces an exhaust with next to no acid-rain-causing sulphur dioxide or lung-clogging particulates. Furthermore, scattering self-generated power all over the grid not only saves on having to string more wires and build more transformer stations to meet the demands of our ever-expanding cities and suburbs, but also eliminates the losses of power that occur in transmission and distribution of electricity from central generation stations. In fact, having electricity generation distributed around the grid in this way can help support grid voltage and power quality, especially near the end of a distribution line.

Public support for the project is in stark contrast to the reaction to a proposed combined cycle gas-fired power plant in the same city of Vaughan, scarcely more than a year ago. As

reported in this magazine in April of 2005, public opposition was so vociferous to that power plant proposal that no political leader seemed prepared to defend it, even though it is the same city, the same politicians, and the same fuel. Clearly small-scale cogeneration has some advantages in terms of public acceptance.



Senior Energy Engineer Vito Casola points out features of the GE Jenbacher natural gas engine-generator set at Villa Colombo Vaughan.

So have the doors for high-efficiency, low-polluting, transmission-reducing, grid-supporting distributed generation been flung wide? Well, not exactly.

An installation like this is relatively easy to justify for a new building such as Villa Colombo Vaughan, as it must install an emergency generator anyway. An old building whose generator or hot water boiler needs replacement would be in a similar position. A cogen unit will run at efficiencies in the high eighties, not far

from the rating of a modern gas water heater, and it will produce electricity as well. In fact OZZ's next project is a retrofit, a high-rise complex northeast of downtown Toronto that will become a mini-district energy system, with a tunnel connecting two buildings allowing heat from the cogen unit to be supplied to both. OZZ Corp. is about to, or by the time of publication will have signed its next contract, one of three similar projects for Toronto Community Housing Corporation. But even so, as OZZ Corp. officials acknowledge, the Vaughan and subsequent projects would not have been possible without major contributions from Natural Resources Canada, Enbridge Gas Distribution, and PowerStream, the local electricity distribution company. A total of \$1 million has been budgeted for Villa Colombo Vaughan and three other projects, with the money to be paid back gradually. As it was the first, Villa Colombo Vaughan received the largest contribution.

PowerStream, the fourth largest electricity distribution company in Ontario, provides service to more than 225,000 customers in Vaughan, Richmond Hill, Markham and Aurora.

Villa Colombo Vaughan is the latest project of Villa Charities, an organization that has been delivering culturally sensitive services to seniors, to individuals with developmental disabilities, and to the general community via sports and cultural arts programs for over 30 years. As Sam Ciccolini, the Chair of Villa Colombo Vaughan, noted at the ceremony, the organization operates "in honour of the pioneer immigrants who made Canada their home." Many of them likely feel that with this latest development, they have truly arrived.

Who says senior citizens aren't ready to try new things?

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