



Energy Innovators Initiative Energy Innovators Case Study

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*Paul Sander
Chief Executive Officer
Hollyburn Properties Ltd.*

HOLLYBURN PROPERTIES: HIGHRISE ENERGY EFFICIENCY

Energy savings that hit home

“It’s a big challenge to upgrade an apartment building that was built in the 1960s to perform at 21st century expectations,” says Paul Sander, the Chief Executive Officer of Hollyburn Properties Ltd., which owns and manages an extensive portfolio of residential apartment buildings in Vancouver, Calgary and Toronto.

Improving energy efficiency is an important goal for Mr. Sander.

“At Hollyburn Properties, we believe that the survival of an apartment building is dependent upon its intelligent evolution; for in the concrete jungle, only the smartest buildings will survive,” he says.

Mr. Sander continues his analogy by comparing his apartment buildings with an animal whose skin can withstand a wide range of temperatures, from 40°C to -40°C. Despite the range in outside temperature, the building can maintain a balmy, well-lit, well-vented and comfortable 22°C atmosphere year-round.

The building consumes gas, water and electricity and produces hot exhaust gases, recyclables, garbage and sewage. Over the years, the building has grown, expanding its control system and reducing its intake of natural resources – which helps improve its efficiency.

Much of Mr. Sander’s expertise in energy efficiency has been gained through experience in the day-to-day maintenance of these buildings. His business has been family-owned and operated since his father started it in 1972.



Hendry House



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Recently, to make his buildings as energy efficient as possible, Mr. Sander embarked on a series of retrofits with assistance from the Energy Innovators Initiative (EII) of Natural Resources Canada's Office of Energy Efficiency. The EII works with commercial businesses and public institutions to increase energy efficiency and reduce greenhouse gas (GHG) emissions that contribute to climate change. Hollyburn Properties joined the EII in November 2001.

These retrofits were part of a \$1-million pilot project, including incentive funding provided by the EII, that consisted of upgrading the lighting, boilers and boiler piping and installing direct digital controls in six of its buildings. The pilot project is on track to result in energy savings of between 8 and 15 percent. Given the success of the pilot project, Hollyburn Properties plans to start replicating these upgrades in the rest of its apartment buildings starting in spring 2004.

The challenge of residential highrises

Hollyburn Properties' portfolio consists of urban concrete highrise buildings built in the 1960s. Originally fitted with oversized boilers and energy-devouring elevators, these buildings have presented Mr. Sander with numerous energy efficiency challenges. But if the buildings are fitted with energy-efficient systems and are properly maintained, highrises can provide a comfortable and energy-efficient home for their many residents.

"I've taken the time to study all the systems and their components to develop the best systems," says Mr. Sander, who once worked as a sound engineer for stadium rock shows. "I've worked my way through all the science. Our buildings are being engineered to the nth degree to provide the most efficient service."

Mr. Sander uses common sense to work out a number of energy-saving solutions. For example, faced with complaints about cold temperatures in the top-floor apartments of some buildings, he tried options such as adding auxiliary heaters before realizing that the ceilings were freezing cold. Adding two inches of rigid insulation to the roof membrane solved the problem.

"I discovered, through trial and error, that to keep the top floor warm, we had to add insulation, not crank the boiler unnecessarily," Mr. Sander explains.

Around the same time, Mr. Sander realized that cold air from outside the building was being transferred through the exposed concrete slabs into ground-floor suites as well.

"It was the same problem, just upside down. The tenants all had their thermostats pinned to maximum, but they were still cold," Mr. Sander says. To warm up the rooms and save energy, he had a valence box built around the outside of the concrete slabs to hold new insulation.

Elevating energy savings

Hollyburn Properties has also managed to reduce energy use by upgrading elevators in its apartments. Elevators can account for up to 9 percent of a highrise building's energy use. Recently, the company invested more than \$1.5 million in elevator retrofits, spending from \$100,000 to \$150,000 per elevator to upgrade them with variable frequency drives (VFDs).

"One of the most expensive mechanical systems in a building is the elevator room," says Mr. Sander. "By eliminating the generator and using a VFD system, the cost of running our elevators has dropped from \$200 per month to \$65 per month."

Hollyburn also installed elevator control systems that optimize energy consumption while reducing response and travel time. "An intelligent elevator system places the cabs where they need to be, so there's less running up and down," Mr. Sander says. That means less energy use and less wear and tear on the elevators.

Direct digital controls

Installing direct digital controls (DDCs) has helped Hollyburn Properties control energy costs and make its apartments more comfortable. In terms of Mr. Sander's animal analogy, DDC systems are akin to the brains of the animal, controlling the fire, elevator, heat and hot-water systems, as well as the ventilation, air conditioning, lighting, entry security, meter reading and even the garden sprinklers.



Old furnace system at Central Plaza



New furnace system at Central Plaza

The controls help diagnose problems and system inefficiencies, with the help of a trend log that keeps track of energy use.

“Using DDCs, we are able to monitor all aspects of our heating and domestic hot-water equipment,” says Mr. Sander. “This allows us to match the load requirements for the heat and hot water needed by each individual building.”

Old boiler systems offer little flexibility to manage the heating system, other than to turn it on or off.

“DDCs help modern boiler systems improve building performance and ensure that the boiler equipment is maintained at ideal operating conditions while reducing energy consumption,” says Mr. Sander.

Controls are used to optimize energy use, depending on the needs of the people living in the buildings. Frequently, hot-water use spikes in the morning when people wake up, and then again around dinnertime. But this pattern can change depending on who lives in a building. For example, if a building is home to many shift workers from a nearby hospital, the load might actually be lower around dinnertime. Alternatively, a building that is home to many seniors may have a very different energy profile than one with younger residents.

“In some buildings, you get a maximum hot-water load at 7 a.m., then again at 7 p.m., after the building occupants are home from work and getting ready to go out. The load then spikes yet again at 2:30 a.m., when they get back

from the bars and dance clubs,” says Mr. Sander. “You can have profiles and demand loads that are dramatically different for the same-sized building, depending on the human aspect of the building.”

At Santana Apartments, a 12-storey, 57-unit building in Vancouver, Mr. Sander installed a DDC panel on the heating and domestic water systems in March 2000. The controls helped identify inefficiencies in the system that were fixed by replacing an undersized circulating pump and an undersized heat exchanger, and by installing a two-stage gas valve on the boiler. After the system was correctly sized, Mr. Sander was able to save energy by programming nighttime temperature setbacks, optimal heating schedules and adjustments based on outside temperatures.

Mr. Sander figures the controls at Santana Apartments have resulted in energy savings of about 21 percent, or \$11,000, per year. The initial investment was paid back in six months.

Under the EII pilot project, Hollyburn Properties is continuing to update its controls. With its state-of-the-art building automation and control system, if anything goes wrong with equipment, an alarm sounds at the operator workstation. If the failure happens after hours, the building manager receives a pager alarm.

“A Saturday afternoon failure can be identified and corrected long before tenants are affected by the problem,” says James Mann of Mann Engineering Ltd., a Toronto-based firm that is helping the company plan and implement its energy efficiency upgrades under the EII.



Old furnace system at Hendry House



New furnace system at Hendry House

Efficient boilers

Hollyburn's most dramatic energy savings have come from retrofitting its boilers and piping systems. Most of its old boiler systems were inefficient and oversized, as they were installed when energy efficiency was not a priority.

"When the boilers were originally installed, engineers and mechanical contractors had few options and ended up using oversized pumps and boilers," Mr. Sander says. "Today, the options are much greater for boiler selection, pump and motor efficiency, and control strategies. VFDs and balancing valves help overcome original building inefficiencies and reduce maintenance costs."

As part of the EII pilot project, low-efficiency atmospheric boilers have been replaced with mid-efficiency boilers that operate at around 86 percent efficiency. To make sure this efficiency is realized, the boiler piping has also been upgraded to a primary-secondary pumping system. With this system, a boiler loop maintains a constant flow of hot water to the boiler to prevent condensation. The temperature of the distribution water does not have to be the same as the water in the boiler loop. This means that the temperature of the water that is sent out through the building can be lower in mild weather, which saves energy and improves tenant comfort.

Lighting retrofits

Hollyburn Properties has worked to make its lighting more energy efficient since the late 1980s, when it converted thousands of lights from incandescent to T-12 fluorescent.

"They were big, chunky and ugly, but they were considered efficient at the time," says Mr. Sander.

Under the EII pilot project, Hollyburn Properties is upgrading its lighting again to T-8 fluorescents, photogenic lighting, and high-pressure sodium and metal halide lights, as well as other new lighting technologies.

"Now, energy-efficient lights are available with attractive fixtures, have a longer service life and throw better light. They're just plain smart," Mr. Sander says.

High-pressure sodium lights with ballast transformers have also been installed in places such as the parkade at Prince's Island Place in Calgary, which used to have incandescent lighting. These lamps also have longer life and require less maintenance.

One dramatic lighting upgrade to underground parking garages has simply been to paint the garages white.

"We discovered that a coat of white paint over the grey on the ceiling and walls has improved the luminosity," says Mr. Sander. This low-cost upgrade improves comfort and safety, and provides energy savings.

Hollyburn Properties has also installed light-emitting diode – or LED – bulbs in its exit signs. These affordable bulbs can be inserted into the same sockets as those for incandescent bulbs and use just 2 watts of power compared with 30 to 50 watts for incandescent bulbs. They also last up to 25 years, which reduces maintenance labour and replacement costs.

Energy efficiency for tenant comfort

The energy efficiency retrofits at Hollyburn Properties have been designed to cut energy and maintenance costs while improving tenant comfort. Still, when some tenants first heard about the energy-saving plans, they worried about cold showers and dark corridors.

“In fact, by engineering our buildings to be more energy efficient, we’ve made them more comfortable,” says Mr. Sander. “The number of complaints has decreased dramatically and, at the same time, we are using less energy.”

Ultimately, making the company’s buildings more energy efficient does more than increase tenant comfort inside – by reducing GHG emissions, energy efficiency also contributes to a healthier environment outside.



New elevator system

For more information

Energy Innovators Initiative
Office of Energy Efficiency
Natural Resources Canada
580 Booth Street, 18th Floor
Ottawa ON K1A 0E4
Tel.: 1 877 360-5500 (toll-free)
TTY : 613-996-4397 (Teletype for the hearing-impaired)
Fax: (613) 947-4121
E-mail: info.services@nrcan.gc.ca
Web site: oee.nrcan.gc.ca/eii

Paul Sander
Chief Executive Officer
Hollyburn Properties Ltd.
250 18th Avenue West
Vancouver BC V7V 3V5
Tel.: (604) 926-7345
Fax: (604) 926-9717
E-mail: paul@hollyburngroup.com
Web site: www.hollyburngroup.com

Leading Canadians to Energy Efficiency at Home, at Work and on the Road

The Office of Energy Efficiency of Natural Resources Canada
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in order to help address the challenges of climate change.

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