



FCM Sustainable Communities Mission

British Columbia, 2008

Case Study: Building Sustainable Developments

OVERVIEW

The National Works Yard Administrative Centre and Parking Operations Building, the Gulf Islands National Parks Reserve Operations Centre, and the Whistler Public Library, as well as developments such as the Whistler Olympic Athlete's Village and Dockside Green are all new buildings certified to Leadership in Environment and Energy Design (LEED®) standards. In their design, materials, and energy sources, these developments are as sustainable as possible. Some municipalities are now setting guidelines that all newly constructed civic buildings must achieve a certain LEED standing.

LEED certifications in Canada are determined by the Canadian Green Building Council (CaGBC) based on a rating system. Buildings are given points for sustainability in multiple categories, including Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Environmental Quality. Buildings can then be awarded LEED Certified, Silver, Gold, or Platinum standings, based on the number of points they receive. A new category, LEED-Neighbourhood Development, has been created for multiple-building residential developments.

NATIONAL WORKS YARD

The National Works Yard Administrative Centre and Parking Operations Building are the first buildings LEED-certified by the Canadian Green Buildings Council (CaGBC) under LEED B.C. criteria; they achieved LEED Gold.

The National Works Yard is built on a former rail yard, near public transportation, and was designed to be sustainable and functional for approximately 400

- The Leadership in Environment and Energy Design (LEED®) rating system measures just how green buildings are: developments are awarded LEED® Certified, LEED® Silver, LEED® Gold, or LEED® Platinum status.
- Many LEED developments in B.C. are constructed on previously contaminated sites, and include features like green roofs, low-flow water fixtures, and solar panels.
- Both large and small municipalities are using the LEED system to set standards for new developments.



"In front of the Whistler Public Library, LEED Gold building"
l. to r.: Melissa Blake (Wood Buffalo, AB), Eckhard Zeidler (Acting Mayor, Resort Municipality of Whistler), Denis Tasse (Gatineau, QC), Jean Tremblay (Saguenay, QC)

employees who live there. Over seventy-five per cent of construction waste was recycled and over fifty per cent of the building includes recycled materials. More than fifty per cent of the materials used in the building were obtained locally.



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A ground source heat pump, along with radiant panel systems, heat and cool the Administrative Centre and Parking Operations Building. Heat is dumped into the ground in summer and pulled out again to warm the buildings in winter. The buildings generate some of their own energy through photovoltaics, and a heating, ventilating, and air conditioning (HVAC) system is used to control the buildings' climate.

The long axis of the Administrative Centre is east/west, while the big surfaces of the building face north/south, which helps to control solar loads. Solar shading is also used outside the building.

The exterior of the buildings uses green vegetated and reflective roofs to reduce heat islands. The landscaping is drought resistant, requiring no irrigation.

Recycled rainwater is used to flush toilets in the National Works Yard, reducing water use. Waterless urinals, automatic faucets, and dual-flush toilets also contribute to an overall reduction of seventy-five per cent, compared with buildings without water-efficient fixtures.

Inside the buildings, low-volatile organic compound (VOC) materials were used to improve air quality while displacement ventilation systems provide occupants with fresh air. Occupants can control their environment by opening windows, as well.

Lighting is designed to decrease the amount of light pollution leaving the site. Less artificial light is required because ninety per cent of occupied spaces have direct views to the outside and skylights enhance the indoor environment.

GULF ISLANDS NATIONAL PARKS RESERVE OPERATIONS CENTRE

The Gulf Islands National Parks Reserve Operations Centre was designed to represent a simple way of life while also conveying Parks Canada's environmental mandate. Three stories and 12,000 square feet in size, it was designed with a goal of LEED Gold but modifications made it the first building in Canada to be certified LEED Platinum.

It is situated on waterfront property and uses an ocean-based geothermal heat pump system to draw seawater into the building and pass it through a heat exchanger. During extreme conditions, the system can change the temperature up to four degrees in either direction. Seawater and solar panels replace fossil fuels for water and heating; a radiant heating and cooling system controls the building's temperature and is responsible for its

consuming twenty-five per cent less energy than buildings that meet the national standard.

Because the Operations Centre faces north, there is no heat gain from the sun. A rain screen wall—a one-and-a-half inch gap before insulation—allows water to slide down the wall and drain out.

In the electrical room, three inverters generate approximately seven kilowatts of energy from rooftop solar panels: enough to run either all the lights or all the computers in the building.

Ocean water supplies all of the National Park Reserve building's hot water needs. Toilets are low flush, and no irrigation is used on the landscaping. Rainwater is collected in a 30,000 litre storage tank and used to wash equipment and run the toilets.

Natural lighting is used as much as possible, while shades mounted to the outside of the building keep it from overheating. Lighting fixtures are energy efficient; those positioned beside windows have sensors to adjust to daylight levels. Lights also have motion sensors to detect when people are not in the room. Interior finishes, all with low-VOCs, were used only when necessary.

All workstations and offices feature windows that can be opened for fresh air, giving occupants control over their workspace.

During construction, waste materials were minimized and approximately eighty-five per cent of construction waste was diverted from landfills. The National Parks Reserve Operations Centre was constructed with over twenty per cent local materials and more than twenty-seven per cent recycled content.

WHISTLER PUBLIC LIBRARY

The LEED Gold-rated Whistler Public Library uses geothermal heating and cooling, manages stormwater to reduce water use, and is constructed of low-emitting, local materials. Passive solar design and the use of natural light and air mean that the library uses between forty-five and fifty per cent less energy than similar buildings without energy-efficient technologies.

Whistler's Public Library was designed with flexible spaces, including book carriages that can be rolled away to create a large multipurpose room. Bike lockers, end-of-trip shower facilities, and changing facilities are available for residents who commute to Whistler by bike. The building has a living green roof.



WHISTLER OLYMPIC ATHLETE'S VILLAGE

At the conclusion of the Olympics and Paralympics, Athlete's Village will become a permanent residence known as Cheakamus Crossing. It will include a mixture of housing types, recreational facilities, and amenities. Designed to respect Whistler's character and values, the village uses progressive design and will optimize synergies between athletes and the regular community. Its goal is to meet LEED Neighbourhood Development standards.

The community's heat will be generated by effluent from the wastewater treatment plant located nearby. Heat exchangers will transfer energy to a fluid, which will be pumped around the development through pipes. Individual homes will use heat pumps to produce space heating and hot water. Up to ninety per cent of the village's heating load will be provided from the system, which gives off no GHG emissions.

The village manages stormwater to maintain predevelopment flows and preserve or enhance existing wetlands in the area. Rain gardens will reduce sediment and contaminant levels in the stormwater, and direct water flows away from the landfill to reducing leachate.

Homes are being built to an EnerGuide rating of approximately 85 and will include low flow dual-flush toilets, low flow faucets, energy efficient fixtures, and dual pane windows. The floors will be made from recycled bamboo. Long-lasting materials will be used for the exteriors.

To encourage sustainable forms of transportation, homes will include a one-car garage.

DOCKSIDE GREEN

Dockside Green, built on a 15 formerly contaminated acres near Victoria's inner harbour, is a mixed-use development of residential, retail office, and light industrial units. It is designed to achieve LEED Platinum certification and will include a creek system and a regional bike trail.

Dockside Green treats its sewage onsite and reuses wastewater. Treated water is used for toilets and irrigation. A biomass gasification plant will turn scrap wood into heat energy for use at the development. All waste treatment systems are designed to emit very little odour.

The residential suites use LED lights and Energy Star appliances. Condensing clothes dryers, which do not require venting and use less energy than conventional dryers, are used in the suites, and each suite includes a web-based meter to allow occupants to monitor their use of electricity and water, whether hot or cold. Because occupants will be able to access their heating systems from a

remote computer, they can shut off the heat even if they are away from their suite. The floors are made of bamboo and the cabinets are made with wheat board substrates.

The building uses one hundred per cent fresh air. A heat recovery ventilator pre-warms any incoming air.

Exterior blinds allow daylight to enter while keeping the suites cool; windows are low-e, double-glazed, and energy efficient. The interior of the building uses compact fluorescent lighting, while closets, storage areas, and bathrooms include occupancy sensors. Low flow showerheads and faucets, and dual flush toilets, are installed in the bathrooms.

The building uses only low or no-emitting VOCs, with a focus on green materials. Fly ash constitutes forty per cent of the cement in the building.

The buildings at Dockside Green have green roofs and will incorporate a vertical green wall. The green roofs are designed for little or no maintenance, and the landscaping uses native species with an additional 1,800 trees still to be planted. A new building will include a community garden on the roof.

CONCLUSION

Regardless of the size of development, it is possible to use materials, energy sources, and design to create new buildings that are more sustainable and energy-efficient than older ones. Even small communities can use LEED standards as a guideline when considering new building development. The creation of LEED Neighbourhood Development standing supports residential developments built to LEED standards.

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ADDITIONAL RESOURCES

This case study highlights sites visited by delegates on the 2008 FCM Community Energy Planning Mission. For additional information on the Mission, including more Mission case studies, presentations and the 2008 Mission Report, visit the FCM Centre for Sustainable Community Development Website at www.sustainablecommunities.fcm.ca/Community_Energy_Mission.