



# CanmetENERGY

Leadership in ecoInnovation

Spring 2009

## COMMUNITY ENERGY CASE STUDIES:

Port Hawkesbury Civic Centre  
Port Hawkesbury, NS



District Energy



Community



Biomass



Solar



Wind



CHP



Heat Pump

### Integrated Community Energy System Application

- Energy-efficiency building design, including geothermal system.

### Context

- One of the highest profile development projects in recent years in the Strait-Highlands region was the construction of the Port Hawkesbury Civic Centre.
- The facility has been highly regarded worldwide for its sustainable design, including a designation as one of the world's 10 greenest buildings by the US magazine Business Week.
- A key component of this facility is the geothermal heating and cooling system that was installed.

### Drivers and Rationale to do the Project

- Port Hawkesbury, a town of about 4,000 residents, needed to replace an aging and inefficient ice arena.

### Benefits

- As a result of the earth energy system, it is estimated that the Civic Centre consumes 40-45% less energy than it would with conventional heating and cooling systems.
- Greenhouse gas intensity (kg of CO<sub>2</sub> per m<sup>2</sup>) is 73% less than the facility it replaced.

### Archetype

#### Characterization

- **Deinsity:**  
22 full time staff,  
1,000 seats at arena  
events, 2,800 visitors per  
week
- **Size:**  
Civic Centre - lot size:  
22,663 sq m, building  
footprint: 7,105 sq m
- **Mix:**  
Building use - Ice arena,  
Recreation, Assembly,  
Restaurant, Retail, and  
Community Halls

## Project Description

### Pre-Design

- Prior to beginning the project, the Town of Port Hawkesbury held a one-day municipal planning workshop, focused on sustainable energy and the community, which was attended by politicians and citizens as well as municipal staff and experts.

### Design

- Community and major end-user groups actively participated in the design process by sitting on an interdisciplinary team.
- The design of the Civic Centre was guided by green protocols based on Leadership in Energy and Environmental Design (LEED) principles and the Commercial Building Incentive Program<sup>1</sup>. These guidelines provided recommendations for the material selection, energy and water consumption.

### Construction

#### *Geothermal Heating and Cooling System*

- The arena is equipped with the Ice Kube System which is an energy efficient geothermal chiller which has cold storage in the rink slab.
- The sophisticated heating system works in reverse, so that rather than cooling down the ice; it is removing heat from it.
- The heat generated during the ice-making process is recovered and used throughout the facility as radiant heating.
- Warm water is also circulated through a heat exchanger to heat hot water for the showers, melt snow shavings removed from the ice and melt snow on the sidewalk around the buildings.
- Excess heat is stored in a horizontal earth loop under the parking lot.
- Forced-air heat pumps through the buildings provide heating and air conditioning by drawing or rejecting the heat to the earth loop. That extracted heat keeps the building at a comfortable temperature. To double community benefit, the excess is shared with the high school next door which uses it to heat the swimming pool.

### *Timeline and Status*

- **2002**  
In November, the commissioning and design process for this project began
- **2003**  
In July, construction began
- **2004**  
The building was completed  
The official opening was held on November 25th



Layout of the Centre

Source: Port Hawkesbury Civic Centre

<sup>1</sup> <http://oee.nrcan.gc.ca/commercial/newbuildings.cfm>

## Project Description (continued)

### *Innovative Daylighting for Building Type*

- In order to provide natural day lighting for the arena, a band of glass coated with a transparent glaze was integrated at the intersection of the roof and the walls. This material, Solera, by Advanced Glazings evenly distributes direct sunlight which eliminates glare and reduces lighting cost by 45% (estimate).
- This is a North American first for this type of building.
- Electric lights in the centre of the arena are turned off during the day.

### *Additional Energy Saving Initiatives*

- A number of technologies, in addition to the daylighting, were employed to reduce energy consumption. These include high efficiency lighting for other areas of the building, improved thermal insulation in the building envelope, radiant heating to allow reduced air temperatures and automated control systems.



Source: OJOLICK ASSOCIATES ARCHITECTS / PLANNERS

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## Considerations for Implementation and Ownership

- A fast-track method facilitated by computerized modeling and pre-fabrication reduced the timeline in half which allowed for the building to be ready for occupancy within a short time frame.

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## Costs and Financing

- The total cost for the Port Hawkesbury Civic Centre was \$ 17.3 million.
- The project received over \$9 million from government agencies at the federal, provincial and municipal level.
- The FCM Green Municipal Funds approved an estimated grant of \$1.09 million, plus a low interest loan of \$900,000.
- Furthermore, the community, local businesses and surrounding municipalities contributed \$4.5 million to the project through fund-raising.
- An analysis of the incremental costs is: \$1,919,516

▶ Roof insulation:	\$345,000	▶ Earth Loop:	\$197,400
▶ Wall Insulation:	\$176,000	▶ Piping for expansion:	\$ 20,000
▶ Glazing:	\$240,000	▶ Heating System:	\$384,716
▶ Ice Making System:	\$321,400	▶ LEED Energy Studies:	\$235,000

## Relationship to Other Best Practices

- In 2006, the Strait-Highlands Region, which includes Inverness County, Richmond County and the Town of Port Hawkesbury, joined the Federation of Canadian Municipalities (FCM) Partners for Climate Protection Program (PCP) with the Strait-Highlands Regional Development Agency (S-HRDA) taking a lead role.
- S-HRDA is working towards completing three milestones under the PCP Program including the creation of a greenhouse gas (GHG) emissions inventory and forecast for the region, setting emissions reduction targets and establishing a Local Action Plan (LAP) to significantly reduce both corporate and community greenhouse gas emissions.

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## Lessons Learned

- Due to the public nature of the civic centre, the community and major end-user groups were invited to actively participate in the design process through the early establishment of a steering committee. This committee represented local interests within an interdisciplinary team of experts which facilitated a system's approach of the project.

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## Additional Information

- Additional information may be obtained from the Town's web site at <http://www.phcivic.com/>

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