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 that it would with conventional heating and cooling systems.
- Greenhouse gas intensity (kg of CO_2 per m^2) 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[1]. 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

[1] 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.

Source: OJOLICK ASSOCIATES ARCHITECTS / PLANNERS

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.

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.

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
Wall Insulation:	$176,000
Glazing:	$240,000
Ice Making System:	$321,400
Earth Loop:	$197,400
Piping for expansion:	$ 20,000
Heating System:	$384,716
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.

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.

Additional Information

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