



Recreation meets Conservation in Uxbridge

Township of Uxbridge, Ontario

Green Municipal Fund Case Study



Uxbridge Arena.

Energy Conservation Study for Uxbridge Arena and Swimming Pool (GMF 1922)

- Pool and ice rink conservation studied
- Accurate payback periods determined
- HVAC systems upgraded
- Results to benefit additional buildings

PROJECT TEAM

Township of Uxbridge
Totten Sims Hubicki Associates Engineers,
Architects, Planners

CONTEXT The Township of Uxbridge owns and operates the Uxbridge Pool and Arena complex, a recreational facility with a swimming pool, skating rink, and banquet facilities. Half the building was constructed in 1978; the rest in 1997. The arena consumes large amounts of natural gas and electricity. The pool area, built in the 1970s, has no cooling or dehumidification capacity and requires a major upgrade. Outdoor air is currently used to modulate humidity. This approach wastes heating energy in winter and can be ineffective in summer, as outdoor air may be as humid as that in the pool area.

The more recently constructed arena, on the other hand, is well maintained and in good condition. It has some new technologies, such as energy-efficient lighting fixtures and motors, a small heat recovery system in the dressing room ventilation system, and an acceptably insulated building envelope.

The Township wanted to find ways to operate both areas of the arena in a more energy-efficient manner, with a view to promoting energy efficiency in the community.

OVERVIEW The Township of Uxbridge undertook an energy conservation study to assess the installation of state-of-the-art energy systems to replace the current electrical and mechanical systems in its swimming pool and arena complex. The complex consumes large amounts of energy, and this study suggested ways to operate the facility in a more energy-efficient manner. Possible upgrades included installing high-efficiency lighting systems, heat exchangers, and energy management systems. Total annual energy savings from the recommended improvements were estimated at approximately \$28,170.



Building tomorrow, today.

FCM | Centre for Sustainable
Community Development

A GMF Case Study



PROJECT DEVELOPMENT TSH conducted on-site audits of the arena and pool complex, and recommended energy-saving options. Site investigations were completed in Spring 2002. TSH reviewed the existing conditions of both halves of the building, including insulation levels, refrigeration systems (for the ice rink), HVAC (heating, ventilation, air conditioning) systems, domestic hot water systems, lighting, and energy recovery systems.

TSH also researched a recently developed technology called the Ice Kube system, as a possible replacement for the arena's existing refrigeration system. Developed in Manitoba, this system uses a modified refrigeration system for ice making and enables a large amount of waste heat to be recaptured for use in heating systems. The Ice Kube system would require new construction and major modifications to the building's heating systems. At a cost of \$900,000, the payback for such a system would be in excess of 20 years. Although this option ultimately was not recommended, the information provided to the Township could prove useful in the future if it decides to install this system.

TSH determined that the ice-making process could generate enough heat to provide for the heating needs of the complex, provided waste heat could be reclaimed. The reclaimed heat could be transported by a condenser water system and used in water-to-air heat pumps and in encased pipes in the bleachers to provide radiant heat. It could also be used to heat domestic hot water and to preheat hot water for ice melting. Any excess reclaimed heat could be used to heat entranceways inside the building (by using under-floor radiant pipes) or stored underground in a geothermal storage. The same geothermal storage could be used in summer to absorb heat from the heat pumps when they reverse their cycles and become cooling units.

RESULTS Average natural-gas consumption per month for the arena was approximately \$4,800, with average electrical costs per month

of approximately \$1,800. In the pool facility, natural gas costs were approximately \$5,000 per month in the heating season (approximately \$2,000 per month in the non-heating season), and average electricity costs were approximately \$3,800 month. Some of the energy reduction opportunities identified by TSH were as follows:

For the arena

- install additional sub-grade insulation below the ice pad when slab replacement is required;
- install heat exchangers to recapture heat from the refrigeration system for use by the hot water system;
- install infrared motion sensors in rooms to override manual switches and switch off lights. An IntelliTimer Pro Logger® (an occupancy sensor, lighting sensor, and data logger combined) was recommended to help calculate energy savings from the use of such controls;
- modify the arena lighting startup sequence.

For the pool facility

- install a new heating system with a desiccant dehumidifier;
- install new exhaust fans;
- replace motors of pool pumps with new energy-efficient units.

For both

- replace existing fluorescent lamps with T8 lamps and electronic ballast;
- replace incandescent exit signs with LED types;
- install night-setback thermostats.

The total cost to implement all the arena recommendations is approximately \$59,500 with annual savings of approximately \$9,850. The total cost for all the pool facility recommendations is approximately \$145,000 with annual savings of approximately \$18,320. All costs were calculated using the current energy rates at the time of the study, which means savings could



A GMF Case Study



vary depending on fluctuations in electricity and natural gas prices.

LESSONS LEARNED Energy usage in these types of buildings is often high because of inadequate isolation between heated and non-heated spaces. This study suggests a number of ways to reduce energy use and reclaim waste heat. If energy prices increase, the payback period on these projects will improve.

NEXT STEPS In fall 2003, Ingrid Svelnis, the Township's Director of Parks, Recreation and Culture, reported that Council had accepted the study report and implemented several of the recommendations. The Township has installed

a new pool area heating system, including the dehumidification system. It has also installed new pool exhaust fans and a night-setback control system. Ms. Svelnis also indicated that the results of this study will be useful when considering the energy efficiency of other buildings owned by the Township. "Now that the biggest items have been dealt with, we will focus on the smaller items."

CONTACT

Alex Grant
Chief Administrative Officer
Township of Uxbridge
Tel.: 905-852-9181
E-mail: uxbridgetwp@interhop.net

About the Green Municipal Fund

The Government of Canada endowed the Federation of Canadian Municipalities (FCM) with \$550 million to establish the Green Municipal Fund (GMF). The Fund provides low-interest loans and grants, builds capacity, and shares knowledge to support municipal governments and their partners in developing communities that are more environmentally, socially and economically sustainable.

Federation of Canadian Municipalities Centre for Sustainable Community Development

24 Clarence Street, Ottawa, Ont. K1N 5P3
Tel.: 613-241-5221 Fax: 613-244-1515
E-mail: greenfund@fcm.ca