

REFERENCE ARENA

GENERAL DESCRIPTION

Building area	3 000 m ²	Duration of operation	9 months
Ice surface dimensions	26 x 61 m	Hours of operation/week	93 h
Ice thickness	25 mm	Lighting hours/week	80
Number of ice sheets	1	Rink lighting	18 kW
Ceiling emissivity	0.85	Number of resurfacings/week	67
Year of construction	1974	Resurfacing water temperature	65°C

REFRIGERATION SYSTEM

Number of evaporators	2	Cooling capacity	280 kW
Type of evaporators	DX	Brine supply temperature	-10°C
Number of compressors	5	Compressor motors	110 kW
Number of condensers	2	Condenser motors	7.5 kW
Number of brine pumps	1	Brine pump motor	20 kW
Type of refrigerant	R-22	Brine flow rate	50 L/s

DESCRIPTION OF FEATURES

Overall thermal resistances

- Ceiling RSI-3.5
- Exterior walls (above grade) RSI-3.2
- Windows RSI-0.35

Lighting and air conditioning

Areas	Surface (%)	Lighting (W/m ²)	Temperatures (day/night)	Fresh Air Intake (L/s/m ²)
(Occupation)				
• Locker room	15	7.9	21°C/13°C	0.60
• Administration	10	10.5	21°C/13°C	0.52
• Ice rink	60	10.0	S/O	0.60
• Stands	10	4.4	18°C/13°C	0.60
• Mechanical room 5	N/A	N/A	N/A	N/A

- Heating under concrete slab is electric. The ground temperature set point is 5°C.
- Two 50 kW electrical coils provide space heating in the "Administration" and "Locker Room" areas. 60 kW of electric baseboards provide building perimeter heating.
- Heat recovered from the refrigeration system compressors provides heating through the ventilation system for the stands area. A 150 kW electric coil provides additional back-up heating.
- The ventilation system operates at a constant flow rate and is operational 24 hours a day.
- This study did not include the electrical or mechanical rooms due to the slight effect on the overall arena energy

consumption. The surface area is however included in the building's total area.

- None of the areas have summer cooling.

Domestic hot water

- Domestic hot water heating is provided partly by heat recovery from the desuperheater of two refrigeration system compressors and by an auxiliary natural gas water heater.

Ambient relative humidity

- The "Rink and Stands" area have two dehumidifiers to control ambient relative humidity at 50%. The refrigeration system load is calculated based on this humidity limit. There are no humidifier or dehumidifier in other parts of the arena.

Refrigeration

- The cooling system's energy efficiency ratio (EER) is 1.5 kW/ton or 7.85 BTU/h/W.
- The refrigeration system contains 750 kg of R-22 refrigerant and has an annual average loss of 10% of this total or 75 kg.

Exterior lighting

- Exterior lighting is not included in this study.

Climatic data

- Hourly climatic data for Montréal from 1996 was used to prepare the fact sheets.

REFRIGERATION SPECIALIST'S REMARKS

The main features of Reference Arena 'A', along with its operating modes, were derived from the study "Potential for Energy Savings in Arenas of the Province of Quebec" conducted by the CANMET Energy Technology Centre-Varenes in December 2000. Energy consumption calculated for the reference arena will be used as a baseline for calculating the future energy savings realized by the implementation of energy efficiency measures.

ARENA'S ANNUAL GREENHOUSE GAS (GHG) EMISSIONS

Reference Arena	Total emissions* Tonnes CO ₂ -eq./yr 278
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NOTE* Calculations of GHG emissions include electricity, fossil-fuel energy and refrigerant leaks.

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The original version of this fact sheet (in French) may be downloaded from the website:

<http://cetc-varennes.nrcan.gc.ca/fr/publication/2003-066-0f.html>

REFERENCE ARENA

Arena's Energy Consumption

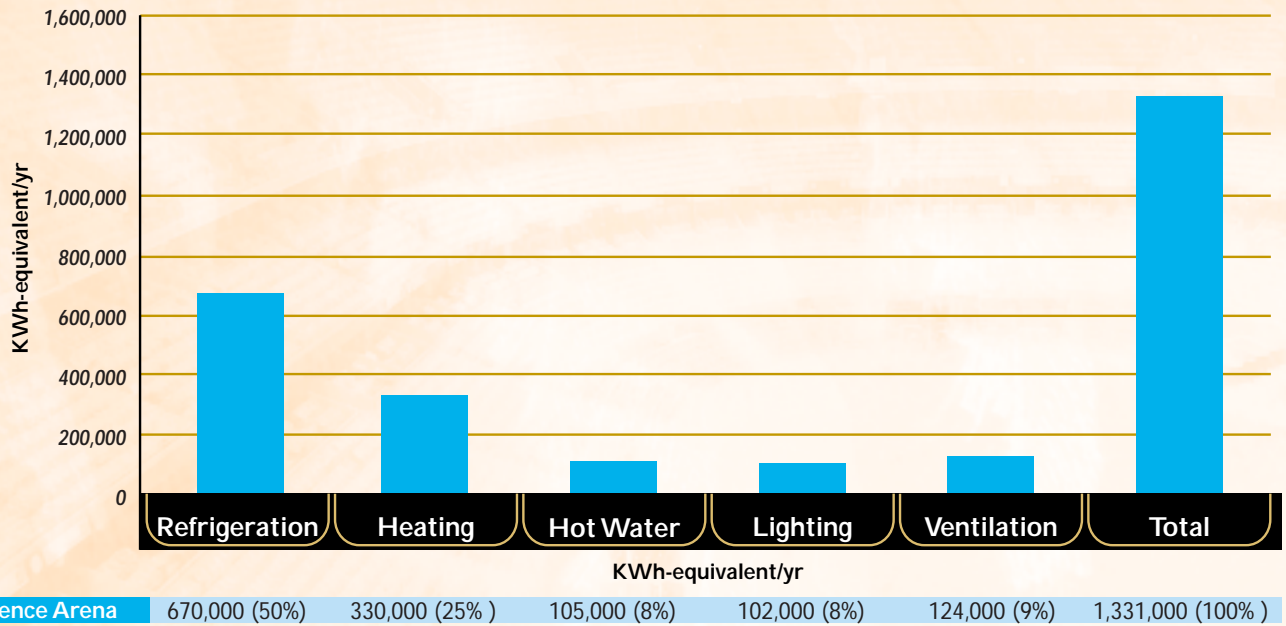


Figure 1

