

MANAGEMENT OF ICE TEMPERATURE

BACKGROUND

Reference conditions

Most arenas keep the ice temperature constant throughout the season. A few vary the ice temperature set point for different activities or during the unoccupied (night) periods.

Proposed improvements

It is possible to reduce the refrigeration system's energy consumption as follows:

- Adjusting the ice temperature set point according to the season and the type of activities:

Hockey:	-6°C to -5°C
Figure skating:	-4°C to -3°C
Free skating:	-3°C to -2°C
No activity:	-2°C to -1°C
- Stop the brine pump and the refrigeration system during unoccupied periods. By measuring the ice temperature with an infrared sensor, the refrigeration system can be restarted if the ice temperature should increase to a preset maximum set point.

BENEFITS

Direct impacts

If ice temperature is allowed to rise during the night:

- The refrigeration system energy consumption decreases.
- The refrigeration system capacity increases.

Indirect impact

- Energy consumption for heating the stands area falls slightly when the cooling system and brine pump are stopped.
- Maintenance costs are reduced.
- Extends the equipments and components life.

REFRIGERATION SPECIALIST'S REMARKS

Figure 1 shows that merely allowing ice temperature to rise during the night will save 18,000 kWh (1%) per year. This figure does not include the lower energy consumption that would result from stopping the refrigeration system and brine pump. Figure 2 on the reverse indicates that energy consumption varies by 21,000 kWh/yr/°C of ice temperature change.

ARENA'S ANNUAL GREENHOUSE GAS (GHG) EMISSIONS

		Total emissions*
		Tonnes CO ₂ -eq./yr
<i>T°ice constant day/night</i>	(T°DAY = -5°C)	278 (Ref.)
<i>T°ice variable during the night</i>	(T°DAY = -5°C and T°NIGHT = -1°C)	275 (-1%)
<i>T°ice variable day/night</i>	(T°DAY = -5°C and T°NIGHT = -3°C)	274 (-1%)

NOTE* Calculations of GHG emissions include electricity, fossil-fuel energy and refrigerant leaks.

NOTE: Energy consumption and energy savings were estimated on the basis of Montréal's 1996 climatic profile. Readers may refer to the technical fact sheet "Reference Arena".

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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/2003-066-7f.html>.

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Arena's Energy Consumption

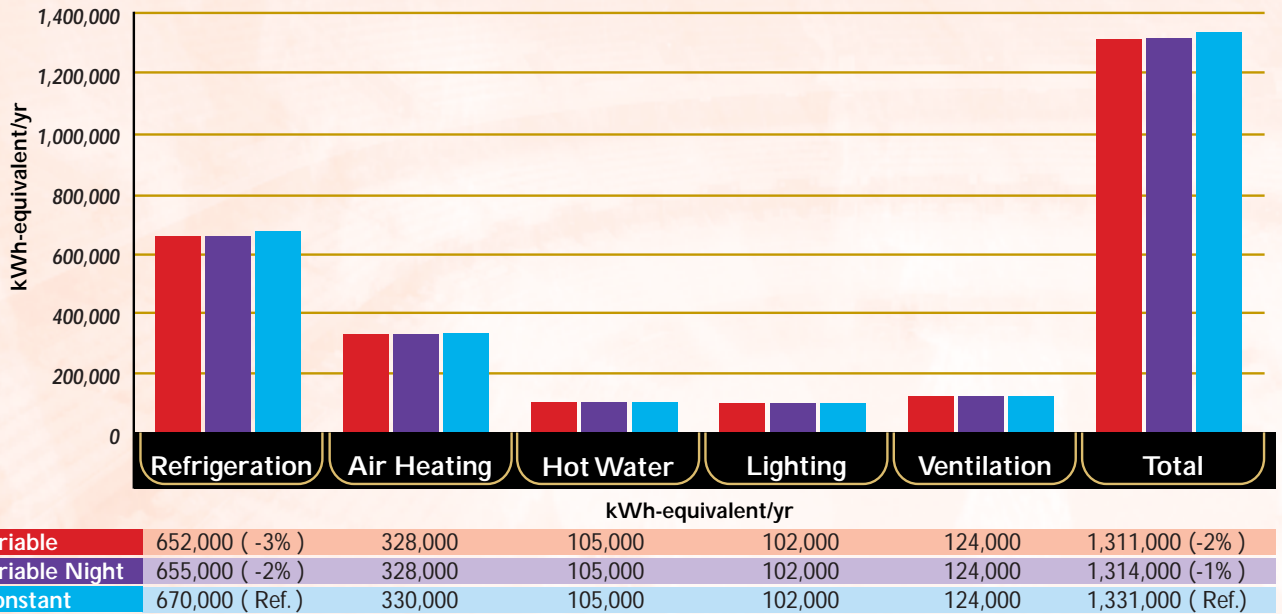


Figure 1

Impact of the ice temperature on the total energy consumption of the arena

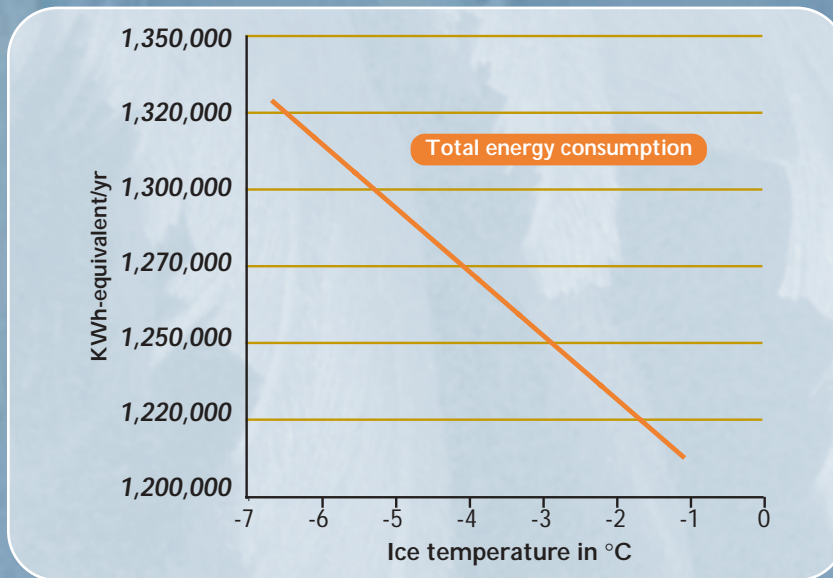


Figure 2

