REDUCTION OF LIGHTING INTENSITY IN THE ICE RINK

BACKGROUND

Reference conditions

The heat given off by the ice rink lighting simultaneously increases the rink's refrigeration load and reduces the heating load of the stands. However, the overall result is an increase in total energy consumption.

The installed lighting power directly influences the building's electricity demand.

The reference arena's lighting annual energy consumption is about 4,500 kWh/kW based on an average of 4,500 hours of operation per year.

Proposed improvements

The impact of lighting on the arena's energy consumption can be reduced by:

- Using lighting systems where the brightness (multi light level intensity) and the number of operating lamps can be adjusted according to the type of activity and the occupancy rate.
- Optimise the height of fixtures by considering the reflectance of walls and the low-emissivity ceiling, while ensuring the required clearance above the ice rink is maintained.

BENEFITS

Direct impacts

- For each kilowatt reduction of installed lighting power, a twofold reduction in the building's electricity demand occurs: 1 kW for the lighting itself and 0.25 kW for the refrigeration system to remove the heat given off by the lights.

Indirect impact

- Energy to heat the arena is reduced by 500 kWh/yr/kW of additional lighting.
- The use of natural lighting provides an ambience that might enhance daytime occupancy of the arena.

REFRIGERATION SPECIALIST'S REMARKS

The annual energy consumption of the reference arena's refrigeration system increases at the rate of 1,200 kWh/kW of additional lighting, or 0.2%. This value seems marginal when compared to the 500,000 kWh/yr that the refrigeration system compressors consumes; however, increasing lighting power from 10 to 50 kW, increases refrigeration system consumption by 10%.

ARENA'S ANNUAL GREENHOUSE GAS (GHG) EMISSIONS

	Total emissions* Tonnes CO_2-eq./yr
Lighting in stands 10 kW	*271 (-3%)*
Lighting in stands 18 kW	*278 (Ref.)*
Lighting in stands 24 kW	*284 (2%)*
Lighting in stands 48 kW	*307 (11%)*

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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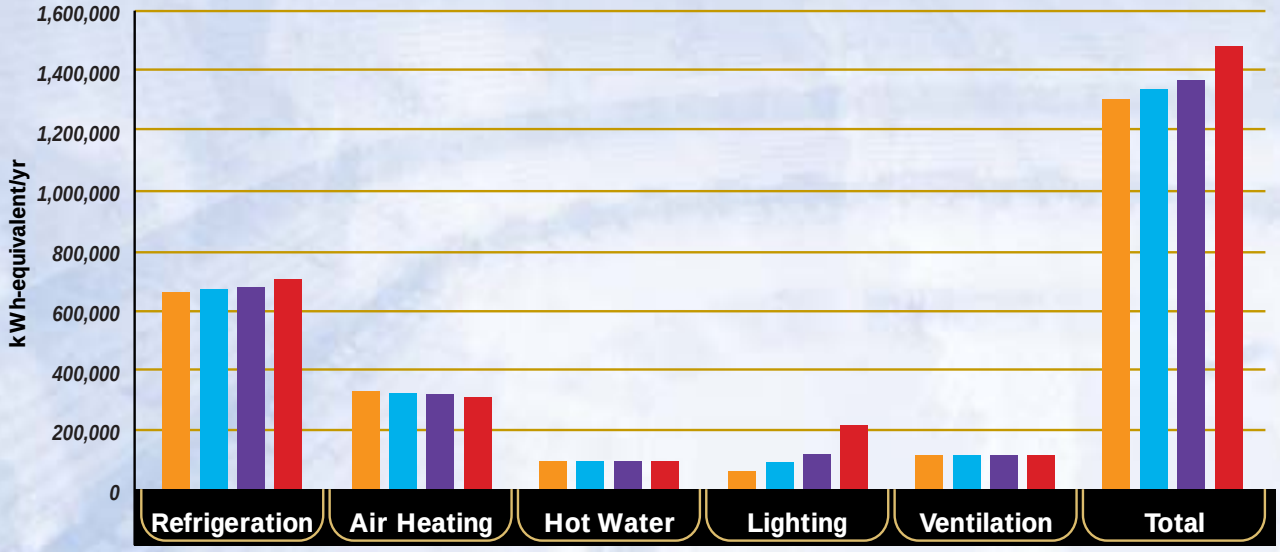
http://cetc-varennes.nrcan.gc.ca/fr/publication/2003-066-4f.html.

REDUCTION OF LIGHTING INTENSITY IN THE ICE RINK

Arena's Energy Consumption



kWh-equivalent/yr

	Refrigeration	Air Heating	Hot Water	Lighting	Ventilation	Total
Lighting 10 kW	662,000 (-1%)	334,000 (1%)	105,000	72,000 (-29%)	124,000	1,297,000 (-3%)
Lighting 18 kW	670,000 (Ref.)	330,000 (Ref.)	105,000	102,000 (Ref.)	124,000	1,331,000 (Ref.)
Lighting 24 kW	678,000 (1%)	326,000 (-1%)	105,000	128,000 (25%)	124,000	1,361,000 (2%)
Lighting 48 kW	706,000 (5%)	315,000 (-5%)	105,000	224,000 (120%)	124,000	1,474,000 (11%)

Figure 1

Lighting energy consumption influenced by electricity power

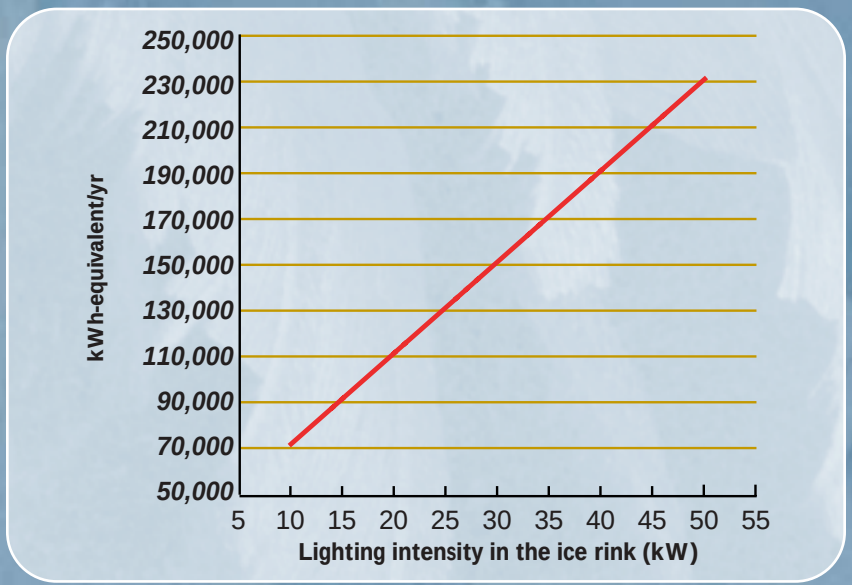


Figure 2

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