

Significant energy use reductions with low-emissivity ceilings in ice rink

The Challenge

Tom Graham Arena has two ice rinks (East and West pad) and both rinks had normal ceilings. The radiant heat emitted from the ceiling structure hit the ice surface adding extra load to the refrigeration plant equipment (compressors). This caused the compressors to work hard to get rid of this extra heat, resulting in excess use of electricity.

The Solution

- In 2020, the City installed low-emissivity (low-E) ceiling over both ice pads, which significantly reduced the radiant heat transferred from the roof to the ice surface. Low emissivity ceiling consists of a low emissivity fabric material, which has a very low potential to transfer radiant heat. The normal material could have an emissivity factor of 0.9, which means they are 90% efficient in transferring their heat to other objects.
A good low-E ceiling is made of materials with an emissivity factor of 0.03, which means it is 3% efficient in transferring heat to other objects.
- The emissivity factor of installed low-E fabric material in Tom Graham Arena is 0.03. This significantly reduced the compressors' load and run time, resulting in huge electricity savings and associated GHG emissions, and lower maintenance costs on the system.

This project assessment revealed very significant reductions in electricity consumption, associated GHG emissions, and energy costs

Measureable Outcomes

	Description
Challenge	Existing ceiling covers emitting radiant heat – Extra heat generation to retain low temperatures in rinks
Solution	Install Low-Emissivity Ceilings – upgrade emissivity factor from 0.9 (90% heat transfer efficiency) to 0.03 (30%)
Energy Saved	23.7% - Compressors
Energy Saved	14.1% - Facility
GHG reduction	7.47 tCO ₂ -eq
Cost savings	\$41,668/year energy cost savings
Capital cost	\$140,400
IESO Incentive	\$29,343
ROI (without incentive)	3.47 years, or 29.7 %
ROI (with incentive)	2.66 years, or 37.6%

About the Property

Building name
Tom Graham Arena

Located
1300 Elgin Mills Rd. E., Richmond Hill ON L4S 1M5

GFA
75,100 Sq ft

Building type
Indoor ice rinks