Staff Report

Development Services Department *www.kitchener.ca*

REPORT TO:	**Planning and Strategic Initiatives Committee**
DATE OF MEETING:	**February 9, 2026**
SUBMITTED BY:	**Anna Marie Cipriani, Corporate Sustainability Officer, 519-783-8970**
PREPARED BY:	**Fionnula Wade, Sustainability Advisor, 519-707-1464**
WARD(S) INVOLVED:	**All Ward(s)**
DATE OF REPORT:	**January 23, 2026**
REPORT NO.:	**DSD-2026-055**
SUBJECT:	**City of Kitchener Arena Cold Water Ice Business Case**

For Information

REPORT HIGHLIGHTS:

- The purpose of this report is to present the findings of a pilot which ran from May 2024 to May 2025 at Sportsworld Arena; whereby cold water was used instead of hot water to make arena ice
- Highlights of the business case include a **5% reduction in energy consumption,** with **annual cost savings of approximately $6,255** and **3.5 years payback**; while maintaining quality ice and user experience.
- Attachment A includes a one-page summary and video.
- Community engagement included staff presentation and discussion with Kitchener's Climate Change and Environment Committee during their September 2025 committee meeting as well as engaging arena users to obtain feedback on user experience.
- This report supports Cultivating a Green City Together: Focuses a sustainable path to a greener, healthier city; enhancing & protecting parks & natural environment while transitioning to a low-carbon future; supporting businesses & residents to make climate-positive choices.

BACKGROUND:

Arenas are the City of Kitchener's most energy intense facility type. Ice making is an energy intensive practice especially because hot water is traditionally used. The business case that follows completes Action #14 of Pivot: Net-Zero, and supports the implementation of Kitchener's 2023-2026 Strategic Plan.

Sportsworld Arena is a twin pad arena constructed in 2000 and purchased by the City of Kitchener in 2010. It is one of 8 City owned arenas and has consistently had the highest energy intensity per square foot across municipally owned arenas in the region of Waterloo. The purpose of this business case was to pilot and monitor the transition to using cold,

deaerated water for ice making while monitoring any changes in operations, ice quality, user experience, and energy efficiency over a full calendar year (May 2024 to May 2025).

REPORT:

Building and maintaining ice is anticipated to become more challenging as the local climate changes. In this region daytime highs are getting higher as are the lows, and overnight temperatures are not anticipated to be dropping as we have typically come to expect. Arenas (as a municipal facility type) are the most energy demanding of all City of Kitchener assets. City of Kitchener arenas account for approximately 15% of the City of Kitchener's corporate greenhouse gas (GHG) emissions and natural gas accounts for the most carbon intense fuel type used in arenas. Burning of fossil fuels like natural gas to meet energy needs creates GHG emissions (CO_2, NH_4 etc.) which contribute to climate change.

Reduced Energy Consumption and Greenhouse Gas Emissions

Water temperature

Hot water with a temperature of 60°C - 71°C (140°F - 160°F) is traditionally used to make and resurface arena ice because it lacks trapped air that is found in cold water. In other words, heating up water effectively deaerates it. The benefit of using deaerated water for ice resurfacing is that it refreezes smoother and creates a stronger bond with the existing ice surface. Further, hot water quickly melts the surface of the ice to smooth any imperfections not taken care of during the scraping or washing process.

Although hot water has been the preferred method for ice making for many years, it is incredibly energy intensive to heat the amount of water required, which is reflected in natural gas consumption at City of Kitchener arenas. During hockey tournaments ice may need to be resurfaced as many as 30 times in one day – with only one flood using up to 500 L of water. Deaerating flood water mechanically, rather than thermally, has proven to be an effective and less energy intensive alternative for ice making and resurfacing.

In February 2024, a mechanical deaerator unit was installed at Sportsworld Arena. After the installation of the unit, the average temperature for ice maintenance has been reduced to approximately 17.5°C (63.5°F), which is a 60% temperature decrease from traditional methods. While utility consumption was not sub-metered, data for the facility shows that both natural gas and electricity usage at Sportsworld Arena decreased by approximately 5% since the installation of the mechanical deaerator.

With a decrease in natural gas and electricity usage, comes a decrease in GHG emissions. When comparing emissions from the project period to baseline emissions (pre installation), a total decrease of 14 tonnes of CO_2 equivalents (tCO_2e) have been observed at Sportsworld Arena. Natural gas emissions have reduced by 12 tCO_2e while electricity has reduced by 2 tCO_2e.

Compressor

While the observed decrease in electricity usage may be a result of several factors, it is anticipated that it is in part a result of installing the mechanical deaerator. Arena ice pads are built on concrete that is kept cool using a refrigeration system which pumps glycol through a network of pipes, effectively removing any heat from the ice. With the use of deaerated cold water, the average ice surface temperature has increased slightly, and the application of hot water has been eliminated, therefore the compressor does not need to run as often, resulting in less electricity used to power the refrigeration system compressor.

Decreased load on the dehumidification system is another added benefit. The use of deaerated cold-water results in the reduction of humidity inside the arena, therefore reducing the load on the dehumidification system, resulting in further energy use reductions.

Ice Surface and Ambient Air Temperatures

Ice surface temperature is another parameter that has changed because of transitioning to cold water for ice making. Traditionally, the ice surface temperature was kept around -6°C/-5.5°C (21°F/22°F). Due to the decrease in water temperature being used to flood the ice rink in between programming, the overall surface temperature of the ice rink was able to be increased by approximately 1.7°C (4°F), with a new average ice surface temperature of -3.8°C (25°F). These increases in temperature reduce the load on the refrigeration system and dehumidification system, resulting in energy savings.

As a result of the increased ice surface temperatures, the indoor ambient air temperature has also been increased slightly. The exact indoor ambient air temperature at Sportsworld Arena pre-mechanical deaerator installation was not recorded, however staff have indicated that the temperature has increased. The average ambient air temperature since installing the mechanical deaerator unit is 10°C (50°F).

No Changes to Maintenance Schedules and Programming

Prior to the installation of the mechanical deaerator, potential challenges were identified by staff and monitored as part of this business case. The first concern noted was if increased time would be required to fill the ice resurfacing tank due to decreased water pressure flowing from the mechanical deaerator, therefore requiring shifts in workflow and ice flooding schedules. Staff also noted the potential for increased ice making and flooding time due to decreased water pressure from the boom sprayer on the ice resurfacer. To track these changes and identify any issues to maintenance schedules, staff at Sportsworld Arena tracked the following metrics over the course of a year:

- Time it takes to refill the ice re-surfacer tank
- Mechanical deaerator water temperature
- Mechanical deaerator unit pressure (PSI), prior to fill and during filling
- Ice surface temperature for both the spectator and practice rinks
- Brine supply for spectator and practice rink
- Indoor ambient air temperature
- Indoor relative humidity

Typically, floods are scheduled at 10 minutes to the hour on the practice rink, and 5 minutes after the hour on the spectator rink. This can change depending on programming, such as tournaments and league games with second period floods for example. Arena staff tracked the time it took to fill the ice resurfacer at least once a day during the monitoring period and indicated that the average fill time was 5.8 minutes.

The data collected on maintenance and programming indicates that while this approach to ice making differs from traditional methods, arena staff are still able to provide the same level of quality service to arena users as previous years.

Ice Quality
Over the course of the pilot project year, staff received positive feedback regarding the ice quality at Sportsworld Arena from arena users. Feedback received from staff and arena users includes:

- Creates good quality ice that freezes clear, smooth and hard
- Ice is easier on skating blades, resulting in less frequent sharpening of blades (approximately 5-10 hours longer)
- Ambient air temperature and relative humidity in the arena is easier to keep at a comfortable temperature for spectators
- Staff have observed that it is easier to build/re-build the ice
- Water softeners require less salt

Cost Savings
The decrease in energy consumption at Sportsworld Arena resulted in a cost reduction of $6,255 the first year. With the estimated annual savings, this project has a payback period of approximately 3.5 years. If the mechanical deaerator operates for the advertised lifespan of 25 years, there are potential savings of up to $134,482, following the initial payback period.

In 2024 the City of Kitchener Project Manager Facilities Energy Management led a grant application to the Independent Electricity System Operator (IESO) Save on Energy Retrofit Program to support the transition of ice making at Sportsworld Arena to deaerated water. The grant application for this electrical demand reduction was successful and the City received $14,789.97. The impact of this funding reduced the costs of procuring the product by 49%.

Scaling
This business case has shown that the installation of a mechanical deaerator at Sportsworld arena has resulted in energy efficiency and cost savings without compromising ice quality or user experience. Since initiation of this project, a mechanical deaerator has been installed at two additional City of Kitchener arenas including: Activa Sportsplex and Lions Arena.

In considering the scaling of this technology to single pad arenas it is important to note that the energy and cost savings would be roughly half of what was observed in this business case. GHG emission savings would be a total of 7 tCO_2e each year. And the payback period would be closer to 11.5 years.

The cost of the mechanical deaerator has recently increased by approximately 33%. This increase may correspond to an increase in demand and/or the impacts of incentives being offered by Enbridge. Incentives are supportive to reducing capital costs. The remaining City of Kitchener facilities are located within Kitchener Utilities' territory. Incentives will be available in Kitchener Utilities' service territory for each arena. Kitchener Utilities will review each application when the gas savings are calculated to determine the incentive amount. Scaling this technology across other facilities is complex and may include considerations beyond that which were included in the pilot.

This business case is supportive to making data informed decisions. To support sharing this story, Attachment A includes a one-pager and video about this pilot and business case.

STRATEGIC PLAN ALIGNMENT:
This report supports Cultivating a Green City Together: Focuses a sustainable path to a greener, healthier city; enhancing & protecting parks & natural environment while transitioning to a low-carbon future; supporting businesses & residents to make climate-positive choices.

FINANCIAL IMPLICATIONS:
Capital Budget – The recommendation has no impact on the Capital Budget.

Operating Budget – The recommendation has no impact on the Operating Budget.

COMMUNITY ENGAGEMENT:
INFORM – This report has been posted to the City's website with the agenda in advance of the committee meeting. Community engagement included presentation and discussion with Kitchener's Climate Change and Environment Committee during their September 2025 committee meeting. Throughout the pilot, staff engaged with arena users to obtain feedback on ice quality. The business case materials, including a one-page summary document, and video will be shared with the public through the City's website and social media channels.

PREVIOUS REPORTS/AUTHORITIES:
There are no previous reports/authorities related to this matter.

APPROVED BY: Justin Readman, General Manager Development Services
Denise McGoldrick, General Manager Infrastructure Services
Michael May, General Manager of Community Services and Deputy Chief Administrative Officer

ATTACHMENTS:
Attachment A – One Page Summary: Arenas Cold Water Ice Business Case