

Corporate Energy Management & Conservation Plan

2024-2029



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KING

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Introduction and Emissions Targets

Ontario Regulation 25/23: Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans require Broader Public Sector (BPS) organizations to develop an Energy Conservation and Demand Management (CDM) plan and update it every five years. King's updated CDM plan was developed in compliance with the regulation and covers the period from 2024 to 2029.

The updated CDM plan builds on King Township's previous conservation and demand management efforts as outlined in past plans found [here](#). The plan continues to build on experience gained in energy conservation and demand management over the last five years. In addition, the update supports our transportation and fleet asset management plans and incorporates our emissions reduction plans.

Targets

After declaring a Climate Emergency in 2019, King Township set its Greenhouse Gas emissions reduction targets at the 2012 emissions total of **1,406.19 tCO₂e** (Metric Tonnes of Carbon Dioxide Equivalent), acting as the baseline for moving forward in measuring reductions.

- Council targets are set at a 45% reduction by 2030, and Net Zero by 2050. Using the 2012 baseline numbers this equals to a target of **632.7 tCO₂e** by 2030.
- In 2019 staff recommended that targets be adjusted to 35% reduction, with 10% offset to meet the 45%. This plan aims for that 45% reduction, but understands that offsets can be used in the future to compensate for 10% reduction if needed.
- In 2023 The Township's total emissions were **1,353.42 tCO₂e**.
- To meet the 2030 target of emissions at 632.7 tCO₂e a year, the Township needs to reduce 720.72 tCO₂e in 7 years (2023-2030),
 - averaging 102.96 tCO₂e per year starting from 2023.

Figure 1 graphs the emission reduction targets from 2023-2050.

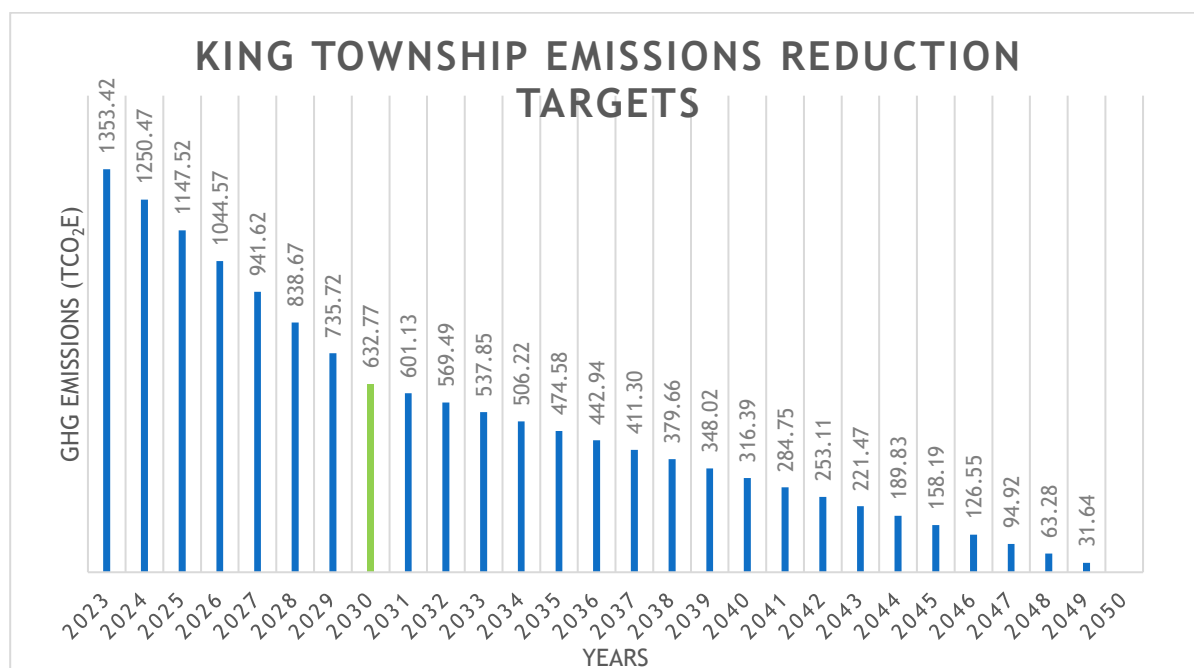


Figure 1: King Township's emissions reduction goals required to meet 2030 and 2050 emission targets.

One of the objectives within the [2023-2026 King Township Corporate Strategic Plan](#) is “Develop environmentally sustainable solutions that reduce King’s footprint and mitigate against the impacts of climate change” with a key result of **Reduce corporate emissions by 140 tCO₂e (tonnes of carbon dioxide) by 2026**. The targets set in this plan are set to exceed the targets defined within the CSP.

Figure 2 illustrates King Townships Corporate Emissions from 2011-2023, with the top bars representing fleet emissions and the bottom bars representing building emissions. The graph shows a steady decline in building emissions since 2018, except in 2022, while fleet emissions have been increasing at a slower rate each year.

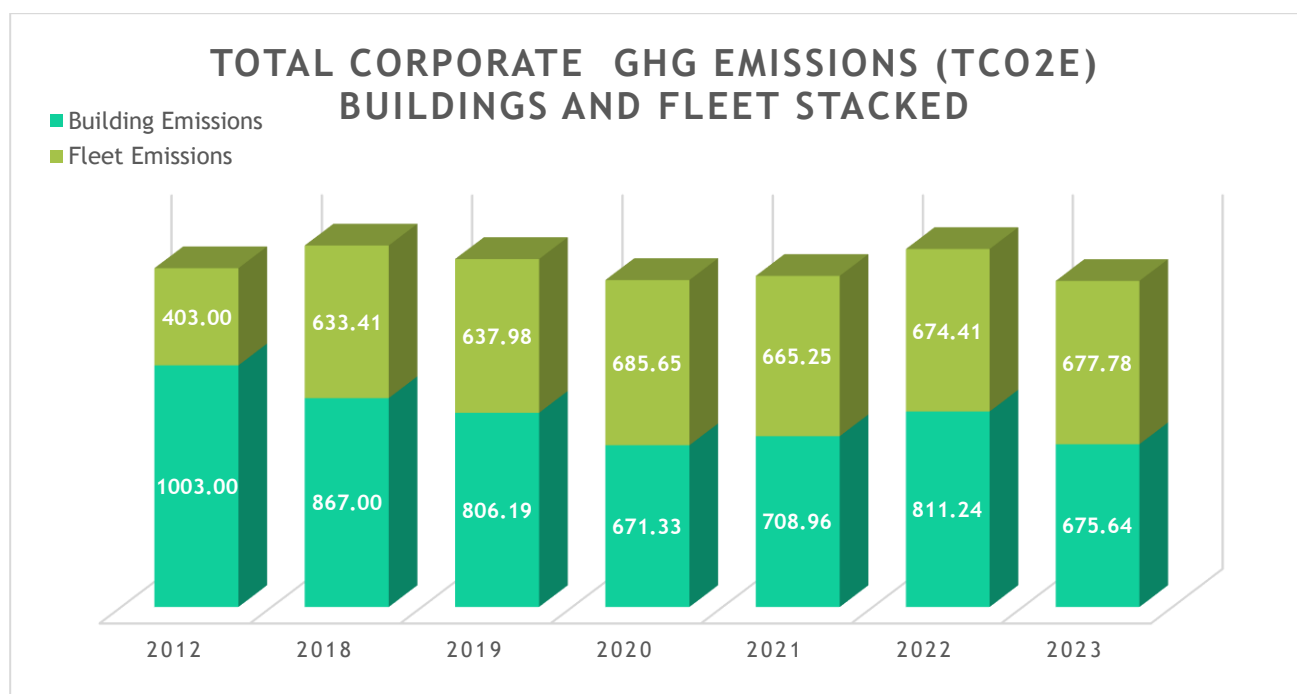


Figure 2: Total corporate GHG emissions (tCO₂e) of King Township buildings and fleet stacked.

Figure 3 displays total corporate emissions by merging fleet and building emissions, highlighting the overall decrease since 2018, note the major decrease in 2021 is likely due to Covid-19. time frame.

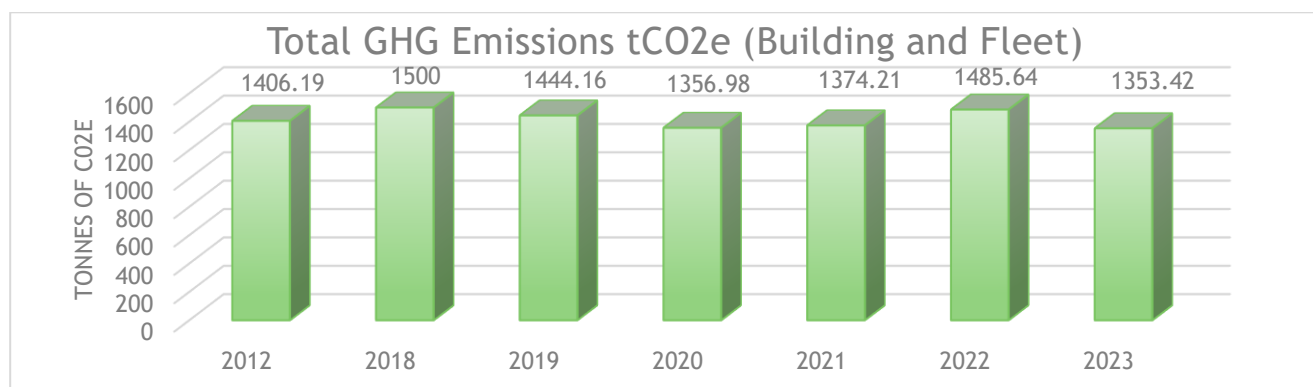


Figure 3: King Township’s total yearly GHG emissions (tCO₂e) from both buildings and fleet.

Accomplishments

Since the 2019-2023 Corporate Energy Management and Conservation Plan, several energy conservation projects have been completed across the Township. While each project contributes to reducing total corporate emissions, those involving fuel switching and renewable energy integration have the most significant impact.

Carbon Neutral Recreation Centre

The Zancor Centre is Canada's first combined aquatics and ice-sports community facility to achieve Carbon Neutral Building Design Certification by the Canada Green Building Council. It will be open in January 2025. The facility will feature a six-lane lap pool, a leisure pool, two NHL-sized ice rinks with spectator seating, an artificial turf fieldhouse with running track, and a multi-use community space. This project is funded by the Township of King, the Government of Ontario, and the Government of Canada through *Investing in Canada Infrastructure (ICIP) Funding*.

Key design features include:

1. **All electric building systems:** Rooftop ventilation, dehumidification, boilers, arena heat rejection, and air source heat pumps, are connect to an integrated thermal energy network. Every possible effort is made to recover waste heat. This means there's less heat energy being ejected into the atmosphere, greater operational efficiency, and less energy required to run the facility.
2. **Innovative CO₂ Arena Refrigeration System:** CO₂ is a naturally occurring refrigerant, usually used in industrial applications. We chose to pursue this system because it produces high-grade waste heat, which can then be cycled through the building's thermal network, effectively providing free heat energy.
3. **Minimal dependence on gas-fired equipment:** The building uses almost no gas-fired equipment, which means greenhouse gas emissions have been reduced significantly. The only Natural Gas systems are backup systems installed as contingencies to ensure the building can keep running through any weather and power variables.
4. **Daylight Optimization:** Ample daylighting has been strategically incorporated into the design to enhance energy efficiency and create a bright, inviting atmosphere.
5. **Geothermal Readiness:** The design includes the coordination of an open-loop geothermal well installation, providing a foundation for future retrofitting. This innovative approach taps into the most stable ground-source energy exchange available.

Trisan Centre & Nobleton Arena Recommissioning and Energy Reduction Projects

Through funding from King Township and the Green Municipal Fund, recommissioning was completed at both the Trisan Centre and Nobleton Arena as of December 2023. The objective of this project was to create and implement a recommissioning plan for the Trisan Centre and Nobleton Arena based on measures to reduce energy use and costs while ensuring optimum efficiency in building operations. The recommissioning looked at improving how the building equipment and systems were operating, identifying operational issues and low- or no-cost operational improvements to improve comfort for building users and save energy (and associated greenhouse gas emissions).

Trisan Centre Arena

In 2020-2021 the Township participated in the Roadmap to Net Zero Ice Rink pilot project conducted by the Mayors' Megawatt Challenge program and supported by the Federation of Canadian Municipalities. Through this pilot, a feasibility study was developed for the Trisan Centre providing a technical and financial plan to reduce greenhouse gas emissions by 80% within 20 years. The study recommended a number of recommissioning measures that could be implemented immediately to bring the facility closer to this target and the Township's overall target of reducing corporate greenhouse gas emissions by 45% by 2030. The Township engaged Enerlife Consulting to implement the recommissioning measures recommended in the study.

The recommissioning project is estimated to see a savings of 5 to 10% on both the electrical and gas consumption from the measures implemented. Greenhouse gas emissions are expected to be reduced by approximately 25 tonnes of CO₂e.

REALice System Installation

In 2022 the Township installed a REALice system at the Trisan Centre. This system eliminates the need to use extremely hot water when flooding the ice. Previously, 750 litres of floodwater was heated to 70°C an average of 8 times per day to maintain the ice at the Trisan Centre. With the REALice system, the floodwater temperature is lowered to 20°C. This lower temperature has a significant impact on the natural gas consumption in the facility. Using cold water instead of hot water helps reduce the use of natural gas towards heating water. The chart below shows that the 2023 natural gas usage is significantly lower than in 2022, the 2023 usage matches the 2021 Covid-19 usage levels, where the arena was not in use full time during the pandemic.

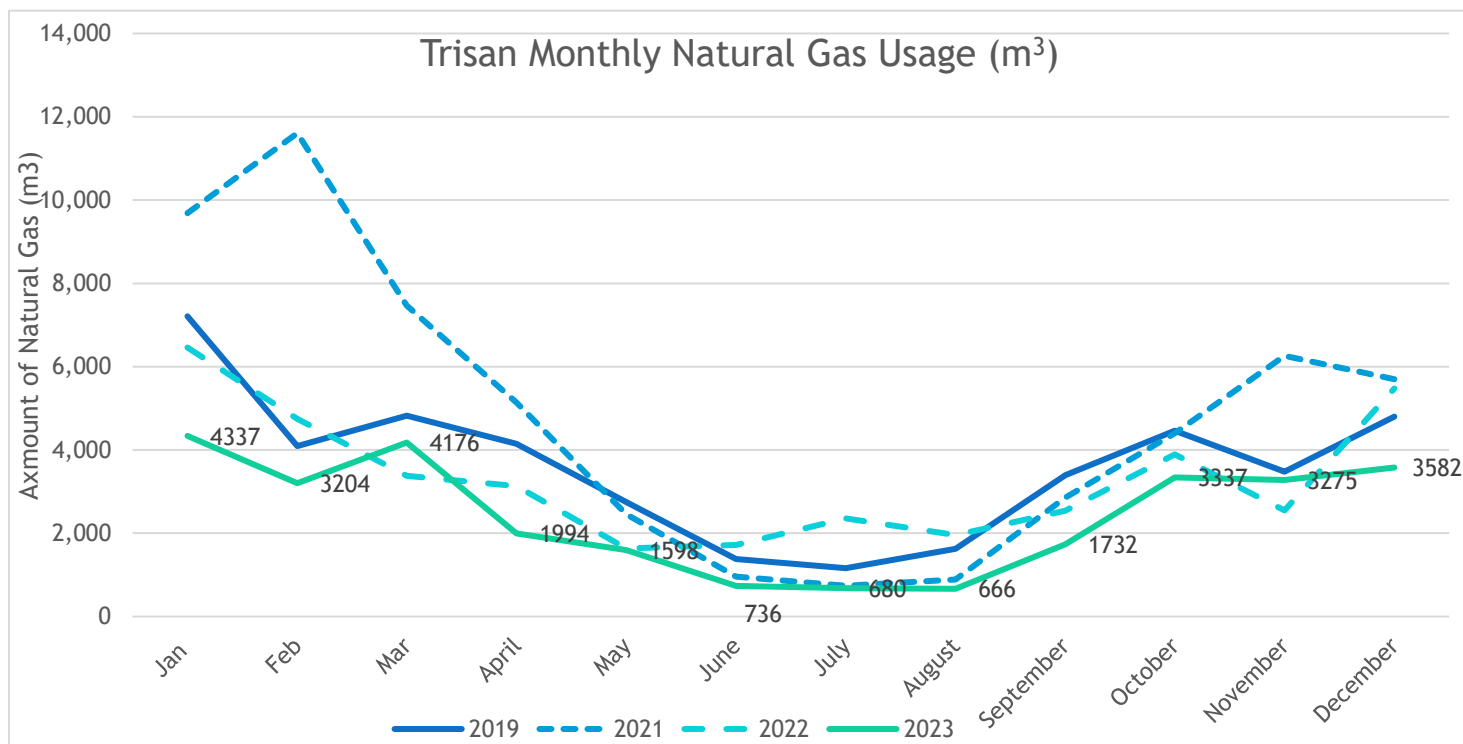


Figure 4: Monthly gas usage (m³) of the Trisan Centre from 2019 to 2023.

Nobleton Arena

The Nobleton Arena Recommissioning project consisted of purchasing and installing a Building Automation System (BAS), which allows monitoring, analysis, and optimization of the refrigeration plant. Similar to the Trisan recommissioning project, this project has an estimated energy savings of 5-10% in total. Additional energy savings include:

- Estimated annual electricity savings: 25,534 kWh
- Estimated annual gas savings: 4,909 m³
- Estimated annual cost savings: \$4,026
- Estimated annual GHG savings: 11.6 tonnes of CO₂

Non-Energy Benefits:

- Improved refrigeration plant operation and reduced maintenance costs

Expansion of Alternative Fuel Fleet

King Township now has six alternative fuel fleet vehicles, four of which are fully electric vehicles and two of which are hybrid vehicles. The electrification of our fleet has allowed King to continue to grow its fleet capacity without seeing large increases in emissions. When looking at the emissions from 2021 to 2022, there is an increase by nine tonnes of CO₂e (tCO₂e), however from 2022 to 2023 there was only an increase of three tCO₂e, which can be partially explained by the new addition of electric vehicles. A further breakdown of fleet emissions will be discussed below.

Staff have also been exploring optimization of services routes, such as snow removal to target efficiencies in service delivery however, it should be noted that exercises such as these provide efficiencies for fuel use reductions.

Solar Electric Generation

Cold Creek Solar Panels

In 2023 an exciting and cutting-edge climate change initiative was piloted at Cold Creek with the installation of 4 Canadian made solar panels installed on the roof of the Cold Creek education centre. These solar panels are used to power our two EcoFlow Generators. Making great strides in clean energy innovation in the Township.

The two generators are a Ecoflow Delta Pro -3600 Watt Portable Power Station, and a EcoFlow Delta 2 -1000W Portable Power Station. EcoFlow is the leader in solar power generators in North America.

Trisan Microfit Panels

This generation facility is a 10KW Solar PV Microfit program running a feed and tariff program with the IESO and Hydro One. As of 2023 the solar panels generated 11240 KWH, earning \$17,382.00

Installation of Air Source Heat Pumps

As of 2023 4 buildings in King Township now have air source heat pumps instead of natural gas furnaces. The newest building to install heat pumps is the King City Fire Hall. With the help of an Enbridge subsidy, the Township was able to replace the natural gas furnace in the Fire Hall with an air

source heat pump. Fuel switching is one of the fastest and largest impacts on our corporate emissions. The Zancor Recreation Centre will use heat pumps throughout the building as well.

Breakdown of Emissions

Buildings

Of the Township's 1,353 tCO₂e 2023 emissions total, 675 tCO₂e come from buildings. King's corporate building emissions include all Township owned buildings, streetlights, park lights, and park washrooms, however the majority of emissions come from the actual buildings. The table below breaks down the corporate building emissions by different facility groupings. The pie chart that follows breaks down the percentage of each facility grouping. The table highlights that arenas are the highest emitters in the Township, due to their size, function and use this is expected, whereas streetlights emit the lowest, which is also expected given their function.

Table 1: Breakdown of GHG emissions and electricity and natural gas consumption by facility type.

Facility Groupings	Electricity Consumption (kWh)	Natural Gas Consumption (m3)	GHG Emissions (tCO ₂ e)
Arenas	2,997,286	106,536	282
Libraries	319,930	36,900	79
Fire Halls	111,121	34,653	70
Community & Cultural Centres	277,127	25,633	57
Municipal Centres, Depots and Yards	676,997	71,111	155
Pump Houses	313,662	374	9
Park Amenities and Fixtures	82,795	1,044	9
Streetlights	605,438	-	15
Totals	5,384,355.83	276,251.68	675.64

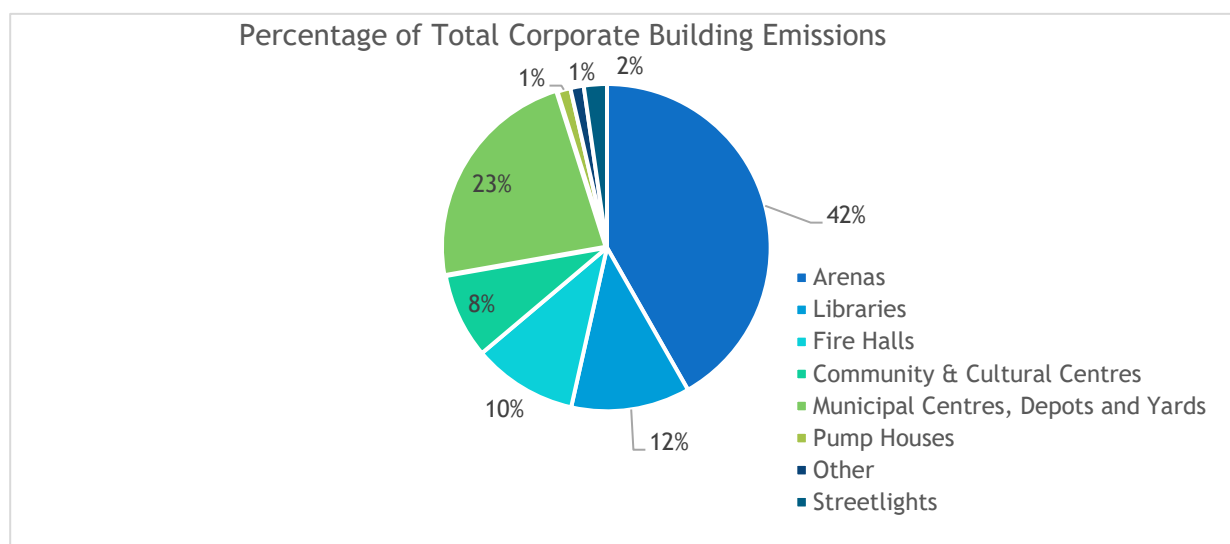


Figure 3: Percentage of total King Township corporate building emissions by facility type.

Since 2018 staff have seen a **22% decrease** in GHG emissions and at **15% decrease** in general energy consumption in our buildings, with 2023 being the lowest year so far. As well there is a **32% decrease** from 2012 Building GHG emissions. There are a few factors that contribute to lower GHG emissions in 2023:

- The different energy reduction and efficiency measures that have been put in place as outlined above in “Accomplishments”
- The disposition of unneeded assets
- Canada saw the impacts of El Niño in 2023, along with impacts of Climate Change creating an uncharacteristically mild 2023 winter leading to less natural gas usage throughout
- Overall decrease of energy consumption since 2018 from the varying occupancy rate of facilities due to Covid-19, with 2020 and 2021 seeing the greatest impact of this

Figures 6 and 7 show the yearly totals for both ghg emissions and energy consumption (Hydro One, Electricity and Enbridge Natural Gas) for all buildings. The graphs clearly outline the reduction in energy usage over time.

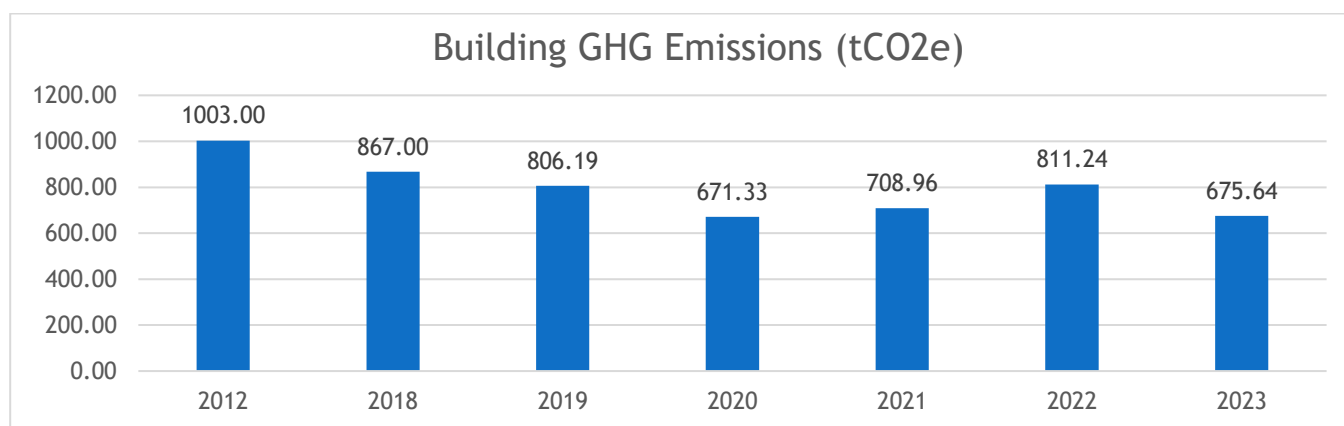


Figure 4: King Township's yearly GHG emissions from buildings from 2018 to 2023.

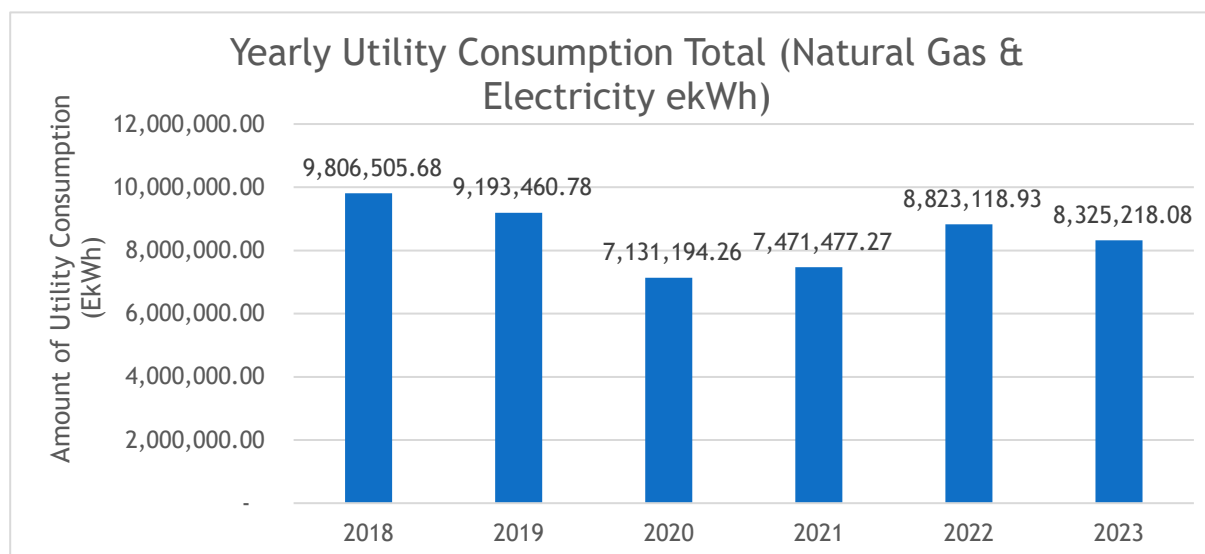


Figure 5: King Township's total annual utility consumption (ekWh) from 2018 to 2023.

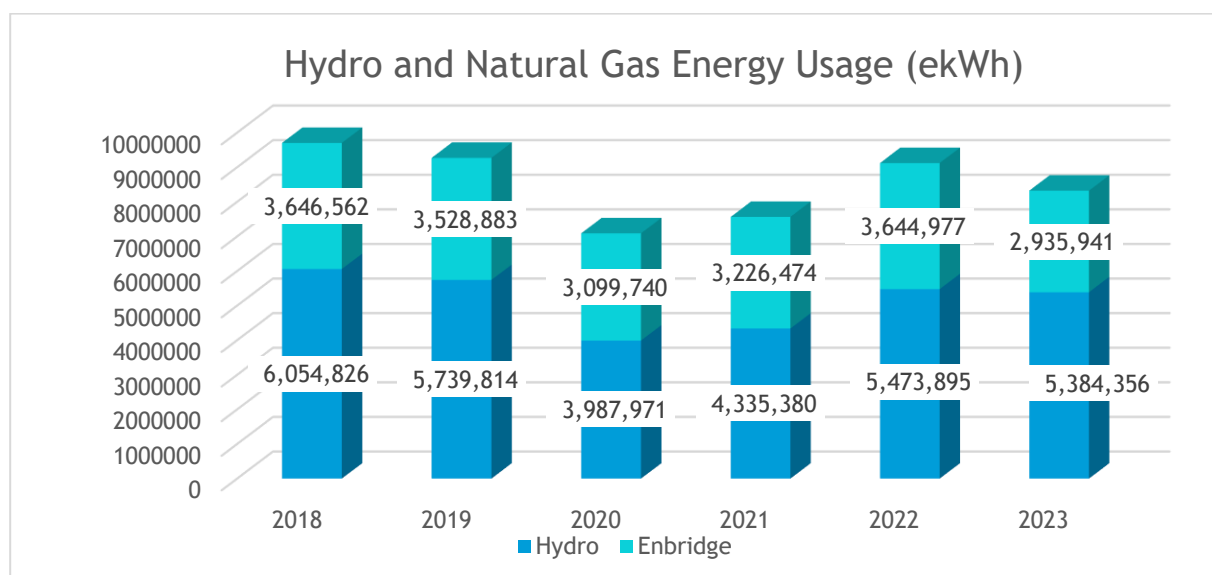


Figure 6 Stacked Graph of natural gas and electricity usage (ekWh)

As can be seen in the yearly graphs Figure 6, Figure 7 and Figure 8, 2022 had a spike in both energy consumption and GHG emissions. In Appendix A, a graph calculating GHG emissions for 2022 and 2023 for each building in King show that a majority of the buildings in 2022 had higher emissions 2023. This can be partially explained by the weather in 2023 and less of a need for heating and cooling. Also with 2022 being the first “normal” year post Covid-19, there were major energy draws and way higher building usage as everything came back online.

Top 10 Buildings

A majority of the GHG emissions are produced from 10 out of the 41 total buildings in King. These buildings are listed in Table 2 and together make up 564.87 tCO₂e of the 675.64 tCO₂e total of all building emissions in 2023. As well the table breaks down the 2023 total energy intensity (energy consumption per square footage) for the top ten buildings. Targeting these top 10 buildings for energy efficiency and emissions reduction will most effectively lower King's overall GHG emissions.

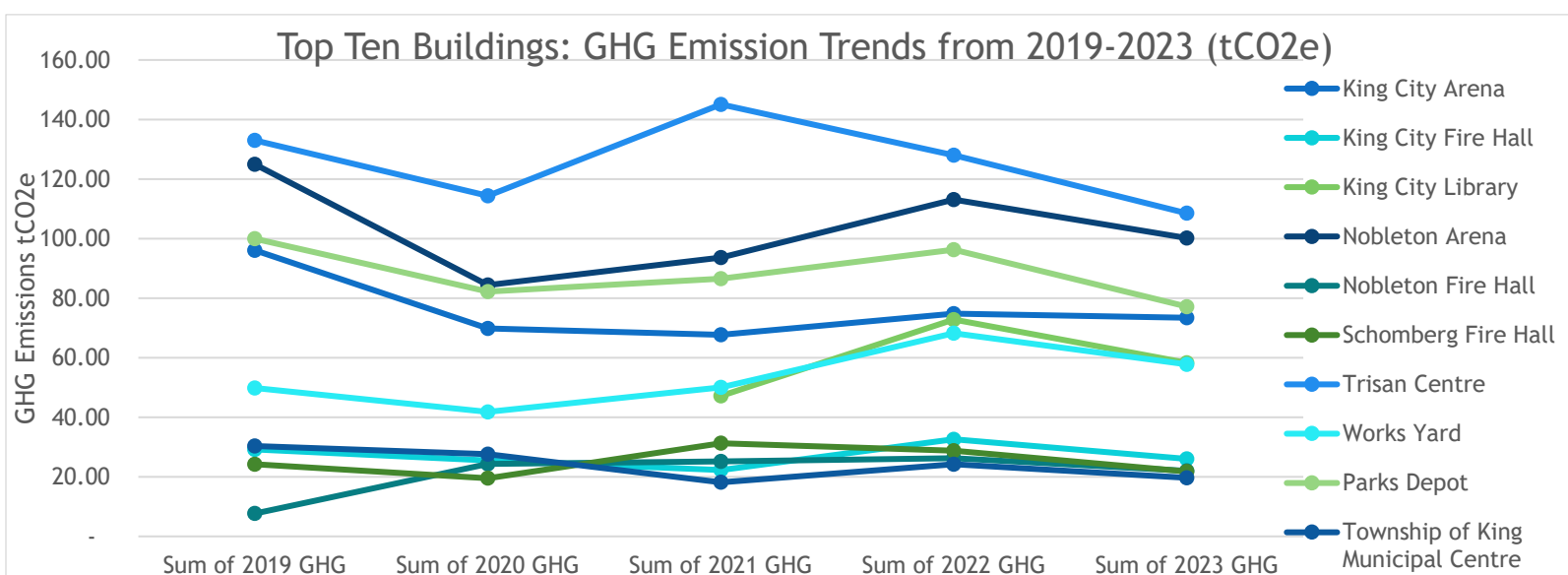
Each building offers significant opportunities for electricity and gas savings, leading to financial and GHG reductions for the Township. The plan's 'Action' section details specific energy-saving measures for each building as well in the next section describing the analysis from the Mayors Megawatt Challenge, it breaks down approximate cost estimates and ghg reduction potential for the top ten buildings.

The top 10 highest emitting buildings are:

Table 2: Top ten highest emitting buildings in King Township and their associated GHG emissions.

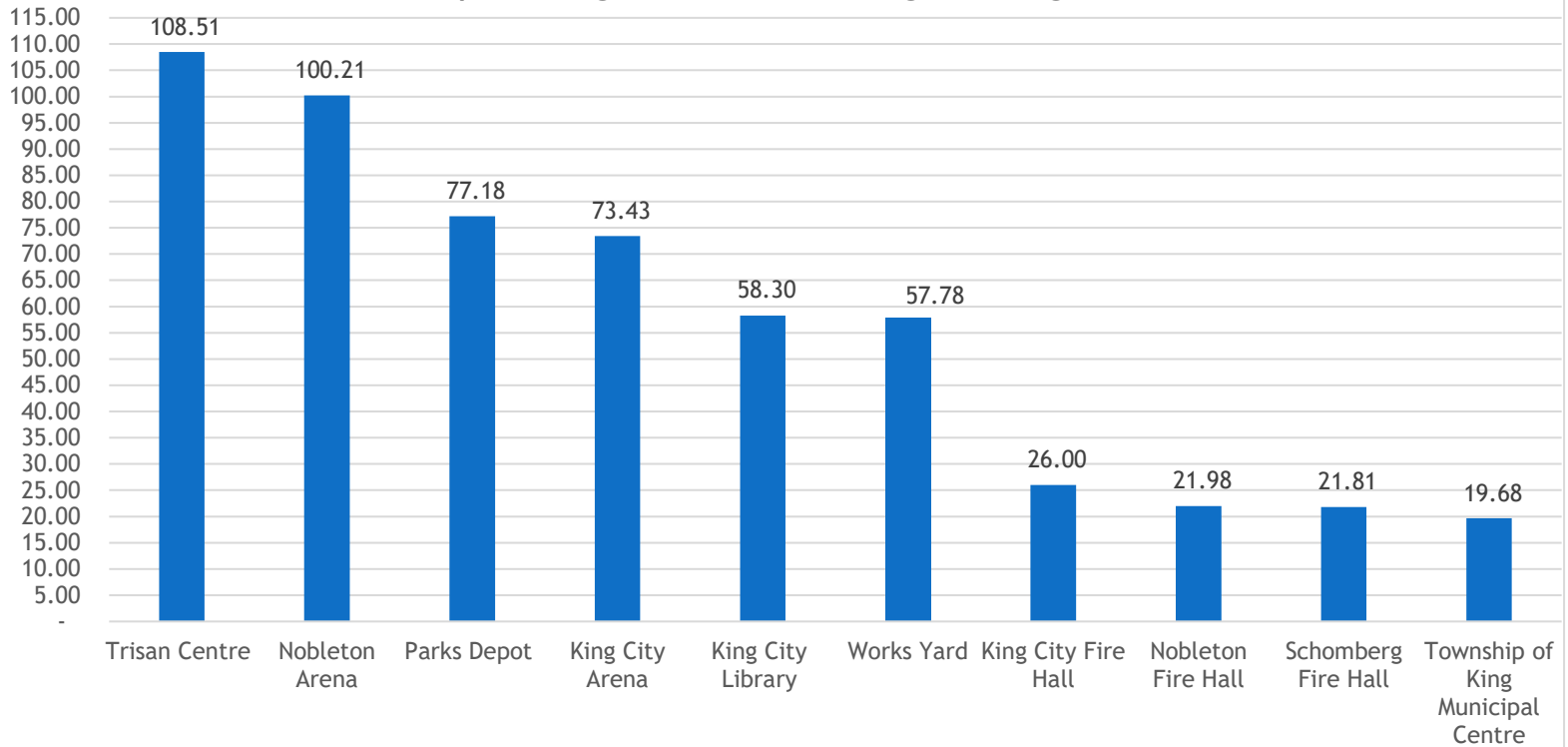
Buildings	Sum of 2023 GHG (tCO ₂ e)	2023 Total Energy Use Intensity (ekWh/ft ²)
Trisan Centre	108.51	32.6
Nobleton Arena	100.21	31.0
Parks Depot	77.18	15.5
King City Arena	73.43	25.21
King City Library	58.30	25.7
Works Yard	57.78	43.7
King City Fire Hall	26.00	24.3
Nobleton Fire Hall	21.98	40.2
Schomberg Fire Hall	21.81	11.5
Township of King Municipal Centre	19.68	13.0
Grand Total GHG Emissions	564.8657513	

Figure 7: Emissions trends of King Township's top ten emitting buildings.



The two graphs visualize King's top ten buildings (Figure 9 & 10) the line graph, figure 9, visualizes the 10 ten emissions from the year 2019-2023, where as figure 10 is a bar graph to highlight each buildings emissions in 2023 compared to each other.

2023 Top Ten Highest GHG Emitting Buildings tCO₂e



Mayors Megawatt Challenge

The Mayor's Megawatt Challenge is a program that brings together municipalities across Canada to improve energy efficiency, reduce GHG emissions and save on costs related to energy in corporate facilities. King Township has been a member of the Mayor's Megawatt Challenge since 2019.

King is a standing member of this program and currently has 14 facilities enrolled, including the top ten highest emitters, providing staff with potential energy savings and achievable targets on an individual building level, as well as benchmarking buildings against similar facilities. The tables below (Tables 3-7) were created by Mayor's Megawatt Challenge in their yearly benchmarking report. They highlight energy and cost saving potential for our highest emitting buildings.¹

Table 3: Mayor's Megawatt Challenge total energy usage.

Buildings	2023 Electricity Use (kWh/ft ²)	2023 Electricity Target (kWh/ft ²)	2023 Thermal Use (ekWh/ft ²)	2023 Thermal Target (ekWh/ft ²)	2023 Total Energy Use (ekWh/ft ²)	2023 Total Energy Target* (ekWh/ft ²)
Works Yard	10.5	3.6	33.2	10.5	43.7	14.1
Nobleton Fire Hall	12.9	5.8	27.3	11.0	40.2	16.7
Trisan Centre	28.5	22.3	4.1	4.0	32.6	26.3
Nobleton Arena	15.5	10.9	15.4	8.5	31.0	19.4
Schomberg Community Hall	20.3	5.8	9.3	9.1	29.6	15.0
Lasky Hall	4.0	2.8	25.3	10.3	29.3	13.1
King City Library/ Senior Centre	12.3	8.2	13.4	9.9	25.7	18.1
King City Fire Hall	7.7	5.4	16.7	11.0	24.3	16.3
Schomberg Library	8.1	6.5	14.3	4.6	22.4	11.1
Parks Depot	2.1	2.1	13.4	9.5	15.5	11.6
King Township Municipal Centre	12.2	10.2	0.8	0.8	13.0	11.0
King Heritage and Cultural Center	5.3	5.3	6.4	6.1	11.7	11.4
Schomberg Fire Hall	4.2	4.2	7.3	7.3	11.5	11.5

¹ It should be noted that there are minor discrepancies between electricity consumption calculated by King Township and the Mayor's Megawatt Challenge which is due to different consumption values used for calculations. King Township uses billed/adjusted consumption while Mayor's Megawatt Challenge uses metered/unadjusted consumption which gets divided by the Total Loss Factor of 1.06 by HydroOne. Both values are sufficient for reporting purposes. Discrepancies with costs are a result of Mayor's Megawatt Challenge using default rates to estimate charges since they only have access to the consumption from utility companies. As well, King City Arena is not included in this analysis and Schomberg Community Hall no longer uses natural gas, however the utility company bills and meters based on a average of historical data thus estimated in 2023 natural gas usage.

Table 3 highlights the total energy performance of the 14 buildings reported on by Mayors Megawatt Challenge from January to December 2023 and compares this with the target energy performance. 2019 is the base year for these targets since it is the most recent year of normal building operations before COVID-19. These targets are readily attainable with current technology and can most likely be attained by implementing low-cost/operational efficiency measures. Targets are adjusted for weather and unique building characteristics such as ice pads and swimming pools. The values highlighted in red are above (have not met) the target energy performance and the values highlighted in green have exceeded the target. The target is based on achieving good performance which would put the facilities in the top 25% of similar buildings.

In Table 4 (below), the red highlighted cells represent the highest savings potential, orange highlighted cells represent moderate savings potential, and green highlighted cells represent the lowest savings potential. The top 10 highest emitting buildings have the highest potential for savings so energy efficiency measures should be focused on these buildings. The table showcases the GHG reduction percentage for each building, the left side of the table shows total energy consumption in both electrical and thermal, while the right side demonstrates the GHG saving potential amount and the percentage of savings. In total if we are able to meet all the potential energy reductions, we would reduce Township wide GHGs by 33%.

A few examples from table 4 below are:

- Nobleton Arena with a 43% reduction potential, with a majority of the potential coming from thermal energy use (natural gas, space and domestic hot water heating and cooling etc.)
- Works Yard with a 68% reduction potential, with a majority of the potential coming from thermal energy use.

Building Name	Energy and GHG Reduction Potential							
	Electrical		Thermal		Total Energy			
	kWh	GHG (tonnes)	ekWh	GHG (tonnes)	ekWh	GHG (tonnes)	GHG (kg/ft2)	% GHG reduction
Nobleton Arena	144,039	2.9	215,033	39.8	359,072	42.7	1.4	43%
Works Yard	64,993	1.3	216,355	40.1	281,348	41.4	4.4	68%
Parks Depot	0	0.0	119,412	22.1	119,412	22.1	0.7	29%
King City Library/ Senior Centre	85,019	1.7	74,433	13.8	159,453	15.5	0.7	27%
Nobleton Fire Hall	31,261	0.6	71,126	13.2	102,387	13.8	3.2	60%
Trisan Centre	423,338	8.5	6,887	1	430,225	9.7	0	11%
King City Fire Hall	18,388	0.4	45,496	8	63,884	8.8	1	34%
Lasky Hall	2,822	0.1	37,225	7	40,048	6.9	3	59%
Schomberg Library	5,996	0.1	34,950	6	40,946	6.6	2	65%
King Township Municipal Centre	79,959	1.6	828	0	80,787	1.8	0	11%
Schomberg Community Hall	60,169	1.2	820	0	60,989	1.4	0	15%
Alex Campbell Pump House	27,749	0.6	0	0	27,749	0.6	1	39%
King Heritage and Cultural Center	0	0.0	1,921	0	1,921	0.4	0	4%
Schomberg Fire Hall	0	0.0	230	0	230	0.0	0	0%
TOTAL	943,734	18.9	824,716	152.7	1,768,450	171.5	1.2	33%

Table 4: Energy and GHG Reduction Potential of Mayor's Megawatt Challenge Buildings.

The next three tables (Tables 5, 6, 7) highlight the electrical, gas and total energy, and cost savings for each of the top 10 buildings. The tables below compares the actual 2023 energy use for each of your participating buildings with its customized target to determine potential energy, greenhouse gas (GHG) emissions, and cost savings. It also points to the areas of greatest opportunity. Table 5 looks at electricity savings potential for three categories of a building: baseload (what runs all the time which includes lighting and plug load), cooling and heating. It breaks down the percentage of electrical savings in each category and what that represents of the total energy savings of the building. As well it gives an approximation of the amount of money that can be saved from energy efficiency measures.

A few examples from this table are:

- Nobleton Arena has the potential for 65% savings on electrical heating costs, translating to \$20,165. This represents an overall potential reduction of 30% in electricity usage.
- The works yard has a potential 73% savings in electrical baseload costs, equating to a cost saving of \$4,952, and 58% savings in electrical heating, amounting to a cost savings of \$4,147. The overall electrical savings potential is 65%

Table 5: Electricity Savings Potential for Mayor's Megawatt Challenge Buildings

Operation name	Electricity Savings Potential							
	Baseload		Cooling		Heating		Total	
	Avg %	\$/yr	Avg %	\$/yr	Avg %	\$/yr	Avg %	\$/yr
TOTAL: 14 facilities	19%	\$82,106	34%	\$3,882	71%	\$46,135	25%	\$132,123
Nobleton Arena					65%	\$20,165	30%	\$20,165
Works Yard	73%	\$4,952			58%	\$4,147	65%	\$9,099
Parks Depot								
King City Library/ Senior Centre	41%	\$11,903					33%	\$11,903
Nobleton Fire Hall	60%	\$4,377					55%	\$4,377
Trisan Centre	22%	\$59,267					22%	\$59,267
King City Fire Hall	23%	\$1,598			100%	\$976	30%	\$2,574
2920 King Rd - Lasky Hall					100%	\$395	29%	\$395
Schomberg Library			72%	\$839			20%	\$839
King Township Municipal Centre			100%	\$2,389	100%	\$8,805	16%	\$11,194
Schomberg Community Hall	0%	\$9			100%	\$8,415	71%	\$8,424
Alex Campbell Pump House			100%	\$653	80%	\$3,232	39%	\$3,885
King Heritage and Cultural Center								
Schomberg Fire Hall								

Table 6 is the same as Table 5 but represents natural gas savings potential for the categories of baseload and heating. A few examples from this table are:

- The Nobleton Fire Hall could save an average of 71% on gas baseload costs, amounting to \$287, and 58% on gas heating, equating to \$1,499. Overall, the total potential savings is approximately 60%, or \$1,787 per year.

Table 6: Gas Savings Potential for Mayor's Megawatt Challenge Buildings.

Operation name	Gas Savings Potential					
	Baseload		Heating		Total	
	Avg %	\$/yr	Avg %	\$/yr	Avg %	\$/yr
TOTAL: 14 facilities	28%	\$2,720	37%	\$17,997	36%	\$20,717
Nobleton Arena			50%	\$5,402	45%	\$5,402
Works Yard	100%	\$1,193	63%	\$4,242	69%	\$5,435
Parks Depot	12%	\$88	30%	\$2,912	29%	\$3,000
King City Library/ Senior Centre	5%	\$43	30%	\$1,827	26%	\$1,870
Nobleton Fire Hall	71%	\$287	58%	\$1,499	60%	\$1,787
Trisan Centre	6%	\$173			2%	\$173
King City Fire Hall	9%	\$21	36%	\$1,121	34%	\$1,143
2920 King Rd - Lasky Hall	62%	\$164	59%	\$771	59%	\$935
Schomberg Library	100%	\$675	33%	\$202	68%	\$878
King Township Municipal Centre	4%	\$21			3%	\$21
Schomberg Community Hall			2%	\$21	2%	\$21
Alex Campbell Pump House						\$0
King Heritage and Cultural Center	16%	\$48			5%	\$48
Schomberg Fire Hall	2%	\$6			0%	\$6

Table 7 exemplifies the total energy savings potential for the buildings combining the data from both Table 5 and 6. It represents the average total energy savings and costs savings associated with energy efficiency capabilities in each building.

Table 7: Total energy savings potential

Operation name	Total Energy Savings Potential		Indoor Area ft ²	GHG Emissions tonnes/yr
	Avg %	\$/yr		
TOTAL: 14 facilities	29%	\$152,840	239,360	171.5
Nobleton Arena	37%	\$25,567	31,000	42.7
Works Yard	68%	\$14,534	9,500	41.4
Parks Depot	25%	\$3,000	30,494	22.1
King City Library/ Senior Centre	30%	\$13,773	21,000	15.5
Nobleton Fire Hall	58%	\$6,163	4,359	13.8
Trisan Centre	19%	\$59,440	67,996	9.7
King City Fire Hall	33%	\$3,717	7,987	8.8
2920 King Rd - Lasky Hall	55%	\$1,330	2,476	6.9
Schomberg Library	51%	\$1,717	3,601	6.6
King Township Municipal Centre	16%	\$11,215	40,000	1.8
Schomberg Community Hall	49%	\$8,444	4,166	1.4
Alex Campbell Pump House	39%	\$3,885	678	0.6
King Heritage and Cultural Center	3%	\$48	6,340	0.4
Schomberg Fire Hall	0%	\$6	9,763	0.0

Fleet

Fleet emissions account for about 50% of King Township's total corporate emissions (677.78 tCO₂e). Figure 10 shows the township's fleet emissions from 2018-2023. As the population grows, more fleet vehicles are needed to meet community demands, leading to an inevitable rise in GHG emissions. However, this increase is slowing as more alternative fuel vehicles replace fuel-powered assets, for example the expansion of fully electric vehicles and hybrid vehicles now integrated into the Town's fleet inventory.

Year-over-year emissions growth is generally linear, except for a spike in 2020 when COVID-19 restrictions required only one staff member per vehicle, leading to more vehicles on the road.

Figure 11 shows that in 2023, 71% of vehicles were diesel, while the remaining were gasoline-powered.

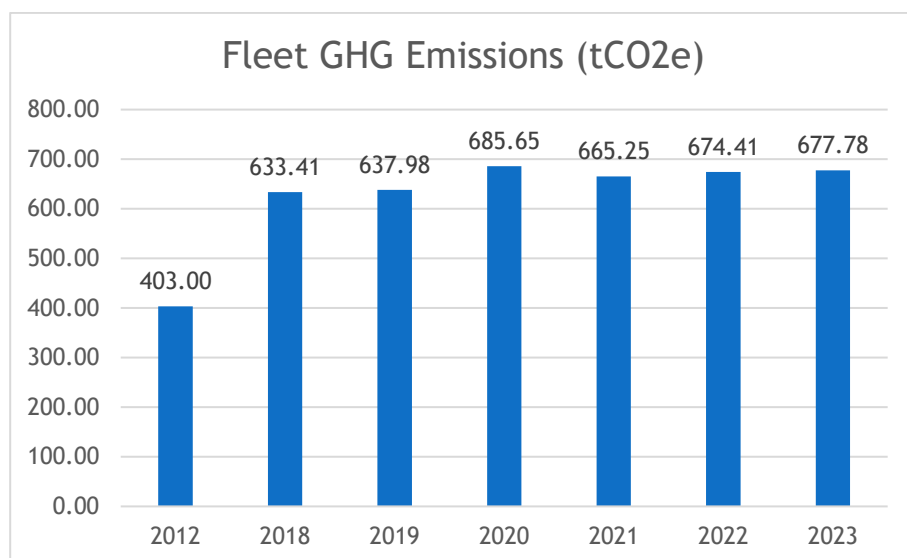


Figure 9: King Township's yearly GHG emissions from fleet from 2018 to 2023

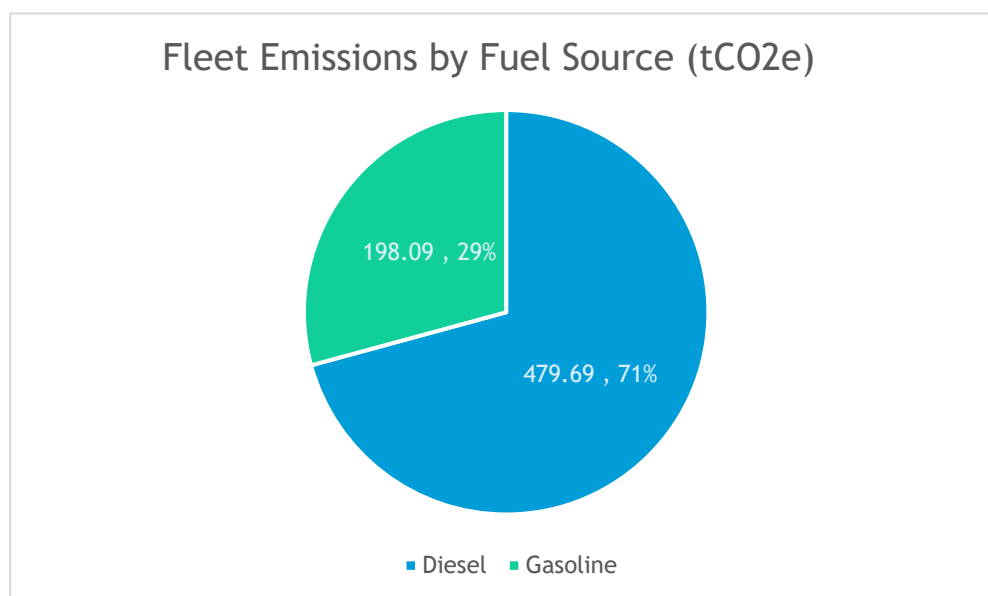


Figure 10: Percentage of King Township's fleet emissions from diesel versus gasoline fuel in 2023

Actions

This section outlines actions for the next 5 years to reduce emissions and meet our 2030 and 2050 net zero emissions targets. The chart is divided into three parts: general corporate energy efficiency actions, fleet specific policies, and facility specific operational measures to improve building energy efficiency. The 'operational measures' for all buildings in King Township will be prioritized using data from Tables 4-7, focusing on the top 10 highest emitting buildings to target those with the greatest GHG reduction potential and need.

Table 8: Priority actions to reduce GHG emissions and energy usage in King township from 2024 to 2029.

General Corporate Energy Efficiency Actions

Action	Relevant Department	Measurement & Verification	Timeline	Notes and details
Development of Energy Conservation Team	All Corporation	Implementation of team and responsibilities	Short Term	The creation of an interdepartmental energy management team to address energy conservation and reduction measures throughout the entire corporation, help with funding of projects, and general education
Creation of a long-term financing plan for Energy Management	Environment Outreach & Sustainability & Finance Dept.	Completion and implementation of financing plan	Mid Term	Consider different financing models for energy management projects and initiatives, ex. a circular funding model
Corporate Workshops on Emissions and Reductions	All Corporation	Implementation of education material and learning sessions	On going	Corporate wide workshops on energy reduction measures employees can complete
Expand Corporate Energy Reporting and Distribution	All Corporation & Environment Outreach & Sustainability	Distribution and awareness of report among departments	Mid Term	Implementation of corporate utility tracking and distribution through software or internal system
Creation of Energy Management Guidelines and Standards for Capital Projects and Facility maintenance	All Corporation	Completion and implementation of the guidelines and standards	Long Term	The creation of guidelines and best practises for facility operations and capital projects, focusing on procurement of material, and decisions making around updating mechanical systems within buildings

Fleet Policies

Action	Relevant Department	Measurement & Verification	Timeline	Notes
Right-Sizing Policy	Fleet & All Corporation	Completion and implementation of the policy	Short Term	Creation of internal policy to ensure proper sized vehicles are being chosen for work
Alternative Fuel Fleet Policy	Fleet	Completion and implementation of the policy	Mid Term	Creation of internal policy to manage the procurement of alternative fuel vehicles within the corporate fleet
Anti-Idling Policy	Fleet & All Corporation	Completion and implementation of the policy	Short Term	Creation of corporate anti-idling policy to manage the corporate fleet idling

Facility Specific Operational Actions

Action	Relevant Building	Measurement & Verification	Timeline	Annual Projected Energy Savings (ekWh)	Annual Projected GHG savings (tCO ₂ e)	Annual Projected Cost Savings (\$)
Enhanced Lighting Controls and Maintenance: Ensure facility lighting is controlled by occupancy schedules and daylight availability. Use BAS systems wherever possible. Install occupancy sensors where appropriate. Replace any remaining fixtures with LED and / or use energy efficient long-life bulbs.	All buildings where applicable	Energy modeling and reporting, statistically significant measurements. Percentage of fixtures have been changed. <i>(Verification & Auditing)</i>	Short – Mid Term	348 - 8190	0.09 – 0.61	\$59 – 1,310
Air leakage reduction: Install new weatherstripping on existing exterior doors to reduce air leakage and lower heating and cooling costs. Inspect and replace/maintain any damaged caulking around external windows. Take thermal images (infrared (IR)) of external walls and roof (where accessible) to identify sources of infiltration, thermal bridging and insulation issues.	All buildings where applicable	All weathering stripping is completed, and a regular audit has been put in place. System inspections complete and repairs done.	Short-Mid Term	100 – 14,651	0.05 – 2.22	\$25 - 925
Electric heater controls: If not part of BAS system, ensure all electric heaters have digital controls and are on an occupancy schedule. Ensure temperature setpoints in vestibules are minimized - they should be set several degrees cooler (or warmer in the summer) than the internal space temperatures.	King City Fire Hall Nobleton Arena Nobleton Community Hall Nobleton Fire Hall Nobleton Library Pottageville Pavilion Schomberg Hall	System controls reviewed and upgrade/adjustments completed.	Mid- Long Term	-	-	-
HVAC scheduling: Program the existing thermostats to use setback temperatures when the facility is unoccupied. Ensure HVAC schedules and setback temperatures are reviewed every 6 months and that occupancy schedules are both activated and accurate. Temperature setpoints	All buildings where applicable	System controls reviewed and upgrade/adjustments completed.	Mid Term	780 – 86,721.69	0.09 – 6.93	\$114 – 3,515

should be set back during unoccupied periods.						
Air source heat pumps: Determine the optimal spaces for the use of air source heat pumps. As the existing HVAC units reach end of life, install an air source heat pump where appropriate.	All buildings where applicable	Process put in place to replace end of life boilers with air source heat pumps. Emergency fund for replacement of boilers with air source heat pumps under emergency circumstances.	Ongoing	22,476 – 104,959.93	0.45 – 17.04	Over time
Solar Panels: Determine optimal facility for a rooftop solar installation. Obtain feasibility grade proposal to assess viability.	King City Fire Hall King Township Museum Nobleton Arena Nobleton Community Hall Nobleton Fire Hall Parks Depot Works Yard	Install solar panels at appropriate locations indicated by feasibility studies. Conduct feasibility studies for solar panel installation at all new Township builds.	Long Term	1,440 – 189,128	N/A	560 – 32,023
Underutilized Appliances: Consider removing unnecessary appliances/unplugging appliances when they are not in use or facility is closed for the season. Remove Kitchens	Cold Creek Conservation Area Nobleton Arena Nobleton Fire Hall Pottageville Pavilion Schomberg Library Works Yard	Annual assessment of appliance uses and practicality.	Ongoing	576 – 1,044	0.03 – 0.05	94 - 170

Roadmap to Net Zero Ice Rink Pilot: Trisan Centre

In 2021 King Township and the Mayors Megawatt Challenge participated in the *Roadmap to Net Zero Ice Rink Pilot project*, which developed net zero building operational plans over time for ice rinks in seven municipalities across the province. The table below outlines low/zero carbon measures based on equipment end-of-life. For each measure, a description of the measure, upfront costs, carbon equivalent savings, energy savings, and net present value are presented. Both upfront costs and life cycle cost analysis are included in the analysis and the budget for each measure are based on costs from suppliers and previous experience. Life cycle costing has been calculated, this is the total cost of the measure including up front, operational and carbon costs and incorporating inflation and other considerations. Many of action items have already been completed in the 2023 Trisan Recommissioning project, the left over items are outlined in the table below, implementing all of these measures will bring the Trisan Centre 80% toward net zero, leaving only 28.7 tonnes CO₂e remaining.

Table 9: Roadmap to Net Zero Ice Rink Pilot Project Trisan Centre Specific Actions.

System	Initial Outlay of Costs (\$)	Total Net Annual Savings (\$)	Emission Savings (t CO ₂ e)	Simple Payback (yrs)	NPV ^{1 2} Without Funding (\$)	% Target Emission Savings
Boiler plant replacement with electric boiler back up + heat recovery loop from the plant	\$248,333	-\$20,680	38.50	-	-\$579,703	35%
Install solar PV on roof	\$881,672	\$78,772	15.38	11.19	\$1,533,491	14%
Low emissivity ceiling	\$66,640	\$11,534	9.80	5.78	\$330,852	9%
Replace existing dehumidifiers with desiccant regeneration by heat recovery from refrigeration	\$204,000	\$957	4.98	213.15	-\$254,806	5%
Replacement of ventilation and fan coil units	\$181,188	\$1,952	0.74	92.81	-\$217,178	1%
VFDs on compressors	\$51,980	\$12,069	0.04	4.31	\$226,292	0%
Full replacement of refrigeration plant like for like	\$1,098,000	\$0	0.00	-	-\$712,505	0%
Underslab heating optimization. Reduce circulation loop water temperature to 38°F.	\$2,500	\$1,497	-0.06	1.67	\$38,806	0%

² Net present value considers initial costs, annual utility costs, any change in annual operation and maintenance costs and any significant replacement costs during the life expectancy of the replaced equipment. When a measure has a positive NPV, it is recommended. With a negative NPV, the decision is less straightforward and should be based on the trade-offs between emission savings, creation of financial value, and other considerations. The measures recommended in this report have a positive NPV, or positive emission savings, or both. If a measure has a negative NPV, negative impact on emissions, and is not required to support other low carbon measures, then it was not recommended. *Mayors Megawatt Challenge (2021)*.

Next Steps

To comply with provincial regulations King will continue to report our annual energy usage through the Broader Public Sector Reporting with the Ministry of Energy. These annual reports provided to the Ministry of Energy, will also be provided to King Township senior management and council to identify areas of progress, needing improvement and successes.

The acquisition of Energy Management Information Software (EMIS) will allow King staff to more effectively monitor facility energy consumption in tandem with staff training on commercially available monitoring programs/software. The creation of a Corporate Energy Management team will allow communication, knowledge sharing, and the implementation of energy management actions by fostering collaboration across departments. Ultimately, a corporate energy management team creates a culture of sustainability, where everyone is aligned and empowered to contribute to energy-saving goals.

The implementation of actions in this plan will begin once endorsed by council. Actions will be implemented based on timeline goals set out in the plan.

Appendix A:

Appendix A chart shows the comparison GHG emissions for all Corporate Buildings from 2022- 2023.

