CITY OF ORILLIA ENERGY CONSERVATION & DEMAND MANAGEMENT PLAN

2024 Update

Prepared in compliance with O. Reg. 507/18, requiring Ontario's BPS (broader public sector) to prepare an updated energy conservation and demand management plan every 5 years. *Approved by senior management*.

To inquire or request any additional information regarding this plan, please contact:

Robert Dick
Supervisor of Environmental Sustainability & Climate Change
City of Orillia
Email: rdick@orillia.ca
Phone: 705-826-4415

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Introduction

The City of Orillia's first Energy Conservation and Demand Management (CDM) Plan was created in 2014 in compliance with Ontario Regulation 397/11, the *Green Energy Act 2009*. The 2014 Plan presented baseline electricity and natural gas data from 2011 and outlined a number of overarching strategies to enhance the City's energy conservation and efficiency efforts. In 2019, in compliance with Ontario Regulation 507/18, *Electricity Act 1998*, an update to the City's CDM plan was developed utilizing 2018 electricity and natural gas data, the 2019 report can be found here.

In compliance with Ontario Regulation 507/18, *Electricity Act 1998,* this report serves as the 2024 update to the City's CDM plan and has been developed utilizing 2023 electricity and natural gas data.

Since completing the 2014 and 2019 plans, the City of Orillia has pursued various projects and actions to reduce energy consumption and enhance sustainable operations. This plan will compare the City's progress between the two previous plans' consumption and trends along with the City's 2023 electricity and natural gas data.

Strategic Direction

The City's 2019 CDM Plan was guided by the Strategic Plan conducted by the previous term of Council, which strengthened the City's environmental commitments. Orillia's City Council and senior leadership have endorsed City staff's efforts to develop long-term strategic plans that focus on the City's sustainability and climate change action.

As part of the 2022 to 2026 Council term, Orillia Council identified 'Community First' as one of its priorities. This entails helping the community with things that matter, such as implementing the City's Climate Change Action Plan, which was adopted by Council in April 2022. In order to implement the Climate Change Action Plan, it is imperative that a robust energy management plan that prioritizes energy efficiency measures is enhanced and aligned with the City's environmental sustainability and climate change plans.

Energy Management Principles

The City of Orillia's energy management practices will continue to focus on opportunities for energy efficiency, the integration of renewable energy generation, and low-emissions opportunities for the City's assets, including facilities, fleet and overall asset management. Our guiding principles encompass the 3 Big Moves outlined in the City's Climate Change Action Plan: Renewable Energy, Buildings, and Transportation.

The main benefits to the City include:

- Reducing greenhouse gas (GHG) emissions related to energy use, thereby enhancing environmental performance.
- Reducing energy use also reduces energy costs, such as rising rates and carbon payments.

- Durable and efficient assets ensure high performance equipment is prioritized, thereby reducing increased maintenance and labour costs.
- Acting as a leader and steward for environmental action.

As the City pursues energy planning and climate change action implementation, a consistent approach will be employed:

- Analyze energy sources and data.
- Standardize and categorize facilities by type and size, identify outliers, and create performance indicators to compare.
- Set objectives and targets.
- Create an action plan with plans, projects, and policies that align with objectives and support meeting targets.
- Monitor progress and evaluate performance to ensure effectiveness, evolve and change plan to enhance.

Goals and Objectives

The City's Council Priorities have prioritized sustainability and climate change action, both of which are supported by a strong energy management plan.

Orillia's Vision:

"Orillia is progressive and sustainable, offering an exceptional quality of life, vibrant culture, beautiful waterfront and a compassionate, welcoming and inclusive community."

As it relates to energy management, and as outlined in the City's Climate Change Action Plan, the City of Orillia and the community are committed to reducing energy use and striving to achieve 100% renewable energy and energy conservation before the year 2050. Additionally, the City is striving to fuel switch 100% of its heating sources ahead of 2050, choosing electric sources or non-emitting sources including green hydrogen.

To help guide the City of Orillia in achieving its climate-driven goals and targets, the Climate Change Action Plan proposes three Big Moves related to local renewable energy generation, transportation, and buildings. Each Big Move is supported by several actions to help curb emissions and improve energy efficiency in corporate operations and across the community at large.

Energy Performance Trends – 2018 – 2023

Facility Trends

Over the five years between 2018 and 2023, changes occurred that influenced the facilities included in the City's energy management process:

- Facility sales, transfers and/or closures:
    - Orillia Police building – 47,000 sq. ft. – Peter Street South – decommissioned
    - Teletech (Nordia) building – 42,000 sq. ft. – University Avenue - sold
- New facility construction:
    - Orillia Recreation Centre – Opened in 2022 – 132,801 sq. ft.

These changes increased the City's building footprint from 473,536 square feet in 2018 to 559,337 square feet in 2023, a net increase of 85,801 square feet or 18.1% (see Table 1).

Table 1 - Annual Square Footage

Year	Square Footage
2018	473,536
2023	559,337
5 Year Delta	+85,801 (18.1%)

Heating and Cooling Degree Days

Heating degree days below 18 degrees Celsius in Orillia fluctuate annually but decreased from 4,516 in 2018 to 3,943 in 2023. This climate change would prompt a decrease in heating needs, primarily from natural gas and electricity. In comparison, the past ten years resulted in an average of 4377 heating degree days below 18 degrees Celsius, while the past 20 resulted in an average of 4425.7 heating degree days below 18 degrees Celsius. This trend signals an increase in temperature in the colder months, resulting in fewer days where heating is required in buildings.

Cooling degree days above 18 degrees Celsius in Orillia also decreased from 258 to 137 between 2018 and 2023, a decrease of 88.32%. This change in climate would prompt a decrease in cooling needs for electricity. Over the past ten years the average cooling degree days above 18 degrees Celsius was approximately 172. Conversely, the average cooling degree days for the past 20 years was approximately 165, highlighting a slight average increase in the number of days where cooling is required in buildings.

These factors are to be considered when reviewing the change in energy use between 2018 and 2023.

Table 2 - Heating and Cooling Degree Days

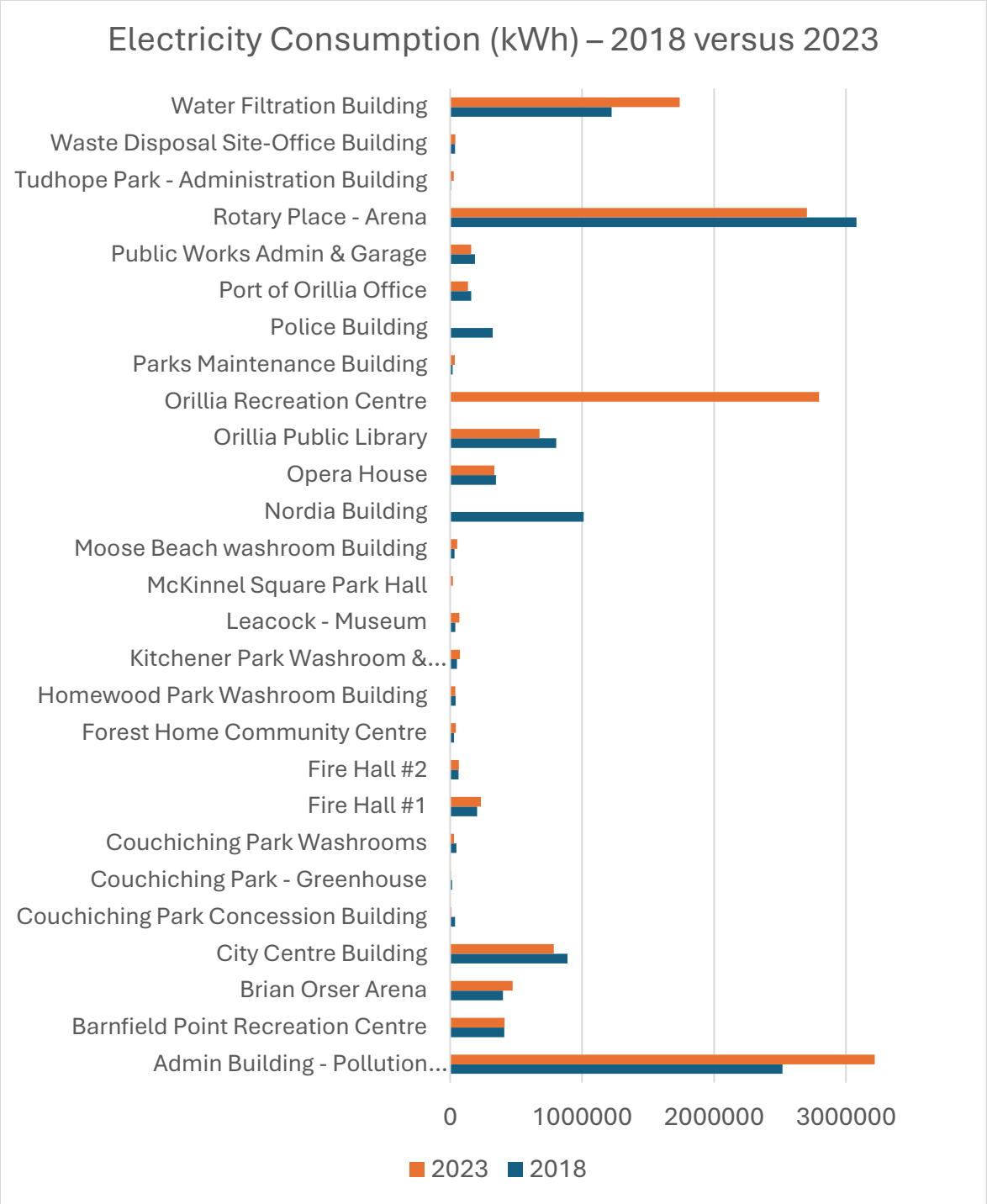
Year	Heating Degree Days	Cooling Degree Days
2018	4516	258
2023	3943	137
Past 10 Years (average)	4377	172
Past 20 Years (average)	4426	165

Key Performance Indicator – Electricity Consumption

Electricity consumption increased by 18.42%, from 11,974,950 to 14,180,955.35 kilowatt hours (kWh). While this is a sizeable increase, the increase is mostly due to the opening of the Orillia Recreation Centre, which was responsible for 2,796,552.7 kWh of the 14,180,955.35 kWh total. The

decommissioning of the Police Building and the sale of the Nordia Building also represented large changes in electricity usage between the two years. These two buildings accounted for 1,334,682 kWh of electricity usage in 2018 and 0 kWh in 2023. Excluding these new and decommissioned or sold buildings, the remainder of the City buildings saw an increase of roughly 7% in electricity usage, even in a year with fewer heating and cooling degree days.

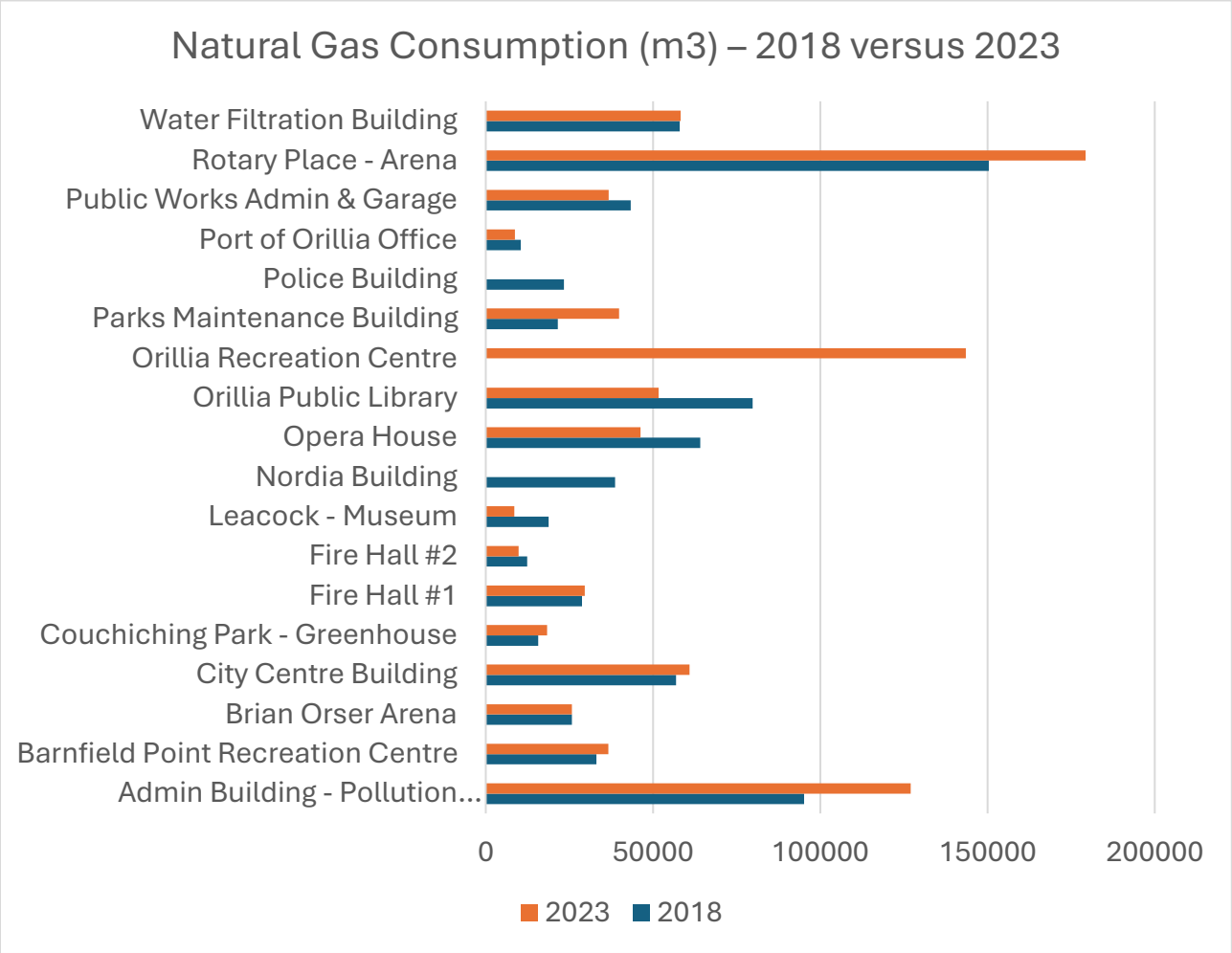
Electricity usage was predictably higher in the City's process-based facilities, such as water, wastewater, and recreation facilities, where increased demand is expected, and lower in administrative buildings. There were significant increases in electricity usage at the City's water filtration and wastewater buildings between 2018 and 2023, identifying opportunities for efficiency improvements moving forward. These increases in natural gas and electricity usage were due to process adjustments, with new components being introduced, aging equipment, and repairs to boilers and booster pumps forcing a switch to natural gas. Conversely, other flagship City facilities, including the City Centre building, Public Library, and Rotary Place arena, all saw significant electricity decreases between 2018 and 2023 due to upgraded efficiency measures and retrofits. In total, the kWh per square foot ratio remained relatively constant at roughly 25.3 for 2018 and 2023.



Key Performance Indicator – Natural Gas Consumption

Natural gas consumption increased by roughly 14% from 775,959 to 880,981 cubic meters (m^3). This is an expected outcome, given the increase in total square feet of facilities due to the opening of the Orillia Recreation Centre, even though heating and cooling degree days both decreased in 2023. The largest increases in natural gas usage between 2018 and 2023 were attributed to the

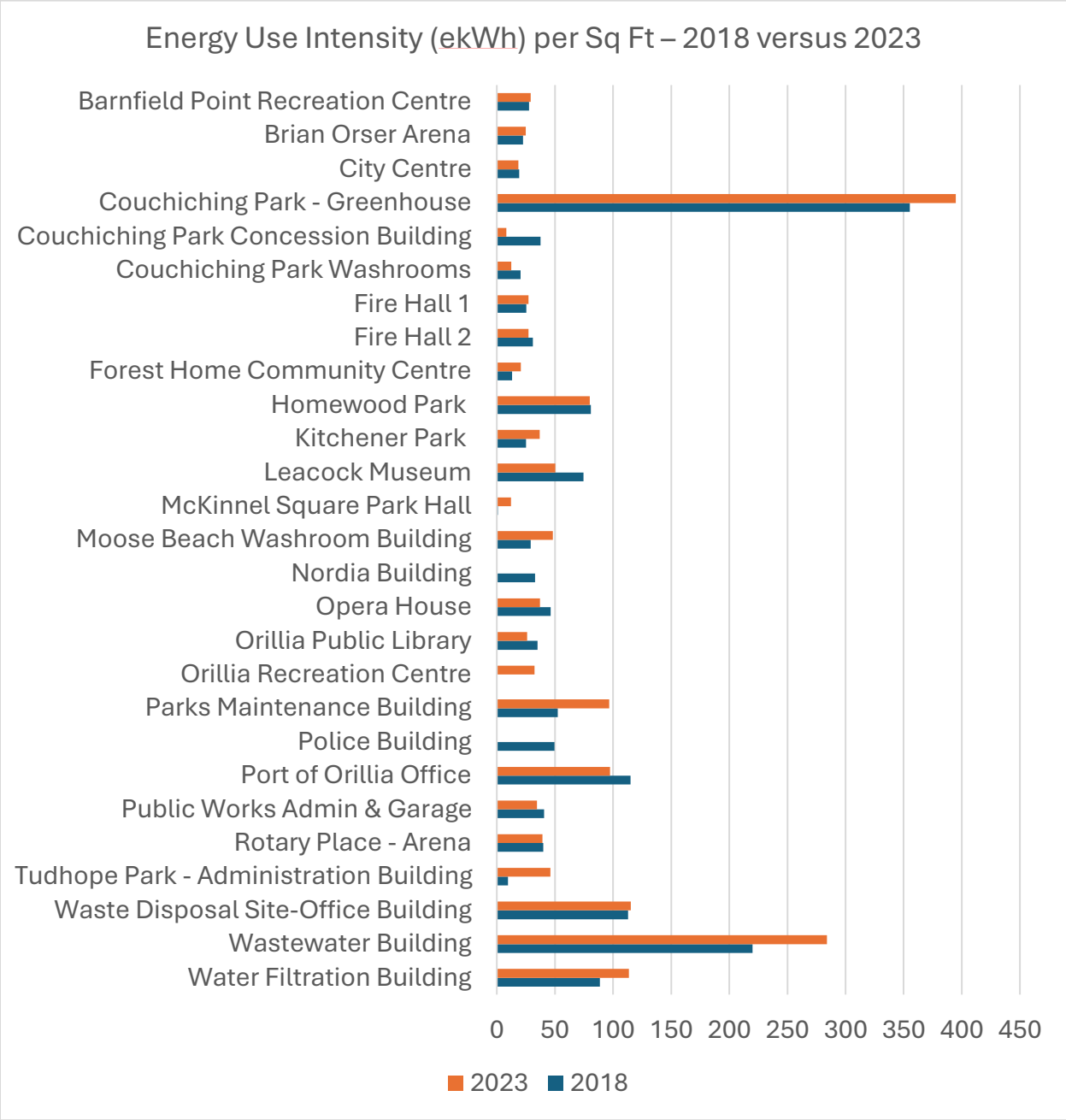
City's Wastewater Facility and Rotary Place Arena. Other major facilities, such as the Orillia Public Library and Opera House, saw significant reductions in natural gas usage, while many of the other facilities had relatively constant usage. The Police and Nordia buildings were decommissioned or sold between 2018 and 2023, leading to a stark decrease in natural gas usage, although the opening of the Orillia Recreation Centre offset this reduction. Orillia's facilities used approximately 1.58 m^3 of natural gas per square foot of building space in 2023, compared to 1.64 m^3 of natural gas per square foot in 2018. This trend is an indication of the improvement of natural gas efficiency measures through city operations.



Key Performance Indicator – Energy Use Intensity

The energy intensity of a facility – calculated by combining electricity and natural gas use into a common factor of 'equivalent kilowatt hour' – allows for the comparison of various facilities' energy consumption. Comparing ekWh per square foot can facilitate benchmarking of a facility versus the industry standards and best practices. Depending on the function of a facility, energy use intensities (EUIs) are lower for administrative and storage facilities where heating and cooling

demands are relatively lower and higher for process-based facilities such as wastewater, water, and recreation facilities, where electricity and natural gas demands are higher.



Key Performance Indicator – Greenhouse Gas Emissions

As a result of the increase in energy usage from the introduction of the new Orillia Recreation Centre, greenhouse gas emissions increased from approximately 1775 tonnes CO2e in 2018 to 1985 tonnes CO2e in 2023, an increase of 11.83%. The entire increase in emissions can be

explained by the opening of the Orillia Recreation Centre, a large building. To strategically prepare for the increase in energy use, the Recreation Centre was built to support a rooftop solar PV system that would contribute to a portion of the facility's energy use. Solar PV and other energy efficiency measures across all City facilities will be essential in driving down energy usage and GHG emissions, especially as the City's building stock expands.

Even though the City recognized a net increase in total emissions due to the introduction of new buildings, the amount of CO2e per square foot actually decreased from approximately 0.0037 tonnes per square foot in 2018 to 0.0035 tonnes per square foot in 2023.

Table 3 - Greenhouse Gas Emissions

Year	2018	2023	5 Year Delta
CO2e (t)	1775	1985	+210 (+11.83%)

Energy Conservation Measures

Development of Climate Change Action Plan

In April 2022, City Council adopted the Climate Change Action Plan, which serves as a roadmap for climate action decision making and priority setting in the City of Orillia over the next 30 years and sets ambitious greenhouse gas reduction targets. The climate targets outlined in the action plan include reducing community emissions by one-third over 2018 levels by 2030, achieving net-zero emissions for all city operations by 2040, and achieving net-zero emissions for the entire community by 2050. Orillia will reach its Net Zero targets by following three Big Moves: Local Renewable Energy, Transportation, and Buildings. Each of these Big Moves includes different actions that will reduce GHG emissions while improving quality of life and affordability for Orillia residents and businesses. These actions are also anticipated to bring major economic benefits to Orillia, generating an estimated $2 billion in net financial returns for the community by 2050 and creating approximately 260 new local jobs annually, with the majority in residential and commercial building retrofits and infrastructure investments.

Climate Change Adaptation Strategy

In August 2023, the Climate Change Adaptation Strategy was received by the City of Orillia Council. The strategy will ensure that the City is adapting our natural, built, and social systems to meet the changing conditions brought on by climate change. The City of Orillia worked with ICLEI Canada through their Building Adaptive and Resilient Communities (BARC) framework, which provides a structured approach to adaptation planning. The goal of the plan is to build upon the existing actions taken by the City of Orillia to address climate change and allow the City of Orillia to proactively identify opportunities for action that advance the community further towards climate resilience of its social, economic, built, and natural systems. The City is looking into pursuing green

develop standards as part of the Official Plan update, and have those standards include resilient building requirements for any new development.

EV Charging at Corporate Facilities

Over the last few years, the City of Orillia has installed two level 2 Electric Vehicle charging stations at the Orillia Recreation Centre. These charging stations are open to the public and can be accessed 24/7 to charge electric vehicles. The City also unveiled two level 2 electric vehicle charging stations for public use at the Orillia City Centre, as well as two level 2 chargers at Fire Hall 1 to charge the facility's electric vehicle.

Orillia Recreation Centre Building – New Construction & PV Ready

The Orillia Recreation Centre was built and opened to the public in 2021. The City of Orillia worked with a local community group – Orillia Community Energy – to evaluate the feasibility of installing solar PV on the rooftop of the recently opened Orillia Recreation Centre. A proposed 125 to 150-kilowatt project would occupy approximately 11,000 square feet of the rooftop and generate 150,000 kilowatt hours (kWh) of clean electricity per year. A combination of funding opportunities and sources would be necessary to see the project through in the future. The City of Orillia is actively seeking funding opportunities to bring this project to fruition.

LED Streetlight Program

In 2020, approximately 3,300 lights in the City's extensive streetlight network were converted from HPS lamps to LED lamps to improve energy conservation, save costs on electricity, as well as improve the lifespan and maintenance impacts of having a durable and long-lasting LED light network. Smart lighting controls were included to maximize energy savings, reduce maintenance costs, and minimize light pollution. The Smart Controls also allowed for the streetlight network to be "future-proof" and allow for additional Smart City applications later on.

At a capital cost of $2,400,000, annual operating costs have been significantly reduced, offsetting the expenditure with an estimated payback of less than six years (including the Smart Lighting Control costs). A 40-70% potential savings in energy costs have been reported through similar upgrade projects. Reduced electricity costs, maintenance and repair costs, as well as administrative costs on an annual basis will be saved by moving to LED lighting. A rebate of $300,000 to support the viability of the project was received.

Through the 2024 capital budget, staff were provided with funds to design and convert all exterior facility lighting, parks and sports field lighting, and parking lots lights to LED, which will provide further energy savings as a result. This project is expected to be completed by the end of 2025.

GHG Audits & Building Condition Assessments

In 2023, City staff completed the process of conducting greenhouse gas audits and building condition assessments on all the City's major facilities. The output of this project was a list of comprehensive reports detailing energy efficiency measures and evaluating the life cycle of our building stock and infrastructure assets. The objective of these reports was to provide the City with a roadmap for getting to Net Zero emissions and reaching its climate change action goals. The reports provide detailed summaries and suggestions for which measures to undertake, and when they strategically should be completed. Now that the city is equipped with a strong plan for

reducing energy and emissions in facilities, staff have integrated many of these measures in the upcoming 10-year capital plan and will begin to implement the identified measures. As a result, the city can expect to see significant emissions and energy reductions in the coming years.

Solar Array Suitability Analysis

In support of Big Move 1 – Local Renewable Energy in the City's Climate Change Action Plan, staff completed a solar array suitability analysis study in 2023 to identify the available feasible space in Orillia where solar panels could be placed in the future. As part of this study, staff also collected information on the available funding resources and current programs in operation by other municipalities to help shape the plan for solar power moving forward. In the coming years a more detailed strategy will form around the plan for solar installation on city facilities. However, several solar opportunities have already been identified in long term plans.

Future Initiatives & 2024 Capital Projects

Library LED Upgrade

In 2024, Staff will complete a capital project to retrofit all interior and exterior lighting fixtures at the Public Library. The project will evaluate the lighting control system being used and replace all existing lighting fixtures with LED bulbs. In total, roughly 1,100 lightbulbs will be replaced with efficient alternatives, contributing to approximately 73,000 kWh savings per year, resulting in cost savings for the City and an approximate reduction of 2.19 tonnes of CO_2e per year depending on energy coefficients.

Water fixtures at Rotary Place & Wastewater Treatment Centre

Several capital projects focusing on retrofitting the water fixtures at key corporate facilities, including the Rotary Place Arena and Wastewater Treatment Centre, are scheduled to be completed in 2024. These projects will not only reduce water usage at facilities that generally use large amounts of resources but also optimize energy usage by limiting the amount of energy used to heat water.

GHG Emissions Annual Inventories

As part of a 2024 capital project focused on evaluating the Climate Change Action Plan and understanding where the City has made progress toward its climate targets, staff were trained in the processes involved in conducting a GHG emissions inventory. Through the collection of annual energy consumption data, staff are now equipped to conduct a GHG emissions inventory on a yearly basis. This accurate approach to measuring climate action progress will allow the City of Orillia to evaluate the impact of implemented actions and periodically identify areas of opportunity for reducing energy use in the building stock.

Brian Orser Arena Reconstruction

One of the City's arenas, the Brian Orser Arena, will begin a large-scale reconstruction in 2024 to extend its lifecycle significantly. As part of the project, staff have integrated several energy efficiency measures into the design to optimize the building's performance and reduce GHG emissions. Several measures, including high-efficiency heat recovery units for dressing rooms, new roof and wall insulation, an electric ice resurfacer, a high-efficiency evaporative condenser, and a high-efficiency rooftop unit for the multi-purpose room will help contribute to an approximate 27% decrease in energy usage, and coinciding GHG emissions reductions.

Climate Lens Integration

Another important deliverable from the Climate Change Action Plan update capital project in 2024 is the development and launch of a City of Orillia Climate Change Lens Tool. This tool will provide all staff with a framework to easily evaluate the climate change impacts of capital projects, including energy efficiency benefits. It will be integrated into the City budgeting and Council reporting processes to bring climate impacts to the forefront of decision-making, alongside financial benefits and costs.