CONSERVATION AND DEMAND MANAGEMENT PLAN

2024 – 2029 Update

INTRODUCTION

In accordance with O. Reg. 25/23 Broader Public Sector: Energy Reporting and Conservation and Demand Management (CDM) Plans under the Electricity Act, 1998, broader public sector agencies within Ontario are required to develop an energy Conservation and Demand Management Plan and update every five years. A summary of the public agency's annual energy consumption and greenhouse gas emissions for its operations must be provided. The CDM plan is to include a record of measures for conserving and reducing energy consumption by the public agency's operations, and the results of these measures.

The Township of Woolwich is prescribed as a public agency and is required to record and make public our annual energy consumption and CDM plan update. The Township's updated plan was developed in compliance with the regulation and covers the period from 2024 to 2029. The plan was approved by Senior Management on June 24th, 2024.

The updated plan describes the Township's:

- Energy conservation goals, objectives, and targets
- 2023 Utility and Greenhouse Gas Emissions Data
- Results from the 2019-2024 CDM plan
- 2024-2029 Proposed energy conservation initiatives

The Township's updated CDM plan builds on the 2019-2024 plan and the experience gained in energy conservation over the past 5 years.

In addition to energy conservation, the updated CDM plan supports the Township's Strategic Plan, Asset Management Plan, and annual capital and operating budgets and workplans. More particularly, the updated CDM plan reinforces and demonstrates the Township's commitment to implementing the Climate Action Waterloo – Transform Waterloo Strategy and working towards the Council endorsed greenhouse gas (GHG) emissions reduction targets of a 50% reduction by 2030, and 80% reduction by 2050 (based on 2010 emissions).

The Township dedicates funds in both its annual operating and capital budgets to support a wide range of GHG reduction measures, including energy efficiencies, retrofits, equipment upgrades, and greening efforts. Funding for these initiatives derives primarily from the Climate Action/Green Infrastructure Reserve Fund, with 2.1% contributed to the fund annually from the general tax levy ($336,143 in 2024).

Hard copies of the CDM plan are available upon request at the Township's Administration Office, located at 24 Church St. West, Elmira.

GOALS, OBJECTIVES, AND TARGETS

The Township of Woolwich's primary goal for GHG emissions reductions is routed in Council's commitment to achieving a 50% reduction in GHG emissions by 2030, and 80% reduction by 2050. To achieve these goals, the CDM plan outlines various objectives and targets for reducing energy consumption and managing our energy demand, taking a proactive approach and focussing efforts on technical, organizational, and behavioural conservation measures.

Technical initiatives are guided by facility energy audits, the Township's GHG Reduction Pathway Feasibility study, and the Transform Waterloo Strategy, and include the implementation of facility and equipment related upgrades and retrofits that have the potential to realize reduced energy consumption and GHG emissions. The Township continues to focus on implementing electrical, water, HVAC, and fleet energy saving measures to achieve our goals.

In 2023/2024, with support from FCM through the Green Municipal Fund, the Township completed a GHG Reduction Pathway Feasibility study of our largest facilities, including the Woolwich Memorial Centre, Breslau Community Centre, St. Jacobs Arena, St. Jacobs Fire Station, and Administration Building. This study provides a roadmap for what technical measures and funding is required to achieve our GHG goals at these facilities. It also not only addresses a clear pathway for these facilities, but provides guidance for duplication at other facilities.

Organizational initiatives are those actions by the Township that guide all municipal work with a focus on energy conservation and GHG reductions. Such initiatives are guided by the Township's Strategic Plan and our internal Green Team, as well as the Transform Waterloo Strategy.

Behavioural initiatives are those measures focused on influencing behavioural change to work towards the common goal of energy conservation. The Township and Green Team continue to educate staff and focus resources towards professional development opportunities for staff to enhance knowledge, and subsequently reduce energy consumption and GHG emissions through Township operations and projects.

Our organizational energy goals include:

- Exemplify energy conservation leadership as a township within the Region of Waterloo
- Ensure effective collaboration with our community partners and communicate our energy conservation progress
- Use this plan to help our organization effectively monitor, evaluate, and measure corporate energy use

Our energy conservation and demand management objectives include:

- Enhance staff understanding of energy and water conservation through Green Team initiatives, events, and education
- Develop a new Township of Woolwich Strategic Plan that addresses and supports the Township's vision for a greener and cleaner Woolwich
- Integrate initiatives and measures from the CDM plan, GHG Reduction Pathway Feasibility, Transform Waterloo Strategy, and other guiding documents to achieve our corporate targets

Our targets towards achieving our goals and objectives include:

- Reduce corporate GHG emissions for all facilities, fleet, and operations by 50% from 2010 levels by 2030
- Reduce corporate GHG emissions for all facilities, fleet, and operations by 80% from 2010 levels by 2050
- Increase our electric vehicle fleet threefold by 2029
- Transition other fleet vehicles to hybrids where feasible/available

2023 Utility Data

See energy consumption and GHG emissions data for January 1st, 2023, through December 31st, 2023.

2023 Facility Energy Data

Facility	Activity Type	From Date	To Date	Amount	Unit	Facility Type
Bloomingdale Community Centre	Electricity	01/01/2023	12/31/2023	40,870.95	kwh	Community Buildings
Breslau Community Centre	Electricity	01/01/2023	12/31/2023	157,686.85	kwh	Community Buildings
Conestogo Community Centre	Electricity	01/01/2023	12/31/2023	4,634.41	kwh	Community Buildings
Elmira Lawn Bowling Club	Electricity	01/01/2023	12/31/2023	9,354.43	kwh	Community Buildings
Heidelberg Community Centre	Electricity	01/01/2023	12/31/2023	13,468.34	kwh	Community Buildings
Maryhill Heritage Community Centre	Electricity	01/01/2023	12/31/2023	29,850.62	kwh	Community Buildings
St. Jacobs Arena	Electricity	01/01/2023	12/31/2023	455,013.77	kwh	Community Buildings
Woolwich Memorial Centre	Electricity	01/01/2023	12/31/2023	1,233,662.94	kwh	Community Buildings
Woolwich Youth Soccer Building	Electricity	01/01/2023	12/31/2023	6,378.64	kwh	Community Buildings
totals				**1,950,920.95**	**kwh**	
Breslau Community Centre	Natural Gas	01/01/2023	12/31/2023	19,858.00	m3	Community Buildings
Heidelberg Community Centre	Natural Gas	01/01/2023	12/31/2023	2,334.00	m3	Community Buildings
Maryhill Heritage Community Centre	Natural Gas	01/01/2023	12/31/2023	3,594.08	m3	Community Buildings
St. Jacobs Arena	Natural Gas	01/01/2023	12/31/2023	40,928.63	m3	Community Buildings
Woolwich Memorial Centre	Natural Gas	01/01/2023	12/31/2023	530,901.00	m3	Community Buildings
totals				**597,615.71**	**m3**	
Bloomingdale Community Park	Propane	01/01/2023	12/31/2023	961.30	BTU	Community Buildings
Conestogo Community Centre	Propane	01/01/2023	12/31/2023	1,689.90	BTU	Community Buildings
totals				**2,651.20**	**BTU**	
Breslau Fire Station	Electricity	01/01/2023	12/31/2023	66,088.17	kwh	Fire Stations
Breslau Siren	Electricity	01/01/2023	12/31/2023	1,157.68	kwh	Fire Stations
Conestogo Fire Station	Electricity	01/01/2023	12/31/2023	5,004.81	kwh	Fire Stations
Elmira Fire Station	Electricity	01/01/2023	12/31/2023	31,199.04	kwh	Fire Stations
Floradale Fire Station	Electricity	01/01/2023	12/31/2023	19,860.43	kwh	Fire Stations
Maryhill Fire Station	Electricity	01/01/2023	12/31/2023	12,874.83	kwh	Fire Stations
St. Jacobs Fire Station	Electricity	01/01/2023	12/31/2023	32,858.54	kwh	Fire Stations
totals				**169,043.50**	**kwh**	
Breslau Fire Station	Natural Gas	01/01/2023	12/31/2023	15,547.00	m3	Fire Stations
Conestogo Fire Station	Natural Gas	01/01/2023	12/31/2023	2,993.00	m3	Fire Stations
Elmira Fire Station	Natural Gas	01/01/2023	12/31/2023	7,147.47	m3	Fire Stations
Floradale Fire Station	Natural Gas	01/01/2023	12/31/2023	15,058.00	m3	Fire Stations
St. Jacobs Fire Station	Natural Gas	01/01/2023	12/31/2023	18,476.00	m3	Fire Stations
Maryhill Fire Station	Natural Gas	01/01/2023	12/31/2023	2,246.00	m3	Fire Stations
totals				**61,467.47**	**m3**	
Administration Building	Electricity	01/01/2023	12/31/2023	210,861.35	kwh	Offices
totals				**210,861.35**	**kwh**	
Administration Building	Natural Gas	01/01/2023	12/31/2023	22,002.00	m3	Offices
totals				**22,002.00**	**m3**	
St Jacobs CUB (Warehouse) / Kelora	Electricity	01/01/2023	12/31/2023	61,398.41	kwh	Other
totals				**61,398.41**	**kwh**	
St Jacobs CUB (Warehouse) / Kelora	Natural Gas	01/01/2023	12/31/2023	16,375.00	m3	Other
totals				**16,375.00**	**m3**	

Conestogo Operations Facility	Electricity	01/01/2023	12/31/2023	8,840.36	kwh	Operations
Howard Operations Facility	Electricity	01/01/2023	12/31/2023	17,461.76	kwh	Operations
Union Operations Facility	Electricity	01/01/2023	12/31/2023	40,546.05	kwh	Operations
Lunor Pumping Station	Electricity	01/01/2023	12/31/2023	24,075.79	kwh	Operations
North Arthur Street Pumping Station	Electricity	01/01/2023	12/31/2023	19,048.13	kwh	Operations
River Run Pumping Station	Electricity	01/01/2023	12/31/2023	3,466.74	kwh	Operations
Victoria Glen Pumping Station	Electricity	01/01/2023	12/31/2023	4,189.96	kwh	Operations
totals				**117,628.79**	**kwh**	
Conestoga Works	Natural Gas	01/01/2023	12/31/2023	17,909.00	m3	Operations
Elmira Public Works - Howard	Natural Gas	01/01/2023	12/31/2023	12,068.00	m3	Operations
Elmira Public Works - Union	Natural Gas	01/01/2023	12/31/2023	15,436.00	m3	Operations
North Arthur Street Pumping Station	Natural Gas	01/01/2023	12/31/2023	73.00	m3	Operations
River Run Pumping Station	Natural Gas	01/01/2023	12/31/2023	543.00	m3	Operations
Victoria Glen Pumping Station	Natural Gas	01/01/2023	12/31/2023	93.00	m3	Operations
totals				**46,122.00**	**m3**	
Streetlights	Electricity	01/01/2023	12/31/2023	504,673.44	kwh	Streetlights
totals				**504,673.44**	**kwh**	
Bolender Park	Electricity	01/01/2023	12/31/2023	578.92	kwh	Parks
Bolender Splash Pad	Electricity	01/01/2023	12/31/2023	1,640.12	kwh	Parks
Breslau Park	Electricity	01/01/2023	12/31/2023	23,852.07	kwh	Parks
Conestogo Ball Park	Electricity	01/01/2023	12/31/2023	1,236.28	kwh	Parks
Gibson Park	Electricity	01/01/2023	12/31/2023	9,431.71	kwh	Parks
Gore Park	Electricity	01/01/2023	12/31/2023	2,605.98	kwh	Parks
Industrial Park	Electricity	01/01/2023	12/31/2023	3,952.89	kwh	Parks
Lions Park	Electricity	01/01/2023	12/31/2023	17,517.18	kwh	Parks
Memorial Park Elmira	Electricity	01/01/2023	12/31/2023	405.66	kwh	Parks
totals				**62,378.49**	**kwh**	

2023 GHG Emissions Data

Location	Type	2023
Bloomingdale Community Centre	Community Buildings	4,056.0
Breslau Community Centre	Community Buildings	67,605.0
Conestogo Community Centre	Community Buildings	2,736.0
Elmira Lawn Bowling Club	Community Buildings	232.0
Heidelberg Community Centre	Community Buildings	9,382.0
Maryhill Heritage Community Centre	Community Buildings	6,598.0
St. Jacobs Arena	Community Buildings	88,416.0
Woolwich Memorial Centre	Community Buildings	2,298,041.0
Woolwich Youth Soccer Building	Community Buildings	182.0
Breslau Fire Station	Fire Stations	38,842.0
Conestogo Fire Station	Fire Stations	6,475.0
Elmira Fire Station	Fire Stations	30,978.0
Floradale Fire Station	Fire Stations	24,865.0
Maryhill Fire Station	Fire Stations	2,346.0
St. Jacobs Fire Station	Fire Stations	24,317.0
Administration Building	Offices	34,461.0
Warehouse	Other	27,841.0
Howard Operations Facility	Operations	24,307.15
Conestogo Operations Facility	Operations	34,832.0
Union Operations Facility	Operations	55,636.0
Lunor Pumping Station	Operations	766.0
North Arthur Street Pumping Station	Operations	693.0
River Run Pumping Station	Operations	1,757.0
Victoria Glen Pumping Station	Operations	301.0
	Total	**2,787,688.2**

2019-2024 CDM INITIATIVES – Progress Update

Annual energy reporting is required under the regulation and allows the Township to understand how energy is used in our facilities, identify potential energy conservation opportunities, and track progress on energy conservation efforts. In addition to reporting through the Ministry of Environment, the Township also tracks utility consumption and GHG's through our partnership with Sustainable Waterloo Region.

This updated plan and the Township's 2030 and 2050 GHG reduction targets use 2010 energy consumption data as a baseline to track progress of our energy consumption patterns, renewable energy generation, and previous and future energy conservation measures.

Recent highlights in energy savings through the implementation of technical measures have been demonstrated at various Township facilities, including the Woolwich Memorial Centre, St. Jacobs Arena, Heidelberg Community Centre, Conestogo Community Centre, and Breslau Community Centre.

At the Woolwich Memorial Centre, a reduction in electricity use was realized through the replacement of the existing refrigeration plant and natatorium HVAC equipment. Similarly, electricity savings were realized at St. Jacobs Arena through replacement of the refrigeration chiller equipment in 2019 and installation of new dehumidification equipment in 2024. Lastly, through the recent (2024) installation of air source heat pumps at three community centres, the Township has either eliminated or significantly reduced the use of fossil fuel burning HVAC equipment at these locations.

Organizational / Behavioural Initiatives

Strategic Plan

The existing Strategic Plan was a community led initiative that established (6) focus areas that guide the decisions and actions of Council and the Township, shaping our community. New for 2024, the Township is currently in the process of completing a new Strategic Plan, which will similarly double-down on the importance of energy conservation and the importance of reducing our GHG emissions.

Goals and strategic directions of the current Strategic Plan include:

- Promote and support environmental stewardship efforts
- Promote water conservation and wastewater efficiency
- Evaluate benefits of green energy technology
- Maintain infrastructure and equipment for continuous improvement and greater efficiencies

- Ensure energy efficiency of street lighting
- Examine alternative energy services

Asset management

Staff are in the process of developing a comprehensive Asset Management Plan to provide evidence-based decision making and risk management guidelines for long-term infrastructure planning. Assets will be evaluated based on their full lifecycle costs, including costs of acquiring, operating, maintaining, renewing and disposing. This will provide an integrated business approach aiming to minimize lifecycle costs of operating assets, at an acceptable level of risk while delivering an established level of service. By implementing an Asset Management Plan, infrastructure needs can be prioritized over time with minimal repair and rehabilitation costs, and replaced when required with energy conservation a focus.

Sustainable Waterloo Region

Sustainable Waterloo Region is a non-profit organization that supports partner organizations to measure base-line consumption data in order to assist with reducing energy consumption and greenhouse gas emissions.

They assist partners in identifying appropriate measures and reduction targets and they assist with creating an implementation plan to successfully achieve established targets.

Sustainable Waterloo Region works with the Township on various initiatives, including assisting the Green Team to generate innovate solutions to use less energy through educational campaigns, and assisting to evaluate operations to identify potential ways to decrease consumption.

Climate Action Waterloo Region (CAWR)

Climate Action Waterloo Region is a collaboration between local organizations, community members, and municipalities within Waterloo Region focused on climate change mitigation. CAWR, working with all local municipalities was integral in achieving support for the 80% greenhouse gas emission reduction goal by 2050. Following this endorsement, this same collaborative was responsible for developing the TransformWR strategy, which outlines our community's pathway to 80% by 2050, and identifies local actions that can be taken in Waterloo Region to reduce emissions 50% by 2030.

Green Team

The Township's Green Team, with representation from core function areas such as Recreation and Community Services, Infrastructure Services, the CAO's office, and

more, meets monthly to review energy conservation initiatives, discuss annual workplans, plan events, and share “Green Tips” with staff. The focus of the team is to demonstrate leadership in environmental stewardship for the Township, and to serve as a forum for addressing specific energy efficiency, environmental and sustainability issues and aid departments in pursuing efficiencies.

Other

Other organizational and behavioural initiatives implemented from the previous CDM plan included:

- Campaigns to encourage staff to “Hit the Switch” when vacating meeting rooms and offices
- Implement anti-idling campaign for the corporation
- Provide Township staff and public increased opportunities for recycling in facilities
- Implement water bottle filling stations at additional facilities to reduce waste

Technical Initiatives

Woolwich Memorial Centre (WMC)

The following is a summary of the progress and achievements in energy conservation made by the Township of Woolwich since the previous CDM plan.

Projects completed between 2019 and 2024 to increase building operating efficiencies:

- Retrofitted LED lighting in McLeod arena to reduce electricity consumption (2019)

Retrofit Lighting Project	McLeod Arena
Project Cost	$97,862
Annual Kilowatt Savings	112,781
Annual Energy Savings	$27,114
ROI Payback	4 years

- Installation of a combined heat and power unit to both supply electricity and waste heat to the facility, reducing our annual electricity consumption from the grid by 1,278,671 kWH (2019)
- Retrofitted LED lighting in the pool and all exterior areas to reduce electricity consumption (2021)
- Installation of private electric vehicle (EV) charging station to support Township’s fleet transition to EVs

- Retrofitted LED lighting in common lobby areas to reduce electricity consumption (2022)
- Replacement of existing refrigeration plant, contributing to reduced electricity and natural gas consumption (2023)
- Replacement of existing natatorium dehumidifier/air handler, contributing to reduced electricity consumption (2023)
- Replacement of both refrigeration plant and natatorium dehumidifier/air handler automated control systems, allowing greater abilities for programming, and hence contributing to reduced electricity and natural gas consumption (2023)
- Retrofitted LED lighting in dressing rooms to reduce electricity consumption (2024)
- Completed a GHG Reduction Pathway Feasibility study with Consultants (Cimco and Enviro-Stewards), reviewing WMC utility consumption to determine technical measures required to achieve GHG reduction targets (2024)

St. Jacobs Arena

- Replacement of existing shell and tube chiller refrigeration equipment with plate and frame heat exchanger, contributing to reduced electricity consumption (2019)
- Replaced existing arena lobby roof, adding insulation with a greater R-value to contribute to a tighter building envelope and hence reduce energy consumption (2021)
- Replaced all lobby HVAC equipment and automated systems, contributing to reduced electricity consumption (2021)
- Replaced existing (2) mechanical dehumidifiers with desiccant wheel dehumidifiers that have the ability to be integrated into a refrigeration waste heat loop (2024)
- Completed a GHG Reduction Pathway Feasibility study with Consultants (Cimco and Enviro-Stewards), reviewing St. Jacobs Arena utility consumption to determine technical measures required to achieve GHG reduction targets (2024)

Breslau Community Centre

- Retrofitted LED lighting in the parking lot and building exterior to reduce electricity consumption (2022)
- Installation of (2) air source heat pumps to reduce reliance on and use of natural gas (2024)
- Completed a GHG Reduction Pathway Feasibility study with Consultants (Cimco and Enviro-Stewards), reviewing Breslau community Centre utility consumption to determine technical measures required to achieve GHG reduction targets (2024)

Conestogo Clubhouse

- Replacement of the propane furnace with an air source heat pump to eliminate use of propane (2024)

Heidelberg Community Centre

- Installation of air source heat pump to reduce reliance on and use of natural gas (2024)

Woolwich Youth Soccer Office Building

- Installation of (2) air source heat pumps to replace window air conditioners and baseboard heating, reducing electricity consumption (2024)

Parks

- Installation of four public electric vehicle charging heads in St. Jacobs to promote the transition to EVs (2024)
- Retrofitted LED lighting at Lions Park ball diamond to reduce electricity consumption (2022)
- Retrofitted LED lighting at Gibson Park tennis courts to reduce electricity consumption (2022)
- Retrofitted LED lighting at Lions Park parking lot to reduce electricity consumption (2023)

Administration Building

- Retrofitted LED lighting throughout the interior and exterior of the facility to reduce electricity consumption (2020)
- Replaced (5) rooftop units with greater efficiency equipment, contributing to reduced electricity consumption (2021-2024)
- Completed a GHG Reduction Pathway Feasibility study with Cimco and Enviro-Stewards, reviewing the WMC to determine technical measures required to achieve GHG reduction targets (2024)

Elmira Operations Facility

- Replaced rooftop unit with greater efficiency equipment, contributing to reduced electricity consumption (2023)

Conestogo Operations Facility

- Reinsulated attic with blown-in insulation to contribute to a tighter building envelope and hence reduce energy consumption (2019)

Elmira Fire Station

- Replaced existing roof, adding insulation with a greater R-value to contribute to a tighter building envelope and hence reduce energy consumption (2021)
- Insulated exterior wall in administrative to contribute to a tighter building envelope and hence reduce energy consumption (2020)
- Retrofitted LED lighting in administrative area to reduce electricity consumption (2020)

Conestogo Fire Station

- Replaced existing roof, adding insulation with a greater R-value to contribute to a tighter building envelope and hence reduce energy consumption (2021)

Maryhill Fire Station

- Constructed a replacement fire station in Maryhill, which included energy star certified glazing, enhanced insulation, heat recovery unit, and re-use of gray water for vehicle washing and fire fighting use.

St. Jacobs Fire Station

- Completed a GHG Reduction Pathway Feasibility study with Consultants (Cimco and Enviro-Stewards), reviewing St. Jacobs Fire Station utility consumption to determine technical measures required to achieve GHG reduction targets (2024)

Equipment

- Added an EV to the Township's Recreation and Community Service fleet (2021), as well as a hybrid to the By-Law fleet (2024)
- Added electric hand tools and landscaping equipment to our inventory, including blowers, string trimers, etc. to reduce reliance on and use of gasoline (2022-2024)

CHANGES FROM PREVIOUS PLAN TO ACHIEVE GOALS AND OBJECTIVES

While the Township implemented the majority of conservation objectives from the 2019 plan, we continue to identify potential measures to ensure savings continue and that new conservation efforts and technologies are adopted. To achieve continued success, the Township's Green Team and staff continue to consider such opportunities for energy conservation and related operations savings.

The CDM plan is reviewed by our Green Team to monitor progress and results of the proposed measures and provide input on potential plan adjustments.

Additionally, the Township of Woolwich is welcoming a new staff position in 2024, a Climate Action and Sustainability Coordinator, which will greatly assist in guiding the Township towards achieving its energy and GHG targets.

2024-2029 PROPOSED CONSERVATION INITIATIVES

Energy conservation projects are identified, forecasted for, and implemented through a variety of initiations, including building condition assessments, GHG reduction pathway feasibility studies, Council direction, and staff recommendations based on available technologies and tracking of energy data. Additionally, when possible, staff compare building-level energy benchmarks to the median energy benchmark for that building type.

Technical initiatives typically include heating, ventilation, air conditioning, refrigeration, and building automated system upgrades and retrofits based on new available technologies and research; building envelope upgrades including roofing system replacements, insulation, etc.; and, green technologies such as solar panel installations, geothermal systems, gray water recovery, etc.

The Township is currently in the process of retrofitting existing or areas of existing facilities, typically under ~4,000 square feet with standard residential HVAC equipment, with air source heat pumps either as the primary cooling and heating source or primary cooling and first stage for heating. At larger facilities such as the Administration Building, arenas, and the Breslau Community Centre that contain either boiler systems for heating and/or roof top units for heating and cooling, the Township is exploring alternative innovative methods for reducing fossil fuel burning equipment with new technologies, and is also waiting for direct retrofits for rooftop units to become available from equipment suppliers. This is the single greatest challenge in reducing our GHG emissions, availability of technologies for commercial and industrial facility retrofits.

Oversight of implementation of the CDM plan is the responsibility of all Township departments with the assistance of the internal Green Team working to identify on-going energy efficiencies and support educational campaigns geared to influence culture.

Implementation of the proposed projects is dependent on:

- Available technologies
- Funding allocated annually through Council budget deliberations
- Grants and utility provider incentives
- Qualified staff, consultants, and contractors

Proposed CDM initiatives for 2024 through 2029 include:

Organizational / Behavioural Initiatives

Organizational initiatives will derive from a variety of departments and resources, including the Township's new Climate Action and Sustainability Coordinator position, Woolwich Environmental Enhancement Committee, new Strategic Plan, and various departments (planning, facilities, infrastructure services, etc.). Additionally, the Green Team and Woolwich Climate Action (sub-group of Green Team) will continue to play a vital role in spearheading behavioural and organizational change throughout the Township through educational campaigns, events, and more.

Initiatives:

- Implement corporate green building standards
- Continue to host monthly Climate Action events for the public and staff to promote changes that will reduce GHG emissions
- Incorporate focus of climate action and GHG emissions reductions into Purchasing By-law and procurement process
- Incorporate focus of climate action and GHG emissions into Strategic Plan
- Implement organizational and behavioural initiatives identified in the TransformWR Strategy

Technical Initiatives

Woolwich Memorial Centre

Through the GHG Reduction Pathway Feasibility study, multiple pathways were identified for achieving GHG reduction targets at the Woolwich Memorial Centre. The two primary options include:

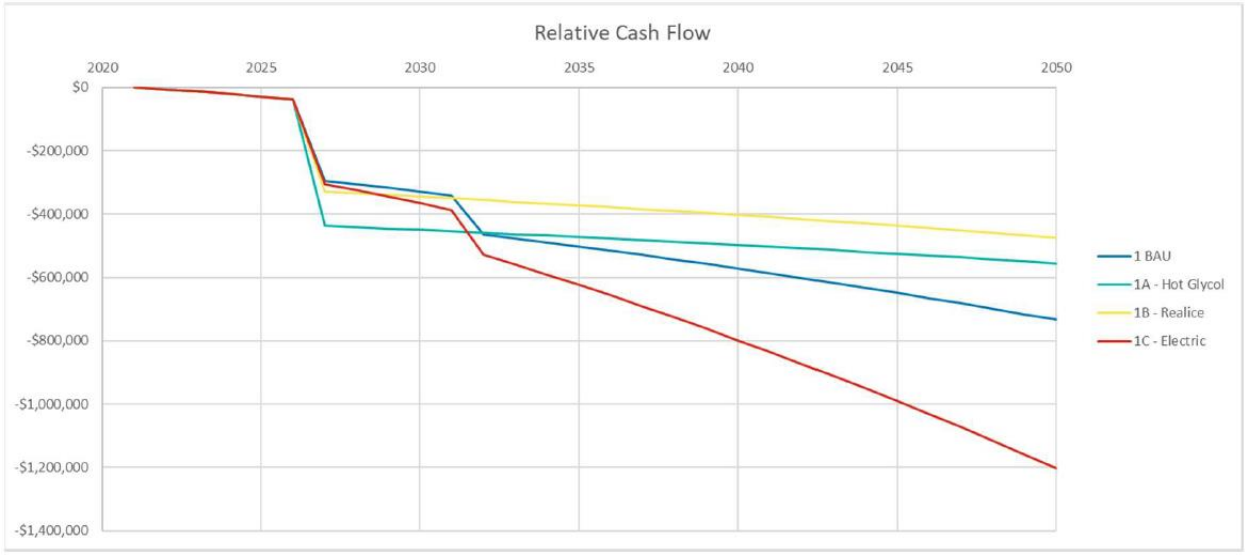
1. Installation of an ammonia compressor to boost the temperature of waste heat from the refrigeration plant, accompanied by an ice bank to store waste cooling when arena ice making is not required. Waste heat and cooling to be incorporated into existing facility rooftop units, dehumidification equipment, water heating, etc.
2. Installation of air source heat pumps as a retrofit for existing heat pumps. Installation of RealIce technology and/or electric water heating.

Below, all options have been detailed, of which the Township will later determine the appropriate pathway for the facility.

1. Reduce Exhaust and Makeup Air During Low Occupancy –
    - Reduce exhaust and makeup air by 80% during low occupancy (30% of time)
        - Reduce 17,000 m3/yr of natural gas
          Save 33t CO2e/yr (3%) and $6,300/yr
          Cost $5,000, Payback 0.8 years

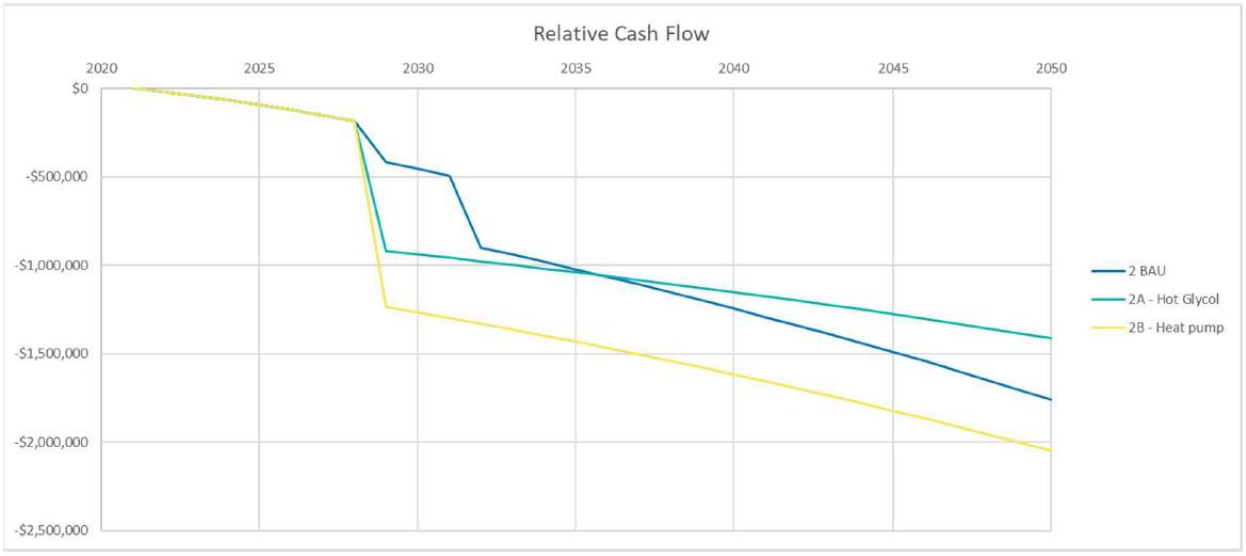
2. Reduce heat reject through cooling towers
    - Recover more waste heat to reduce heating demand
        - Equivalent to the energy in 167,000 m3/yr
          NG, which could theoretically offset 321 t CO2e/yr (30%)

3. Increase heat recovery from Chiller to Hot Water
    - Option A - Install an ammonia heat pump to boost glycol to 180 °F
        - Offset 16,800 m3/yr NG, with 24,000 kWh/yr
          Save 32t CO2e/yr and $2,600/yr
          Added cost $43,000
    - Option B - Implement cold RealIce technology to replace ice resurface water heating. Electrify domestic water heaters.
        - Reduce 16,800 m3/yr NG, add 29,000 kWh/yr
          Save 32t CO2e/yr and $1,800/yr
          Reduced cost $55,000



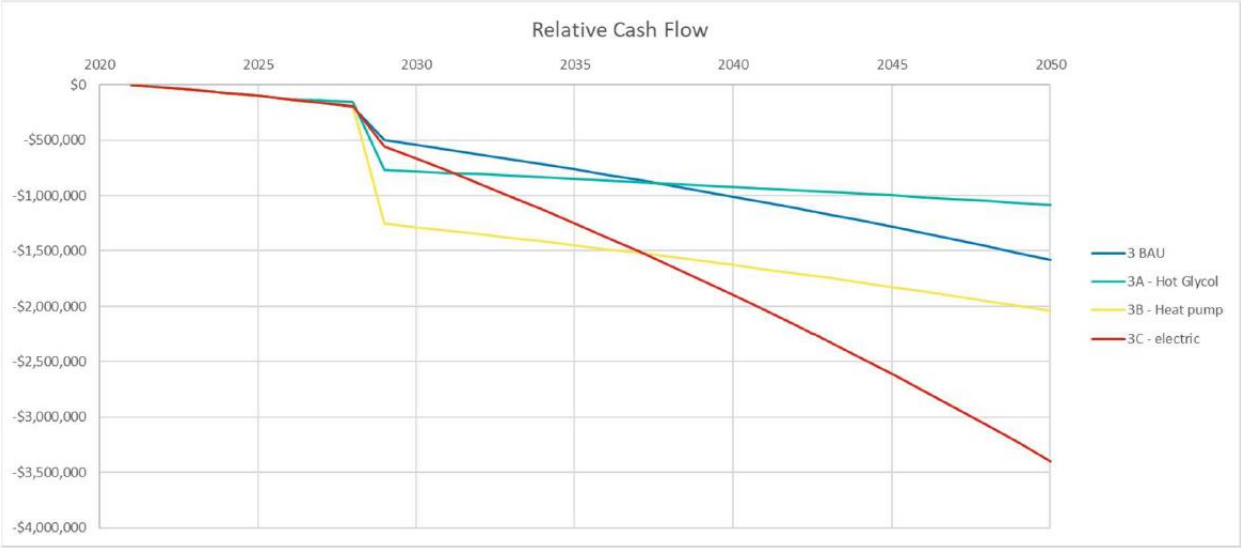
**BAU – Business as usual*

4. Decarbonize rooftop units for space heating
    - Option A - Replace with air-source heat pumps at end of life
        - Offset 54,000 m3/yr NG with 103,000 kWh/yr
          Save 100t CO2e/yr (10%) and $4,200/yr
          Added cost $414,000
    - Option B - Connect units to hot and cold glycol distribution loop
    - Offset 54,000 m3/yr NG with 34,000 kWh/yr
      Save 102t CO2e/yr (10%) and $14,700/yr
      Added cost $151,000

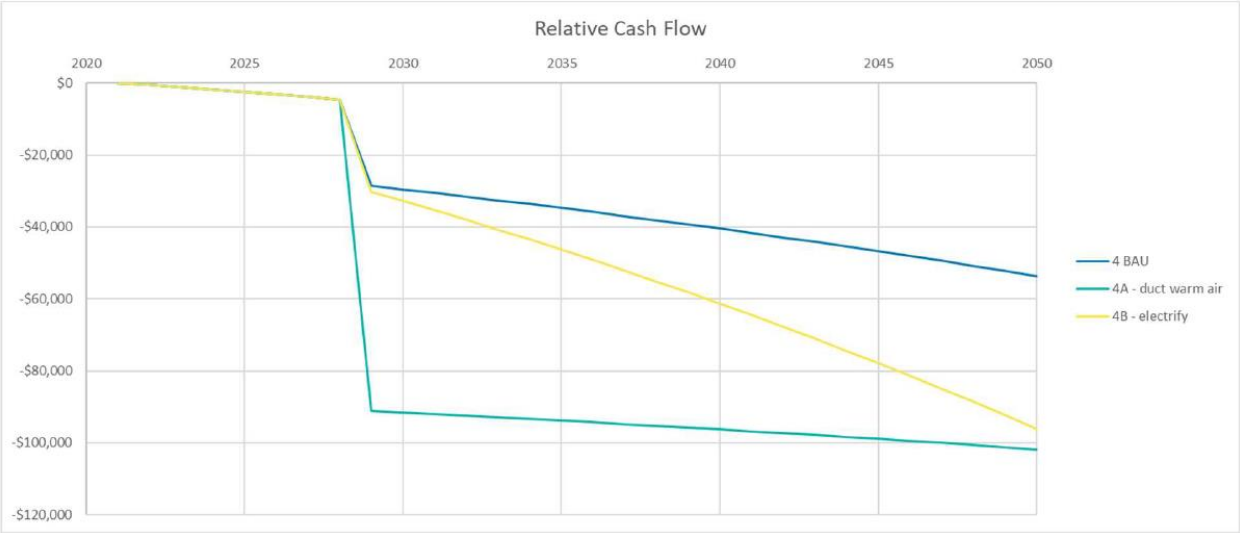


5. Decarbonize rink dehumidifier

- Option A - Install EcoDry connected to hot and cold glycol distribution loop
    - Offset 59,000 m3/yr NG with 68,000 kWh/yr
      Save 112t CO2e/yr (10%) and $11,700/yr
      Added cost $301,000
- Option B - Replace with heat pump for dehumidification (similar to DU-1)
    - Offset 59,000 m3/yr NG with 171,000 kWh/yr
      Save 109t CO2e/yr (10%), costing $4,000/yr
      Added cost $675,000
- Option C. Increase capacity to 21,000 CFM for latest fresh air requirements
    - No direct GHG impact. Consider at the same time as replacing for decarbonizing.
      Additional cost $260,000 (over option A)



6. Spectator radiant heating
    - Option A - Duct warm air from DU-2 above spectators
        - Offset 1,400 m3/yr NG with 2,300 kWh/yr
          Save 2.6t CO2e/yr
          Added cost $75,000
    - Option B - Replace with electric radiant heaters at end of life
        - Offset 1,400 m3/yr NG with 14,300 kWh/yr
          Save 2.2t CO2e/yr, costing $1,700/yr



7. Increase heat recovery from Chiller to heat Building Loop
    - Install a heat pump to boost NH3 Compressor glycol to heat the building loop

8. Increase heat recovery from Chiller to MUA-1
    - Heat pump to boost temperature of glycol loop will improve effectiveness of space heating

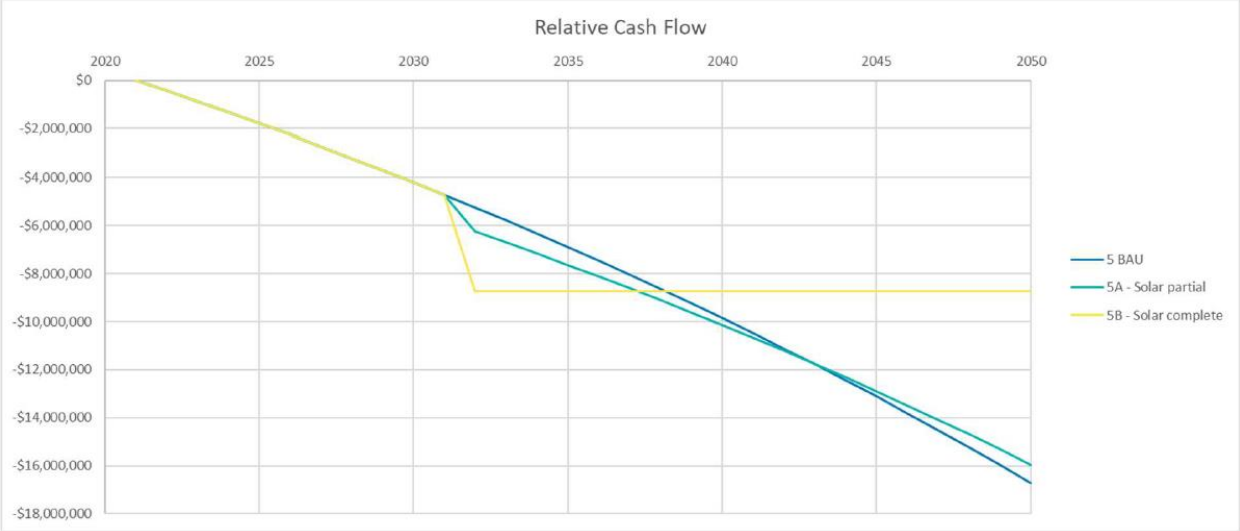
9. Connect AMU-1 to cold glycol distribution
    - Connect to cold glycol distribution network to benefit from better COP of Chiller
        - Reduce 37,800 kWh/yr
          Save $5,800/yr and 2.6t CO2e/yr
          Reduced capital cost $10,000

10. Connect DU-1 to cold glycol distribution
    - Connect to cold glycol distribution network to benefit from better COP of Chiller
        - Reduce 193,000 kWh/yr
          Save $29,600/yr and 5.8t CO2e/yr (1%)
          Added capital cost $200,000

11. Thermal Storage to bridge gaps in supply and demand
    - Thermal storage includes an ice battery to bridge gaps in heat supply and demand
    - If peak heating demand is not met with waste heat, a geothermal heat pump can be considered

- Added cost $250,000 ($35,000 / ice battery)

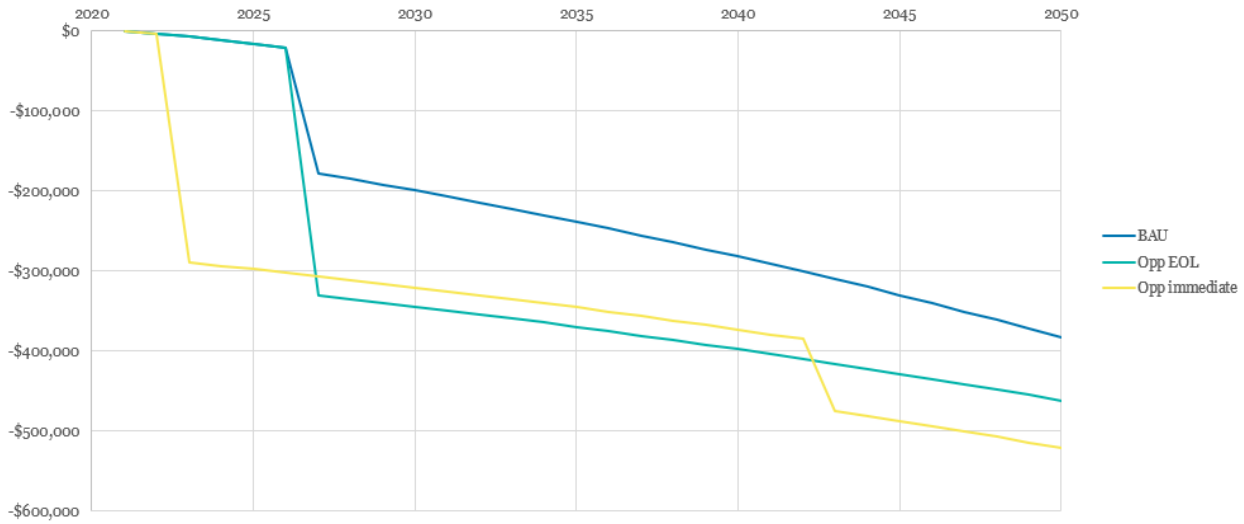
12. Solar PV Generation
    - Option A - Satisfy added electrical demand - Install roof and/or parking lot solar to eliminate emissions associated with electricity from Ontario's grid (10% fossil fuel)
        - Offset 439,000 kWh/yr
          Save 13t CO2e/yr and $67,000/yr
          Added cost $890,000 (400 kW)
    - Option B - Eliminate all grid electricity - Install roof and/or parking lot solar to eliminate emissions associated with electricity from Ontario's grid (10% fossil fuel)
        - Offset 2,820,000 kWh/yr
          Save 85t CO2e/yr (8%) and $431,000/yr
          Added cost $3,300,000 (1,500 kW)



<u>Recreation Facilities</u> – Breslau Community Centre, Bloomingdale Community Centre, Maryhill Community Centre

1. Breslau Community Centre Air Source Heat Pump

    - Install air-source heat pumps
        - Reduce 12,800 m3/yr of NG
          Increase -$700 /yr and save 24 t CO2 e/yr (50%)
          Cost $276,000



**EOL – End of operating life*

2. Bloomingdale Community Centre Air Source Heat Pump

    - Install air-source heat pump

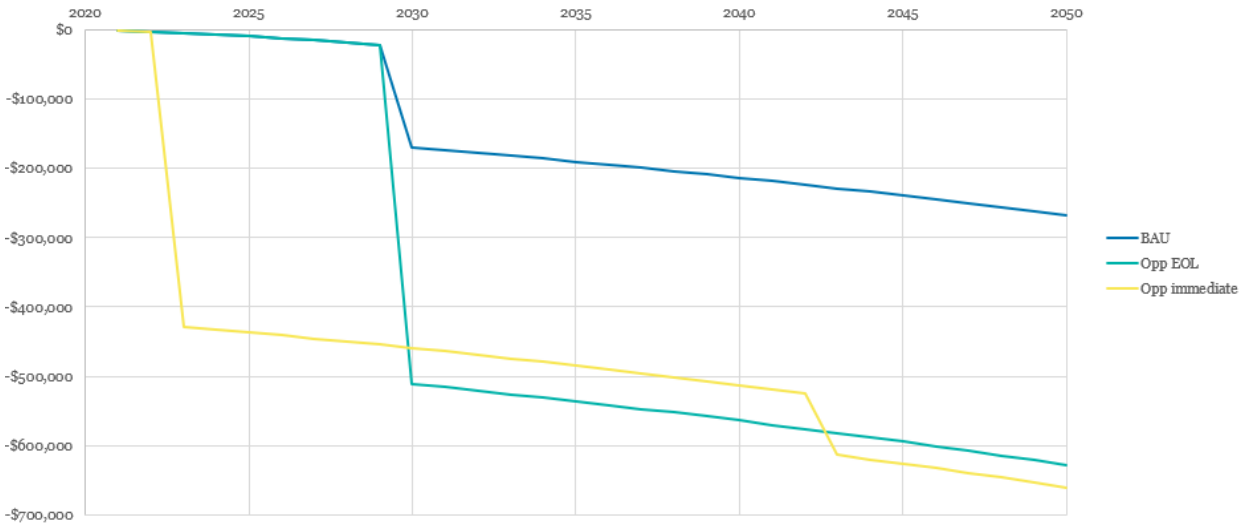
3. Maryhill Community Centre Air Source Heat Pump

    - Install air-source heat pump

<u>Administration and Operations Facilities</u> – Administration Office, Union Operations Facility

1. Administration Building Air Source Heat Pumps

    - Install air-source heat pumps
        - Reduce 7,000 m3/yr of NG
          Increase -$1,200 /yr and save 13 t CO2 e/yr (32%)
          Cost $414,000



2. Union Operations Facility Air Source Heat Pump

- Install air-source heat pump

<u>Fire Stations</u> – St. Jacobs Fire Station, Floradale Fire Station, Conestogo Fire Station

1. St Jacob's Fire Station Air Source Heat Pump

- Install air-source heat pumps
  - Reduce 11,400 m3/yr of NG
    Increase -$2,500 /yr and save
    21 t CO2 e/yr (88%)
    Cost $172,000

2. Floradale Fire Station Air Source Heat Pump
    - Install air-source heat pump

3. Conestogo Fire Station Air Source Heat Pump
    - Install air-source heat pump

St. Jacobs Arena

Through the GHG Reduction Pathway Feasibility study, different pathways were identified for achieving GHG reduction targets at St. Jacobs Arena. The options include:

1. Installation of an ammonia compressor to boost waste heat from the refrigeration plant, then used to preheat both HVAC and hot water heater.
2. Installation of air source heat pumps as a retrofit for existing heat pumps. Installation of RealIce technology or electric water heating.

Below, all options have been detailed, of which the Township will later determine the appropriate pathway for the facility.

1. Hot Water Heating
    - Option A - Implement cold water Realice technology to reduce natural gas used for heating resurfacing water
        - Conserve 17,400 m3/yr natural gas,
          Save $7,100/yr and 34t CO2e/yr (3%)
          Payback 2 – 3 years
    - Option B - Install a hydronic loop to transfer superheat from refrigeration to the domestic hot water (electric backup)
        - Reduce 26,700 m3/yr of NG,
          Save $2,400/yr and 4.7 t CO2e/yr (8%)
          Cost $25,000, payback 16.5 years
    - Option C - Electrification of hot water
        - Natural gas decrease: 9,795 m3/yr
          Electricity increase: -76,792 kWh/yr
          Total utility cost increase: -$8,974/yr
          Total GHG decrease: 11.9 t CO2e/yr

2. Space Heating and Cooling
    - Option A - Install air-source heat pumps
        - Natural gas decrease: 13,047 m3/yr
          Electricity increase: -37,708 kWh/yr
          Total utility cost increase: -$889/yr

Total GHG decrease: 24.0 t CO2e/yr

- Option B – High Temperature Heat Pump and Hydronic Loop
  - Reduce 25,200 m3/yr of NG,
    Save +$5,300/yr and 42 t CO2e/yr (70%)
    Cost $195,000, Payback 6.7 years

3. BAS or Programmable Setbacks

- Install a timer switch, or program an HVAC schedule and setbacks based on occupancy
  - Conserve 900 m3/yr of NG
    Save $300 /yr and 1.8 t CO2e/yr
    Cost $1,000, Payback 3 years

Combined – Breslau Community Centre, St. Jacobs Fire Station, Administration Building

1. Solar PV Generation

- Install roof and/or parking lot solar to eliminate emissions associated with electricity from Ontario's grid (10% fossil fuel)
  - Offset 498,000 kWh/yr of electricity,
    Save $84,900/yr and 15 t CO2e/yr (25%)
    Cost $780,000, Payback 9 years