Conservation & Demand Management Plan

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Introduction

Context

The Conservation & Demand Management Plan for the University of Guelph is a five-year plan covering the period July 1, 2024, to June 30, 2029. This report is in response to the University of Guelph's requirements under Ontario Regulation 25/23 to submit an Energy Conservation and Demand Management (CDM) Plan.

Data reporting for 2022 and 2023, also required under Ontario Regulation 25/23, is submitted through the ENERGY STAR Portfolio Manager ("Portfolio Manager").

Intent

The intent of this CDM Plan is to promote good stewardship of the Energy and Water resources consumed at the University of Guelph and provide a framework for energy and water management activities.



Background

Regulation 25/23

On January 1st, 2012, the Ontario Regulation 397/11 came into effect under the Green Energy Act, 2009. Its goal was to allow organizations and agencies within the Broader Public Sector (BPS) to better understand how and where their energy is used, as well as to provide public access to the usage and plans. Starting in July 2013, organizations and agencies within the BPS were required to prepare and publish a summary of their 2011 energy consumption and greenhouse gas emissions. The regulation further requires the organizations and agencies to report their energy usage and Greenhouse Gas (GHG) emissions on an annual basis, and to develop a Five-Year Energy Conservation and Demand Management (CDM) Plan by July 1st, 2014, and every five years thereafter.

With the repeal of the Green Energy Act, 2009, O. Reg. 397/11 (Energy Conservation and Demand Management Plans) was moved to the Electricity Act, 1998, and re-named as O. Reg. 507/18 (Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans), with no changes made to the regulation's requirements. In October 2022, O. Reg 507/18 (Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans) was revoked and replaced with the new reporting regulation O. Reg 25/23 which now requires BPS organizations and agencies to annually report their energy usage and Greenhouse Gas (GHG) emissions using ENERGY STAR Portfolio Manager's electronic reporting system for the past calendar year. No other major changes were made to the policy intent of the former O.Reg. 507/18 BPS energy reporting regulation.

Our CDM Plan, developed in compliance with the current O. Reg 25/23, covers the period from 2024 to 2029 and builds on the University's previous CDM efforts and experience gained over the last five years.

The University of Guelph

The University of Guelph was established in 1964. The Campus consists of 160 buildings covering an area of approximately 7 million square feet, with a Central Utility Plant (CUP) that provides chilled water and steam across the Campus. Research facilities represent 29% of the total floor area, followed by Residences at 28%, Academic facilities at 19%, Libraries and Athletics at 11%, Administration at 5%, Multi-Use at 4%, and other building usage covering 3%.

The University of Guelph is a public agency defined as "post-secondary educational institution" under section 1 of O. Reg 25/23.

The University has utility revenue meters on the main feeds to the Campus, and data collected from these meters is used for annual reporting for this Regulation. There is an ongoing initiative to broaden the sub-metering to the building level, though not yet 100% complete; as such, specific energy and water usage by building, building type, or operation, is not yet possible.

O. Reg 25/23 Annual Energy Consumption – 2023

As required by Section 5 (1) of O. Reg 25/23, a summary of the University's most recent annual energy report submitted to the Ministry of Energy through Portfolio Manager is presented in **Table 1**, below.

Table 1: O.Reg 25/23 Annual Energy Report, 2023						
Reporting Year	Electricity kWh	Natural Gas m³	Site Energy Use GJ	GHG Emissions kg eCO ₂	Energy Use Intensity eGJ/m²	
2023	96,313,202	19,746,189	1,105,568	40,849,500	1.76	



Conservation & Demand Management Plan

Ongoing Commitment to Resource Conservation

The University has a long tradition of responsible stewardship of energy and water resources.

Since 2004/2005, the University, through its Energy Conservation Fund (student-funded and University-matched investment), initiated a wide range of energy conservation measures. This student-led incentive opened up the campus sustainability dialogue and resulted in our successful Community Energy Plans (CEP), which have been in place since 2004. The CEP was a comprehensive energy and water conservation program achieved through on-going deep retrofit projects and capital renewal projects with large energy components. Over a 10-year period, from 2004/05 to 2014/15, these projects have resulted in the reduction of over 50,000 tonnes of eCO₂.

Building on the success of these programs, and the continued engagement of the students and administration personnel, the University set increasingly ambitious goals to improve our Sustainability Plan and in 2015 launched the Green Gryphon Initiative – a \$26.2 million investment in sustainability and energy improvements. The project includes many innovative and challenging measures, including a chilled water Thermal Energy Storage system, one of the largest utilities projects ever undertaken at the University.

Through the Post-Secondary Greenhouse Gas Campus Retrofits Program (GGRP), the University has invested \$9 million in upgrades to the central heating plant boiler heat recovery system over the period 2019-2021. The expanded heat recovery system has increased the efficiency of district heating natural gas combustion to previously unattainable levels. Additionally, the installation of a 90 ton water to water heat pump serving the heat recovery system has allowed University staff the opportunity to become familiar with heat pump technology as a first step towards our long-term strategy to eliminate carbon-based heating.

Through the Carbon Economy Fund (LCEF) Challenge stream, the University has invested \$2 million in upgrades to the University Centre over the period 2022-2024. This project further expanded the heat recovery loop to serve the University Centre with low temperature heating water that is upgraded to useful heat through the use of a 485 ton water to water heat pump.

Over a 5-year period, from 2014/15 to 2019/2020, these projects have resulted in the reduction of over 15,000 tonnes of eCO₂.



Alignment with the Climate Change Action Plan

In June 2016, the Ontario Government announced the Climate Change Action Plan (CCAP) to reduce GHG emissions and help move the province towards a prosperous low-carbon economy.

Aligned with the CCAP and broader Federal commitments to the Pan-Canadian Framework on Clean Growth and Climate Change, the University will continue to move forward with energy initiatives that focus on Scope 1 and Scope 2 GHG reductions and support the provincial CCAP GHG emissions reduction targets of 37% by 2030, and 80% by 2050. The University has created an Environmental Sustainability Plan 2018 - 2050 with an Action Plan targeted to meet and exceed these goals wit the stated ambition of achieving net zero operation by 2040.

The main initiatives of the University's Environmental Sustainability Plan 2018 - 2050 to meet the GHG reduction targets included:

- **Buildings** improving energy efficiency of campus buildings, through campus wide energy efficiency upgrades, deep energy retrofits and new construction building performance standards.
- Central Plant Services improving the efficiency of the Central Heating and Cooling Plant, including adding capacity from heat recovery and low carbon electric heating sources.
- · Renewable Energy Supply increasing reliance on renewable energy systems, including 'getting to Net Zero' buildings initiatives.

While not targeted in this report, the University recognizes the importance of Scope 3 emissions. Transportation and Carbon inventory management will also play a role in meeting the 2050 target.



Energy Conservation Progress and Benchmark Performance of Operations

Over the 5-year period since the previous 2019 CDM Plan (2019-2023), the energy improvements implemented under the GGI program have resulted in a combined energy reduction of over 153,000,000 in equivalent kWh, over \$19 million in annual utility savings, and 19,000 tonnes eCO₂ in GHG emissions. The greatest impact to reduced utility cost savings continues to be from the chilled water district Thermal Energy Storage system and Global Adjustment (GA) Engineered Response Strategy.

Since implementation in 2015, the combination of energy improvements such as large-scale lighting retrofits, heating and cooling system upgrades, water savings measures, thermal energy storage, and community engagement has resulted in annual GHG emissions reduction of about 4,000 tonnes in eCO₂ and over \$3 million in annual utility cost savings.

Despite campus growth and increasing enrolment over the years, energy use intensity across the campus has improved by 4% since completion of the previous 2019 CDM Plan, as shown in **Table 2** below.

Table 2: Energy Use Intensity (EUI) Comparison (eGJ/m ²)					
Year	Site EUI	Change			
2019	1.83	4%			
2023	1.76				



Action Plan

The University of Guelph has a strategic goal to transform our campuses into living labs as we work towards net zero carbon emissions by 2040. We are currently working to achieve this goal through campus wide actions, actions targeted at specific buildings, and ongoing behavioural measures:

Campus Wide Actions

- Building Energy Assessments An energy audit of most buildings on campus will be conducted to determine which building measures are required to reduce the energy consumption and demand on a building-by-building level. These measures will be integrated into annual capital planning based on CRM prioritization or bundled to create larger-scale energy projects. This will be done using a phased approach, prioritizing buildings that have the greatest DCRM, energy consumption and strategic importance to the academic mission of the University.
- **Design Standards** Update Design and Construction Standards to ensure all new construction and renovation projects align with the netzero carbon emissions by 2040 target. This will take place as part of the broader Design Standards Refresh.
- District Energy Decarbonization Feasibility Study Develop pathways to decarbonize and reduce the energy intensity of the CUP and district energy system (DES) over time. This will result in a cost-benefit analysis of each pathway to determine the best option for the U of G.

The University recognizes that the best way to reduce GHG emissions is to reduce energy usage. The Building Energy Audit reports will help us to set annual energy reduction targets and identify Energy Conservation Measures (ECMs) that we can implement to meet those targets. Updating our Design and Construction Standards will also support our energy reduction goals. The DES Decarbonization Feasibility Study will direct us to the best path for eliminating GHG emissions from the energy that is still required to operate our campus.

Targeting Specific Buildings

Day Hall Building – Zero Carbon By Design

Intended to be one of Canada's most sustainable, zero-carbon educational and research facilities, the University has required the full building renovation of the Day Hall building to comply with the Canada Green Building Council's Zero Carbon Building Design Standard (Version 2).

At a minimum, this project will be expected to use sustainable materials such as FSC-certified lumber and recycled steel, as well as disclose the lifecycle embodied carbon of the building materials. The building will embrace a design that is resilient to the impacts of climate change through enhanced building envelope performance and passive heating and cooling. Additionally, energy and water modeling will be utilized to quantify the impact and value of the sustainability measures incorporated in the building design.

By building to a stringent energy and carbon building design standard, the project is expected to achieve near-zero operational GHG emissions and low levels of energy and water consumption. This aligns with the climate action plans of the Government of Canada, Government of Ontario, the City of Guelph, as well as the University's goal to transform our campus as we work towards net-zero carbon by 2040.

The plan was approved by Senior Management on June 20 2024

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