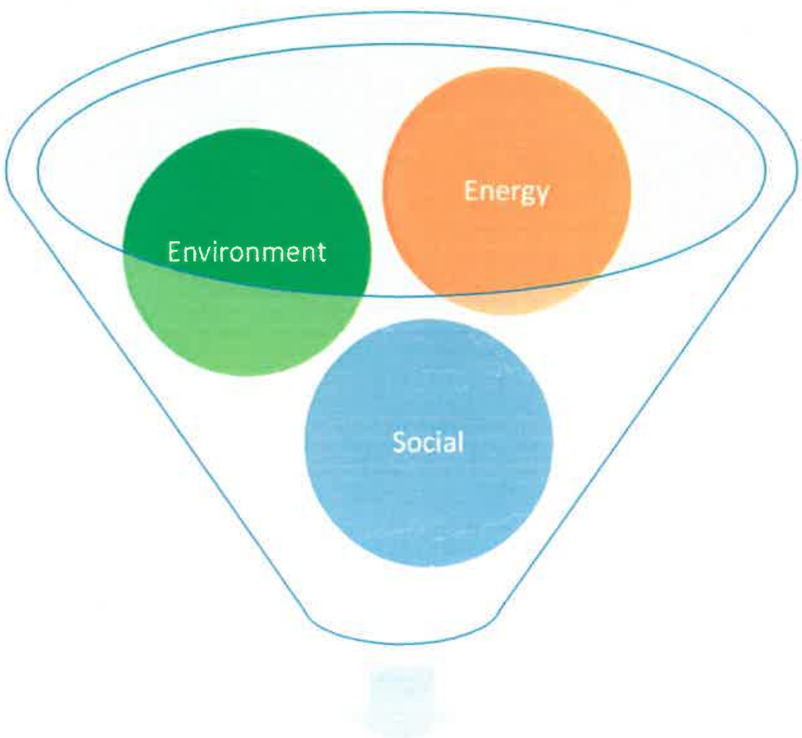
ST. CLAIR COLLEGE

Energy Conservation and Demand Management Plan



Sustainability

July 1, 2024

Table of Contents

ST. CLAIR COLLEGE

Executive Summary

Under *Ontario Regulation 25/23*, public agencies, including colleges and universities, are required to report their annual energy consumption and greenhouse gas (GHG) emissions, as well as to implement an Energy Conservation and Demand Management Plan (ECDMP) from July 1st 2019 onwards. These plans are required to be reviewed and updated every 5 years thereafter. *Our updated ECDMP was developed in compliance with the regulation and covers the period from 2024 to 2029. The plan was approved by senior management on June 13, 2024*

St. Clair College's ECDMP will serve as a guide to better understand its energy usage, educate its community (including students and staff) and identify strategies for reducing energy consumption and corresponding greenhouse gas (GHG) emissions. Conserving energy will not only aid St. Clair College in realizing a reduction in waste, but also lower operating costs. Additionally, this comprehensive plan contributes to the development of a larger foundation and framework that will ensure continuous sustainability integration across the three St. Clair College campuses and community.

The ECDMP ensures compliance with current regulations and aids in providing a framework for communicating targets, planning for new and retrofit equipment and infrastructure installations, and monitoring progress in reducing energy demand.

This document is available in print or other formats to suit individual needs, upon request.

St. Clair College appreciates and recognizes the assistance and contribution of the following individuals to this report:

- St. Clair College
  - Rebecca Demchuk P.Eng. - Associate VP - SSFM
  - Peter Panzica - Facilities Manager
  - Richard Arboleya - Facilities Maintenance Manager
  - Fiona McLean - Manager, Marketing and Recruitment
- Tandem Engineering Group
  - Jeff Morrison CEM - Energy Manager
  - Brian Muscat P.Eng. - Energy Manager

1. Introduction

1.0 Institutional History

The roots of the College can be found in the Western Ontario Institute of Technology (W.O.I.T.) which opened its doors in 1958 in two rooms at the Mercer Street Public School where 104 students paid $235 for their tuition. There were four programs to choose from: electronics, electrical, mechanics and chemistry.

As the student body grew, it was evident that the Mercer Street facilities were not going to provide the required educational spaces for long term growth. Thanks to William G. Davis, the Premier of Ontario in the mid 1960's, the concept of institutes of applied arts and technology was born and that made way in 1965 for the transformation from W.O.I.T. to St. Clair College of Applied Arts & Technology. St. Clair College was one of the 19 provincial colleges approved that year.

In September 1967, St. Clair College's first building was completed, and 300 students commenced their college education at 2000 Talbot Road West. Within 10 short years, the College opened its permanent campus in Chatham, on Grand Avenue, serving the community of Chatham-Kent. Today, St. Clair College has four campuses, two in Windsor, one in Chatham and one in Toronto, providing higher education for over 16,000 full-time post-secondary students.

In addition, more than 5,000 people a year come to the College to take courses through our Continuing Education and Corporate Training offerings. St. Clair College graduates have gone on to prosperous careers and have become contributing members to a strong and vibrant Canadian economy.

St. Clair College provides over 120 advanced diplomas, graduate certificates, and degree pathways with a focus on Technology and Trades, Business and Information Technology, Media Arts & Design, Community Studies, Nursing and Health Sciences. The College is proud of its many global university partners which allows students to pursue a pathway to degree completion here in Windsor, in Canada, and around the world.

1.1 Academics

St. Clair College offers more than 120 diplomas, advanced diplomas, certificates, and degrees across nine schools:

- Zekelman School of Business
- Zekelman School of Information Technology
- School of Community Studies
- School of Engineering Technologies
- School of Skilled Trades
- School of Health Sciences
- School of Nursing
- School of Media, Art & Design
- School of Academic Studies – Chatham Kent

1.2 Campuses

St. Clair College is made up of three campuses, Windsor South, Windsor Downtown, and Chatham.

Windsor South Campus

Situated on a sprawling 110-acre campus in South Windsor, this is the College's largest campus with close to 10,000 students studying in the Schools of Business and IT, Community Studies, Engineering Technologies, Health Sciences, Nursing, Engineering, and Skilled Trades.

St. Clair College is renowned for its excellence in applied health programs. In fact, the College educates the largest number of health science students of any post-secondary institution in the province. To support the growing demand for highly trained health care professionals, St. Clair College opened the $32 million Anthony P. Toldo Centre for Applied Health Sciences facility in September 2011. The Centre provides state-of-the-art learning labs for Dental Hygiene, Dental Assisting, Medical Laboratory Science and Technician, Nursing, Practical Nursing, Personal Support Worker, Diagnostic Medical Sonography (Ultrasound), Cardiovascular Technology and Respiratory Therapy. Labs for all programs contain the latest in health care simulation equipment. This includes numerous nursing labs with simulation mannequins including birthing simulators. Similar facilities that support the Nursing and Practical Nursing programs are also found at our Chatham Campus in the Mary Uniac Health Sciences Centre.

St. Clair also offers a popular Veterinary Technician program, which is one of the few in the province that provides a teaching hospital environment. The program is accredited by four individual associations including the College of Veterinarians of Ontario and the Canadian Veterinary Medical Association.

The College has established a number of outstanding facilities where labs reflect real-world technology environments.

The Cisco-certified computer labs that support Computer Networking and Programming, Cybersecurity, Data Analytics, and Mobile Applications plus an Honours Bachelor of Business Administration Degree, provide students with state-of-the-art technology on which to practice their skills. In 2019, St. Clair College was ranked #1 in North America for the largest enrolment of students in a Computer Networking program by Cisco Network Academy. The College's computer networking program also continues to have one of the highest rates of female enrolment of Cisco Certified Programs in Canada.

The Ford Centre for Excellence in Manufacturing, a 100,000 sq. ft. manufacturing facility, emulates the shop floor and provides hands-on learning for students in Robotics, Power Engineering Technology, Automotive Product Design, CAD/CAM, Industrial Millwright, and more!

The Centre for Construction, Innovation and Production is a skilled-trades lab facility that provides an ideal space for students studying in the electrical, plumbing and carpentry trades at the Windsor South Campus.

St. Clair College fully supports student life activities to help students round out their academic studies. This is done, in part, with a focus on athletics and health and wellness. The College provides students with an 85,000 sq. ft. Sports Plex facility which is one of a kind in Ontario. Triple gym, elevated running track and 10,000 sq. ft. fitness center are available for use by our students and by the community at large. The Sports Plex hosts OCAA varsity sports including Basketball and Volleyball, and many high school sports as well. The College has also completed a multi-year construction project of the outdoor Sports Park which includes a state-of-the-art turf field soccer stadium, women's softball diamond, indoor tennis facility and beach volleyball courts all integrated around a beautifully landscaped promenade.

St. Clair College has built a 3-storey 71,670 sq. ft. addition to the main building for Esports Nexus (2021), purchased a 5,793 sq. ft. city of Windsor fire hall for the Firefighter program (2022), and added a fieldhouse to the stadium (2023).

In 2023, St. Clair College started construction of the new Welcome Centre, scheduled to Open September 2024.

Downtown Campus

The downtown campus comprises of three signature facilities, which are home to over 1,000 students. In fact, St. Clair College was the first post-secondary institution to open campuses downtown.

St. Clair College Centre for the Arts is home to our Graphic Design program with state-of-the-art Mac lab. The Advertising & Marketing Communications program along with our Hospitality program and some of the Legal and First Responder programs also take residence in this facility. The Centre boasts a 1,200-seat professional theatre known as the Chrysler Theatre, which is used by our Music Theatre Performance students for their productions.

Another significant facility in our downtown campus complex is the Media Plex. It is home to students studying in Journalism, Public Relations, Media Convergence, Tourism & Travel, and Event Management. To help prepare students for 21st century news reporting, this facility offers television, radio, web, and print platforms where students learn to write and report for all media platforms. The Media Plex is one-of-its-kind in North America as it produces a weekly newspaper, radio show, and live television news broadcast in conjunction with the local cable TV station.

Downtown is also home to Zekelman School of Business and Technology (2018) which consists of leased space in two buildings downtown. 1 Riverside Drive with eight classrooms, lounge, tutoring/testing and Faculty space. This is home to many business and IT programs. 333 Riverside Drive consists of 7 classrooms, a beautiful student lounge, restaurant, study rooms and faculty space.

Lastly, the TD Student Success Centre offers students a computer lab and lounge area and is operated by the Student Representative Council.

Chatham Campus

St. Clair College's Chatham campus is home to over 1,200 full time students who study Business, Community Studies, Skilled Trades and Health Sciences. Similar to the Main Windsor Campus, students studying Nursing or Practical Nursing will find state-of-the-art simulation equipment in the Mary Uniac Health Sciences Centre.

The Chatham Campus is one of a very few higher education centers across the country to offer Powerline Technician training. In 2018, St. Clair College completed construction of a National Powerline Training Centre located on a pole field which simulates powerline construction and installation in the real world. The 6,460 sq. ft. Powerline Training Centre was built next to the Chatham campus in 2018.

Students at the Chatham Campus also have their own 50,000 sq. ft. fitness facility called the Chatham Health Plex. The Health Plex boasts two gyms, a fitness center and is the home to the College's Paramedic, Occupational Therapy and Physical Therapy Assistant labs.

2. Energy Conservation and Demand Management

2.0 Introduction

At St. Clair College, the Facilities Services department is actively involved in campus sustainability initiatives and leads the development and implementation of this ECDMP. The Facilities Services department is also responsible for all related reporting. Under current regulation, all broader public sector (BPS) organizations, including Colleges & Universities, are required to:

> Prepare, publish, make available to the public and implement energy conservation and demand management plans or joint plans.

An energy conservation and demand management plan is composed of two parts:

- A summary of the public agency's annual energy consumption and greenhouse gas emissions for its operations.
- A description of previous, current, and proposed measures for conserving and reducing the amount of energy consumed by the public agency's operations and for managing the public agency's demand for energy, including a forecast of the expected results of current and proposed measures.

All reports and submissions are available on the St. Clair website (http://www.stclaircollege.ca/boardandstaff/corporatedocuments.html). As required, approval by senior management for this ECDMP is documented in Appendix B.

2.1 Energy Conservation Targets & Goals

A. Energy Consumption

Under *Ontario Regulation 25/23*, public agencies are required to develop goals and objectives for conserving and otherwise reducing energy consumption and managing demand for energy. At St. Clair College, the ECDMP is an evolving document built on several technical, organizational, and behavioral measures. The measures aimed at conservation are based on a number of factors including organizational gaps and needs, current consumptions, available funding, incentives from various local, provincial and federal sources, existing infrastructure, new technologies, etc.
Over the next 5-year period, ***St. Clair College aims to reduce overall energy intensity across all three campuses by 30% for the 2029 ECDMP report*** *(compared to 2013 baseline)* and to foster a stronger sense of sustainability in the organizational culture.

B. Greenhouse Gas Emissions

St. Clair College aims to reduce overall GHG emissions across all three campuses 30% by 2029 *(using 2013 as the baseline)*, which aligns with both provincial and federal proposed targets. This plan maps out that strategy and is dependent on the ongoing funding from both the Provincial and Federal governments to help facilitate this plan.

The above college target is expected to contribute to the proposed "Made in Ontario Environment Plan - 2018" which introduces emission reduction targets for Ontario, in line with Canada's 2030 targets under the Paris agreement. The plan also recognizes that Ontario has been the leading province in the emission reduction efforts towards meeting the Paris agreement..

St. Clair College's goals for GHG emission reductions also help contribute to:

- ***Canadian Emissions Reduction Plan 40% from 2005 levels by 2030, and Net zero 2050.***
- ***Ontario Climate Change Strategy reduce GHG by 37% of 1990 levels by 2030, and 80% by 2050.***

2.2 Sustainability Strategy

A. Overview

Recognizing that energy conservation and carbon neutrality are dynamic targets where technology and applications are ever changing and improving, St. Clair College has adopted an integrated sustainability approach. Through the Facilities Services group, resources are dedicated to the ongoing integration, performance measuring and reporting of sustainability initiatives.

Facilities Services has led the development of the ECDMP, which will highlight current practices and target future actions that will influence the quantity or patterns, of energy consumed by St. Clair College. Our five-year strategy will focus on energy use reduction while also considering renewable energy sources and other on-site generation applications.

Alignment with Strategic Mandate Agreement (SMA)

St. Clair College's SMA identifies the student experience as one of our top priorities. The student experience is greatly impacted by the facilities that students occupy. Enhancing the facilities with improved lighting, ventilation, and other energy efficiency measures will improve the student experience.

St. Clair College is undergoing a significant capital transformation as it knows that the conditions of the interior and exterior spaces that campus stakeholders use, impacts their experience.

The proposed plan fully aligns with St. Clair College's SMA and is a key next step in the capital transformation of campus.

Categories

St. Clair College has divided its five-year strategy for the ECDMP into six categories:

I Efficient Buildings
II Efficient Energy Sources & Distribution
III Renewable Energy
IV Future Technologies
V Demand Management
VI Behavioural Energy Efficiency

I Efficient Buildings

The Efficient Building category is divided into two primary action items:

- Retrofit and optimize buildings for energy efficient operation.
- Perform continuous monitoring, targeting, and commissioning, to ensure best-in-class performance is maintained at all times using the upgraded Building Automation System.

St. Clair College recognizes that their energy efficiency efforts must start with ensuring that the buildings on campus, which are the primary energy consuming loads, are utilizing the minimum amount of net energy possible. The pinnacle of energy efficiency for buildings is known as zero-energy, or net-zero building, meaning that the total amount of energy used by the building on an annual basis is roughly equal to the amount of renewable energy created on site.

Over the next 5 years with the continued funding from the Ministry of Colleges and Universities, St. Clair College plans to systematically address the energy efficiency of their buildings by executing projects that will lower total building energy consumption, while simultaneously improving the student experience. To accomplish this goal, feasibility studies have and will be conducted identifying which differed maintenance and capital projects can take advantage of the latest HVAC technology. The scope of these projects may include heat-pump, energy recover, and electric heating of equipment across any of the campuses.

In 2023/24 the South Campus Main Building, Central Power Plant, and Sports Plex, as well as St. Clair Center-For-The-Arts building at Downtown campus have been identified as strategic targets for synergistic, deep energy efficiency retrofits (Existing Building Re-Commissioning). This is a funded study through the IESO to identify potential initiatives with additional funding for implementation, and monitoring of the results.

II Efficient Energy Sources & Distribution

The Efficient Energy Sources & Distribution category is divided into two primary action items:

- Hot water distribution system optimization.
- Chilled water generation & distribution system optimization.

1. Hot-Water distribution system optimization

The hot water system at St. Clair College's campuses provide thermal energy to most buildings for the purposes of space heating and domestic hot water and it uses a medium/high-temperature hydronic system. St. Clair College will be ensuring that we continually optimize our existing system, including, but not limited to the following measures:

- ✓ Insulation
- ✓ Leak Repair
- ✓ Air venting

2. Chilled-Water system optimization

The chilled water system at St. Clair College's main campus provides thermal energy to most buildings for the purpose of air conditioning. It is understood that the chilled water system is the most efficient technology to provide cooling, as it can approach an efficiency of 0.5 kW/ton, compared to direct-expansion air conditioning systems which typically can only approach efficiencies of 1.0 kW/ton. Therefore, the chilled water system is expected to be part of the long-term future of St. Clair College's energy system.

Together with engineering studies, ongoing reviews of existing control strategies, equipment condition and new technologies, will be the primary means to continue to optimize the chilled water systems.

III Renewable Energy

The Renewable Energy category is divided into five primary action items:

- Solar Photovoltaic (Distributed Electricity Generation)
- Solar Wall / Air (HVAC air pre-conditioning)
- Solar Thermal (Hot water generation)
- Micro Wind (Distributed Electricity Generation)
- Heat Pumps (High efficiency electric Heating & Cooling)

St. Clair College recognizes that in order to make progress towards 'net-zero' energy usage on the campus, renewable energy sources must be extensively utilized. One of the fundamental tenants of renewable energy is to consider that all of the sunlight that lands on St. Clair College's property, and all of the wind that blows across it, is an energy resource that can be tapped into. Practical technologies that currently exist which St. Clair College is studying for implementation include:

- Solar Photovoltaic
    - Solar panels on building roofs
    - Solar carports
    - Solar powered battery backup
    - Solar powered exterior lighting
- Solar Air
    - Solar walls (air pre-conditioning)
- Solar Thermal
    - Solar hot water
- Micro Wind Turbines
- Heat Pumps

A heat pump is a device that transfers heat energy from a source of "heat" to a destination called a "heat sink". Heat pumps are designed to move thermal energy in the opposite direction of spontaneous heat transfer by absorbing heat from a cold space and releasing it to a warmer one. A heat pump uses a small amount of external power to accomplish the work of transferring energy from the heat source to the heat sink and the same heat pump can be used for space heating or space cooling. When a heat pump is used for heating, it employs the same basic refrigeration-type cycle used by an air conditioner or a refrigerator, but in the opposite direction - releasing heat into the conditioned space rather than the surrounding environment. In this use, heat pumps generally draw heat from the cooler external air or from the ground. Though it may seem counterintuitive at first, heat can actually be extracted from air as cold as -40C and used for space heating.

Heat pumps have two primary technologies – ground-sourced and air-sourced. Heat pumps are typically considered to be a hybrid renewable energy source, as they require external power to operate, usually in the form of electricity, however, they achieve higher overall efficiency than conventional heating and cooling systems.

St. Clair College has the potential to provide a vast majority of the heating thermal energy required for the campus with air-sourced heat pumps. Given that the electricity produced for Ontario's grid contains a small percentage of fossil fuel generation, air-sourced heat pumps have the ability to allow St. Clair College to significantly reduce its GHG emissions. However, the installation, operational and maintenance costs will be significantly higher than fossil fuel-based heating.

IV Future Technologies

St. Clair College understands that in order to achieve the targets set by the *2030 Emissions Reduction Plan, to reduce GHG emissions 40 percent below 2005 levels, and Net Zero by 2050,* future technologies are required.

Forecasts and predictions about potential future technology need to be included in this ECDMP. The Future Technology category is divided into four primary action items:

1. Electric Vehicle Charging
2. Battery Storage
3. District Energy
4. Nuclear Power

1. Electric Vehicle Charging

St. Clair College recognizes that electric vehicle (EV) technology is maturing at a rapid rate, and that the two key opportunities exist to capitalize on the ongoing deployment:

- Install publicly accessible charging stations.
    - Installing EV charging stations will encourage the students and staff of St. Clair College to purchase and utilize EVs in lieu of vehicles powered by fossil fuels. This will lead to a reduction in the indirect amount of GHG emissions generated for transportation associated with St. Clair College.
- Replace fleet vehicles with EVs and install private charging stations.
    - St. Clair College could replace all fleet vehicles with EVs. Given the relatively compact nature of the main campus, EVs are a very practical consideration for St. Clair College. This will lead to a reduction in the direct amount of GHG emissions generated for transportation by St. Clair College.

2. Battery Storage

The primary function of these systems is to allow for energy to be stored when it is available but not immediately required, then utilizing the energy when demand is high.

Examples of systems where St. Clair College could utilize battery storage are:

- Solar powered exterior lighting.
- Replacement of diesel & natural gas backup generators with batteries.
- Pairing of batteries with Solar Photovoltaic and/or Micro-Wind systems.
- Grid-scale battery storage system for entire campus.

St. Clair College has great interest in battery storage and will be exploring opportunities for implementation over the next years.

3. District Energy

District energy is the production and supply of thermal energy. Hot water or steam, and chilled water, are produced at central plants and distributed to surrounding buildings via a closed-loop underground distribution system known as a thermal grid. The thermal energy delivered to the buildings is used for space heating, domestic hot water heating and air conditioning. Buildings connected to the thermal grid do not need their own boiler or furnaces, chillers, or air conditioners. Commercial buildings, condominiums, hotels, sports facilities, universities, and government complexes are all examples of buildings commonly connected to a thermal grid.

The Community Energy Plan developed by the City of Windsor indicated potential opportunity for a city-wide district energy system. The plan envisions first connecting the downtown buildings to the existing system in the downtown core, run by the Windsor Utilities Commission. Next, the system would be expanded to connect to the University of Windsor, Ford Windsor site, and Stellantis Windsor Assembly Plant. By doing so, greater coverage area and overall efficiency could be attained by integrating residential, commercial, and industrial buildings into a single system. In addition, there is an opportunity at the South Campus to turn the Central Power Plant into a localized district energy plant for all surrounding buildings. District energy is internationally accepted as one of the most efficient methods of heating, cooling, and powering communities.

Further investigations into the potential expansion and integration of our campus energy system will be considered.

4. <u>Nuclear Power</u>

St. Clair College sees the potential application of nuclear power technology to allow them to self-generate most, or all of their electrical and thermal energy needs. Small modular reactors are a type of nuclear fission reactor which are smaller than conventional reactors, manufactured at a plant, and brought to a site to be fully constructed. Modular reactors allow for less on-site construction, increased containment efficiency, and heightened nuclear materials security.

The technology needed to implement small modular reactors has been successfully demonstrated. However, there is currently no regulatory or licensing mechanism available in Canada to allow for this type of reactor to be constructed or operated. St. Clair College could explore this option if the regulatory environment changes in the future.

V Demand Management

St. Clair College, South Campus, is eligible to participate in the Industrial Conservation Initiative (ICI) as offered by the Independent Electricity System Operator (IESO) since the average electrical demand from the grid exceeds 1 MW. The Industrial Conservation Initiative (ICI) is a form of demand response that allows participating customers to manage their global adjustment (GA) costs by reducing demand during peak periods. Customers who participate in the ICI, referred to as Class A, pay GA based on their percentage contribution to the top five peak Ontario demand hours (i.e. peak demand factor) over a 12-month base period. Ontario`s electricity system is built to meet the highest demand periods of the year. By reducing demand during peak periods, ICI participants can both reduce their global adjustment costs and help defer the need for investments in new electricity infrastructure.

St. Clair College is currently investigating multiple solutions and scenarios available to all ICI participants, which would allow lowering and/or shifting the demand of the campus during peak periods. This would result in a significant reduction of the average cost per kWh of electricity, and indirectly, a reduction in GHG emissions.

St. Clair College is actively investigating the following measures to reduce or control the peak demand:

1. HVAC Curtailment & Temperature Setbacks
2. Hot and Cold Thermal Storage

VI Behavioural Energy Efficiency

Behavior based energy efficiency programs are those that utilize strategies intended to affect energy use behaviors by students, staff, contractors, and others in order for St. Clair College to achieve energy or peak demand savings. Programs typically include outreach, education, awareness building, reward benchmarking and feedback elements.

Such programs may result in changes to habitual behaviors (i.e. turning off lights where no controls are in place), or one-time behaviors (i.e. changing thermostat settings or retro commissioning). In addition, these programs target changes in purchasing behavior (i.e. purchase of energy efficient products or services) often use in conjunction with other programs, as well as other behaviors related to the selection, installation and operation of building systems.

2.3 Energy Policy

St. Clair College is committed to the conservation of natural resources and will endeavor to reduce its energy footprint through all available means. The key elements to sustainable energy are:

- Commitment to the energy and GHG reduction targets:
  - 30% Energy reduction target for the 2029 ECDMP report, below 2013 Baseline levels
  - 30% GHG emissions reduction for the 2029 ECDMP report, below 2013 Baseline levels Maintaining our goal of 3% per year, or 15% for each 5-year reporting period.
- Direct and consistent involvement of students and staff in energy reduction efforts.
- Senior Management commitment and support

St. Clair College adheres to and promotes energy optimizations and reduction efforts in a structured framework, towards enhancing our competitive position.

2.4 Energy Team

Our core energy team consists of knowledgeable individuals with a broad range of expertise:

- Jeff Morrison — Energy Manager, CEM
- Brian Muscat — Energy Consultant, P.Eng.
- Rebecca Demchuk — Assistant VP, Safety, Security and Facilities Management, P.Eng.
- Peter Panzica — Facilities Maintenance Manager
- Richard Arboleya — Facilities Maintenance Manager
- Christopher Hebert — Facilities Electrician
- Kim Kubis — Power Plant Chief Engineer
- David Grieve — Facilities HVAC Technician
- Devin Cousineau — Convergint (BAS) Representative

The energy team is planning to expand its membership to include other college constituents, such as faculty, support staff, and students.

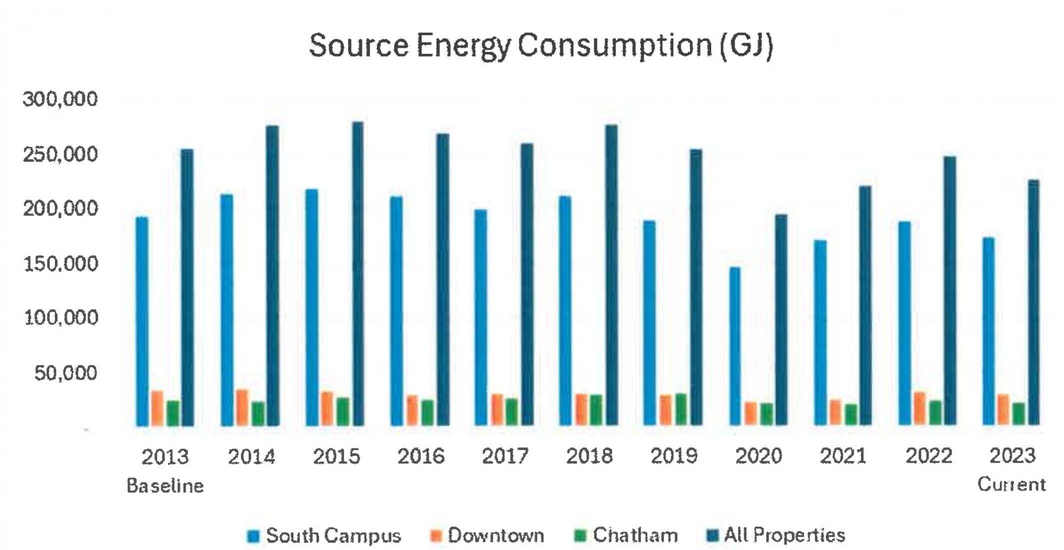
2.5 Energy Performance Results

Energy Consumption

The table below shows the energy consumption in GJ by campus and all properties combined during the baseline 2013 calendar year, and 2023 the most current complete year. A graph is provided to show the energy consumption progression through those 10 years.

Source Energy Consumption (GJ)			Comparison of % Change		
Properties	2013 Baseline	2023 Current	2013 Baseline	2017 (ref.)	2008 (ref.)
South Campus	193,249	172,635	-11%	-13%	-2%
Downtown	34,287	28,886	-16%	-7%	-4%
Chatham	24,295	21,232	-13%	-19%	102%
All Properties Combined	253,953	224,904	-11%	-13%	4%

The percent change for 2017 and 2008 have been provided as a comparison, since 2017 was the baseline for the previous ECDMP report. Although data is now available to go back to 2008 it was not used as the baseline because there were significant differences in consumption mainly due to campus size and enrolment.



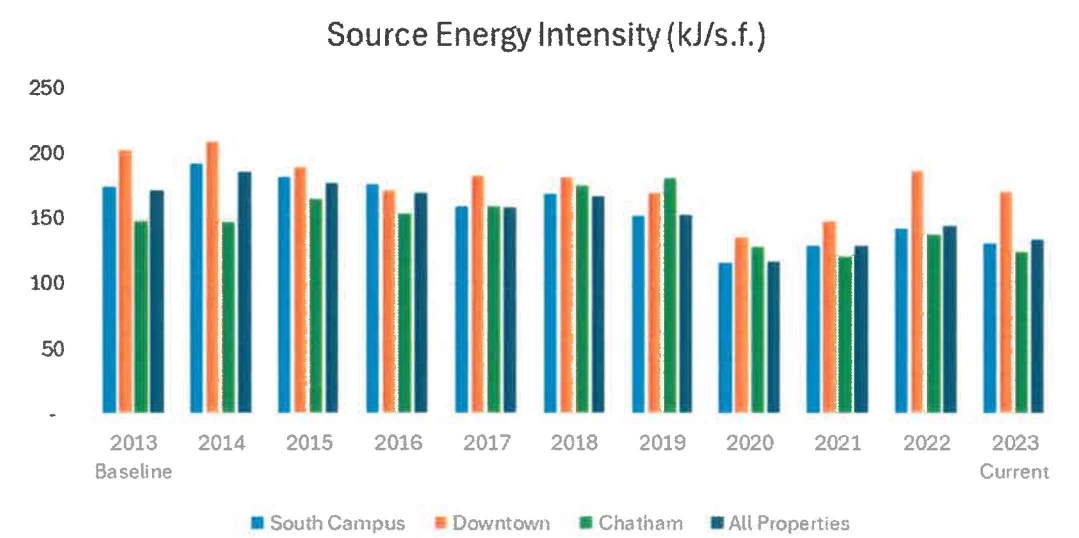
We did fall a bit short of our 15% target, but the South campus did have a major addition, and Chatham added the Powerline building since the previous report.

Energy Intensity

The table below shows the energy intensity in kJ/s.f. by campus and all properties combined during the baseline 2013 calendar year, and 2023 the most current complete year. This provides a perspective of the energy consumed to the gross floor area of the buildings. A graph is also provided with the previous 10 years of energy intensity.

Source Energy Intensity (kJ/s.f.)			Comparison of % Change		
Properties	2013 Baseline	2023 Current	2013 Baseline	2017 (ref.)	2008 (ref.)
South Campus	174	131	-25%	-18%	-29%
Downtown	202	170	-16%	-7%	-19%
Chatham	148	125	-16%	-22%	-5%
All Properties Combined	171	134	-22%	-15%	-24%

2013 was selected as the new baseline to include our earlier energy reduction measures through the Energy Manager program.



Note the unusually high energy intensity of the Downtown campus, which can be attributed to the largest building, St. Clair College Center for the Arts, which is the focus of our PM service to the building automation system (BAS) and building recommissioning investigation (EBCx).

ST. CLAIR COLLEGE

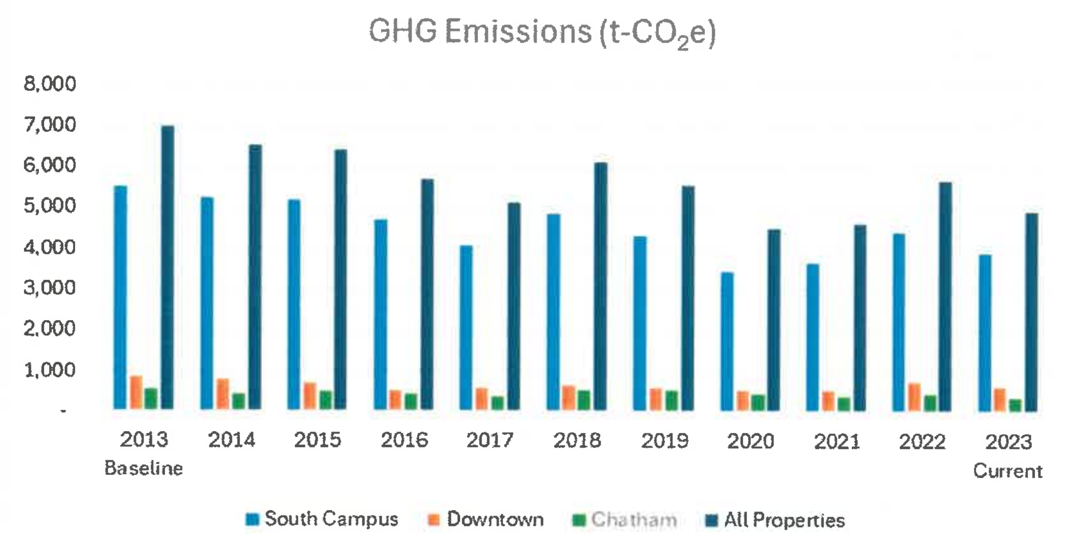
2.6 Greenhouse Gas Performance Results

Emissions

The table below shows the GHG emissions in metric tons of equivalent carbon dioxide by campus and all properties combined during the baseline 2013 calendar year, and 2023 the most current complete year. A graph is also provided with the previous 10 years.

GHG Emissions (t-CO_2e)			Comparison of % Change		
Properties	2013 Baseline	2023 Current	2013 Baseline	2017 (ref.)	2008 (ref.)
South Campus	5,523	3,871	-30%	-5%	-39%
Downtown	847	624	-26%	5%	-41%
Chatham	540	351	-35%	-6%	10%
All Properties Combined	6,971	4,901	-30%	-4%	-36%

The new 2013 baseline better reflects changes to Ontario's electricity production, while not taking full advantage of the 2005 baseline suggested by the federal government, or the 1990 offered by the province.

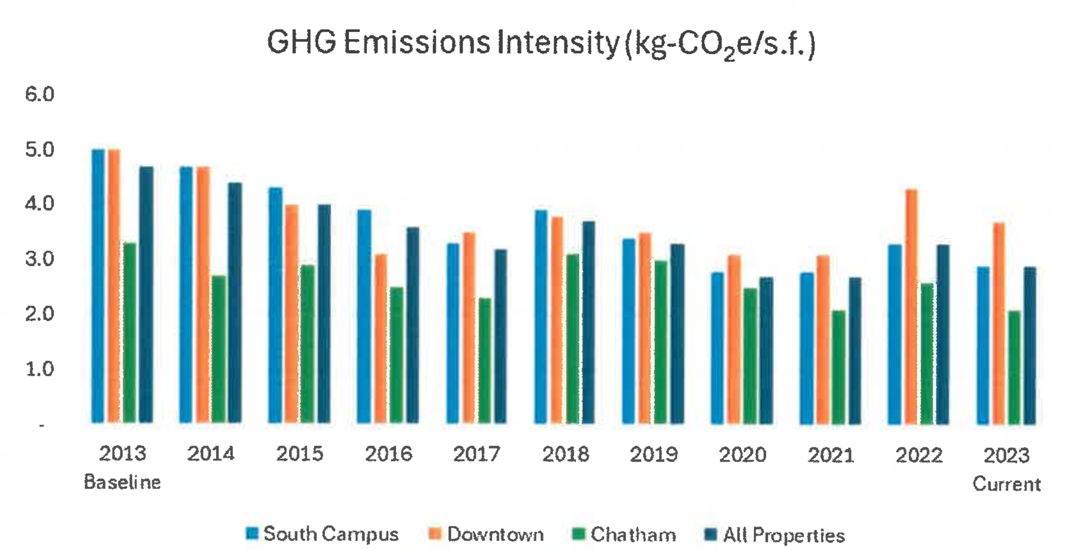


GHG emissions have lowered with consumption and additional reductions can be attributed to Ontario's mix of electricity generation having the lowest CO_2e emissions.

GHG Emissions Intensity

The table below shows the GHG emissions intensity in kilograms of equivalent carbon dioxide by square foot of gross floor area for the campuses and all properties combined during the baseline 2013 calendar year, and 2023 the most current complete year. A graph is also provided with the previous 10 years.

GHG Emissions Intensity (kg-CO_2e/s.f.)			Comparison of % Change		
Properties	2013 Baseline	2023 Current	2013 Baseline	2017 (ref.)	2008 (ref.)
South Campus	5.0	2.9	-42%	-12%	-56%
Downtown	5.0	3.7	-26%	6%	-50%
Chatham	3.3	2.1	-36%	-9%	-48%
All Properties Combined	4.7	2.9	-38%	-9%	-52%



Here too the high consumption can be seen in the emission intensity of the Downtown and South Campuses.

2.7 Energy Cost Review

Overview

The tables below show the site energy with costs of electricity and natural gas for all properties combined since the previous 2019 report (2017 data), and the current 2024 report (2023 data). Showing how energy prices have increased in the last 6 years. Our efforts to reduce electricity consumption, and natural gas to a lesser extent, have helped to offset the increased unit cost of both.

Electricity (Site)	2017	2023	% Change
Consumption kWh	23,069,619	20,297,599	-12%
Cost	$ 3,721,682	$ 3,343,141	-10%
Cost per kWh	$ 0.161	$ 0.165	2%

Natural Gas (Site)	2017	2023	% Change
Consumption m^3	2,265,834	2,222,153	-2%
Cost	$ 606,366	$ 882,161	45%
Cost per m^3	$ 0.268	$ 0.397	48%

This table compares the 2023 cost of electricity and natural gas in an equivalent unit of energy to understand the current difference. The increased cost of natural gas has lowered the ratio between electricity and natural gas to approximately 4:1. This was more than 6:1 in 2017.

2023 Fuel Comparison	Electricity	%	Natural Gas	%
Consumption GJ	73,071	46%	84,442	54%
Cost	$ 3,343,141	79%	$ 882,161	21%
Cost per GJ	$ 45.752	81%	$ 10.447	19%

3. Energy Conservation Measures

3.0 Overview

Based on Energy Feasibility Studies conducted, condition assessments, and maintenance service history, the following is a list of energy conservation measures (ECM) completed during the previous ECDMP period, those currently in process for 2024 to 2028, and those that are proposed for further reductions of both energy usage and GHG emissions:

Completed ECM's

Category	Description	Campus	Building	Budgetary Cost	GHG Savings (tonnes CO2/year)	Project Start	Project Completion	Annual MWh Saved	Annual NG-m³ Saved
Lighting	FCEM LED Upgrade	Main - South	FCEM	$ 266,649	6	2017	2018Q1	200	-
Lighting	CCIP - H Building LED T8 Lamp Upgrade	Main - South	CCIP	$ 3,276	0	2018	2018Q2	13	-
Lighting	Pool LED Lighting Upgrade	Main - South	C-Block	$ 4,530	0	2018	2018Q2	16	-
Lighting	Main Building 12-Classroom LED Upgrade	Main - South	All	$ 47,510	2	2018	2018Q3	53	-
Lighting	Corridors, stairwells & cafeteria LED Upgrade	Main - South	B & C-Blocks	$ 95,200	5	2018	2018Q4	180	-
Building Envelope	Door weather strips, caulk O/H doors, seal penetration	Main - South	All	$ 40,850	105	2018	2018Q4	-	55,040
Building Envelope	Door weather strips, caulk O/H doors, seal penetration	Downtown	SCCCA	$ 17,566	34	2018	2018Q4	-	17,920
Building Envelope	Door weather strips, caulk O/H doors, seal penetration	Downtown	Media Plex	$ 7,553	12	2018	2018Q4	-	6,400
Building Envelope	Door weather strips, caulk O/H doors, seal penetration	Downtown	TD Student Centre	$ 3,248	7	2018	2018Q4	-	3,840
Building Envelope	Door weather strips, caulk O/H doors, seal penetration	Main - South	Residence	$ 1,397	22	2018	2018Q4	-	11,520
Building Envelope	Door weather strips, caulk O/H doors, seal penetration	Main - South	Sports Plex	$ 601	15	2018	2018Q4	-	7,680
Building Envelope	Door weather strips, caulk O/H doors, seal penetration	Main - South	FCEM	$ 258	19	2018	2018Q4	-	10,240
Building Envelope	Door weather strips, caulk O/H doors, seal penetration	Chatham	Main Building	$ 111	29	2018	2018Q4	-	15,360
Heat Recovery	Boilers Condensing Economizer	Main - South	Powerhouse	$ 955,000	178	2018	2019Q1	- 65	95,000
Heating	Boilers replacement (Main)	Main - South	Powerhouse	$ 1,126,000	201	2018	2019Q1	97	104,500
Lighting	CCIP - H Building LED T5 Lamp Upgrade	Main - South	CCIP	$ 3,538	2	2018	2019Q1	55	-
HVAC	Large single zone VAV Conversion	Main - South	C-Block	$ 100,000	51	2018	2019Q1	-	26,730
HVAC	Multi zone VAV Conversion	Main - South	B & C-Blocks	$ 900,000	78	2018	2019Q1	-	41,255
Heating	Boilers replacement (SCCCA)	Downtown	SCCCA	$ 700,000	48	2018	2019Q2	-	25,300
Heating	Boiler Upgrade (TD)	Downtown	TD Student Centre	$ 50,000	6	2019	2019Q4	-	3,000
HVAC	AHU-14,15&16 VFD & Control - 5th Floor	Downtown	SCCCA	$ 60,302	143	2021	2021Q4	-	75,209
HVAC	Duct Sealing AC-2B & 1C	Main - South	B & C-Blocks	$ 455,077	111	2021	2021Q4	-	58,496
Lighting	South Main LED Lamp Upgrade	Main - South	Main Building	$ 7,115	1	2022	2022Q1	25	-
Other	AC-1C Supply Fan Control Optimization	Main - South	C-Block	$ 500	5	2022	2022Q2	183	-
Lighting	Pool Changeroom LED Upgrade	Main - South	C-Block	$ 2,458	0	2022	2022Q2	10	-
Lighting	SCCCA LED Troffer Upgrade	Downtown	SCCCA	$ 3,199	0	2022	2022Q2	4	-
HVAC	Split AC Units	Main - South	Automotive	$ 7,860	0	2022	2022Q2	2	-
Lighting	Baking Lab LED Upgrade	Main - South	B-Block	$ 5,065	0	2022	2022Q3	10	-
Cooling	Chiller Plant Optimization	Main - South	Powerhouse	$ 4,883	0	2022	2022Q3	3	-
Lighting	Health Plex Gym LED Upgrade	Chatham	Health Plex	$ 25,590	1	2022	2022Q3	49	-
Lighting	Main Campus & Sports Plex Track LED	Main - South	All	$ 7,869	1	2022	2022Q3	28	-
Lighting	SCCCA Theartre LED Upgrade	Downtown	SCCCA	$ 6,544	1	2022	2022Q3	17	-
HVAC	Split AC Units	Main - South	Residence	$ 21,950	0	2022	2022Q3	7	-
Other	AC-1C Return Fan Control Optimization	Main - South	C-Block	$ 500	4	2022	2022Q4	135	-
Lighting	Main Campus & Electrical Vault LED Upgrade	Main - South	All	$ 4,004	1	2022	2022Q4	22	-
Lighting	SCCCA Service Rooms LED Upgrade	Downtown	SCCCA	$ 7,699	1	2022	2022Q4	20	-
Lighting	A-Block LED Upgrade	Main - South	A-Block	$ 259,896	5	2022	2023Q1	175	-
HVAC	AHU-11,12&13 VFD & Control - 4th Floor	Downtown	SCCCA	$ 152,505	68	2022	2023Q1	-	35,553
Other	City Water Booster Pump Control Optimization	Main - South	Powerhouse	$ 5,000	1	2022	2023Q1	49	-
Lighting	Main Building LED Upgrade	Chatham	Main Building	$ 174,744	5	2022	2023Q1	161	-
Lighting	Quittenton LED Upgrade	Main - South	Residence	$ 77,960	2	2022	2023Q1	52	-
HVAC	SAF-2,3&4 Final Commissioning	Main - South	A-Block	$ 60,752	308	2021	2023Q1	-	162,159
Lighting	SCCCA Stairwells & Washrooms LED Upgrade	Downtown	SCCCA	$ 5,665	0	2022	2023Q1	12	-
HVAC	Weld Shop & Kitchen Café Air Balancing	Main - South	A & B-Blocks	$ 10,773	267	2023	2023Q1	-	140,454

Completed ECM's (continued)

Category	Description	Campus	Building	Budgetary Cost	GHG Savings (tonnes CO2/year)	Project Start	Project Completion	Annual MWh Saved	Annual NG-m³ Saved
Lighting	Mechanical Service Rooms LED Retrofit	Main - South	All	$ 3,731	1	2023	2023Q2	20	-
Lighting	Power House Classrooms LED Upgrade	Main - South	Powerhouse	$ -	-	2023	2023Q2	-	-
HVAC	SAF-4 VFD & Control	Main - South	A-Block	$ 46,500	3	2022	2023Q2	85	-
Lighting	Skilled Trades Regional Training Centre LED	Other	STRTC	$ 12,360	1	2023	2023Q2	18	-
Lighting	Automotive Building LED Retrofit	Main - South	Automotive	$ 3,180	1	2023	2023Q3	23	-
Lighting	Health Science LED Retrofit	Main - South	Toldo HC	$ 210,118	5	2023	2023Q3	160	-
Lighting	Power House Chiller Room LED Upgrade	Main - South	Powerhouse	$ -	-	2023	2023Q3	-	-
HVAC	RF-7C Pool Return Fan VFD & Control	Main - South	C-Block	$ 10,000	0	2022	2023Q3	14	-
HVAC	SAF-2 & 4 Duct Sealing	Main - South	A-Block	$ 233,675	18	2023	2023Q3	592	-
Lighting	TD Student Centre LED Retrofit	Downtown	TD Student Centre	$ 13,204	0	2023	2023Q3	13	-
HVAC	AC-1B Supply & Return Fan VFD & Control	Main - South	B-Block	$ 60,509	3	2022	2023Q4	85	-
Lighting	B & C Blocks LED Upgrade	Main - South	B & C-Blocks	$ 156,748	8	2023	2023Q4	252	-
Lighting	Boardroom LED Upgrade	Main - South	C-Block	$ 5,000	0	2023	2023Q4	0	-
Lighting	Health Plex LED Retrofit	Chatham	Health Plex	$ 134,829	3	2023	2023Q4	99	-
Lighting	Mary Uniac LED Retrofit	Chatham	Mary Uniac	$ 29,463	0	2023	2023Q4	14	-
Lighting	Media Plex LED Retrofit	Downtown	Media Plex	$ 48,570	2	2023	2023Q4	70	-
HVAC	SAF-1 VFD Controls Upgrade	Main - South	A-Block	$ 66,372	2	2023	2023Q4	53	-
Lighting	Sports Plex LED Retrofit	Main - South	Sports Plex	$ 121,107	6	2023	2023Q4	203	-
Lighting	IT Server Room LED Upgrade	Main - South	G-Building	$ -	-	2024	2024Q1	-	-
Lighting	SCCCA Current LED Lighting Upgrade	Downtown	SCCCA	$ 8,930	1	2023	2024Q1	23	-

Current ECM's

Current energy conservation measures may increase electricity consumption by 10% and reduce natural gas consumption by 25%.

Category	Description	Campus	Building	Budgetary Cost	GHG Savings (tonnes CO2/year)	Project Start	Project Completion	Annual MWh Saved	Annual NG-m³ Saved
Lighting	600 (F) First Floor & Basement LED Upgrade	Main - South	F-Block	$ 30,000	0	2024	2024	15	-
HVAC	600 (F) Third Floor Renovation	Main - South	F-Block	$ 50,000	1	2024	2024	20	-
HVAC	AHU-6,7,8,9&10 Upgrade & Optimize - Mezzanine	Downtown	SCCCA	$ 1,386,400	2	2023	2024	74	-
Lighting	CCIP - H Building LED Upgrade Remaining	Main - South	CCIP	$ 5,000	1	2024	2024	31	-
HVAC	Chatham RTU-1 & 4 Upgrade & Optimize	Chatham	Main Building	$ 200,000	4	2024	2024	5	2,000
Cooling	Cooling Tower Optimization	Main - South	Powerhouse	$ 15,000	0	2024	2024	10	-
Fossil Fuel Conversion	FCEM Electric Boiler	Main - South	FCEM	$ 400,000	264	2024	2024	- 1,800	167,400
Fossil Fuel Conversion	FCEM Heat Pumps (Air / Ground)	Main - South	FCEM	$ 800,000	110	2024	2025	- 180	61,000
HVAC	FCEM Split AC#1 thru 3 Replacement	Main - South	FCEM	$ 40,000	1	2024	2024	33	-
HVAC	Health Plex RTU-1 & 2 Upgrade & Optimize	Chatham	Health Plex	$ 500,000	7	2023	2024	10	3,500
Heating	Power House Boiler Optimization	Main - South	Powerhouse	$ 35,000	-	2023	2024	-	-
Cooling	Power House Chiller Optimization	Main - South	Powerhouse	$ 30,000	-	2024	2024	-	-
HVAC	RTU Replacement / HP Upgrade	Chatham	Mary Uniac	$ 480,000	-	2024	2024	-	-
HVAC	RTU-2G, 2S, 5S Upgrades	Main - South	S-Block	$ 60,000	-	2024	2024	-	-
Existing Building Commissioning	SCCCA EBCx	Downtown	SCCCA	$ -	-	2024	2024	-	-
Existing Building Commissioning	Sports Plex EBCx	Main - South	Sports Plex	$ -	-	2024	2024	-	-
HVAC	Welcome Centre Addition VRV & DOAS	Main - South	Welcome Centre	$ -	-	2023	2024	-	-
HVAC	AC-4B & AC-5B Upgrade & Optimize	Main - South	B-Block	$ 856,000	-	2024	2025	-	-
HVAC	AC-4C Upgrade & Optimize - Gym - direct replacement	Main - South	C-Block	$ 370,000	-	2024	2025	-	-

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Proposed ECM's

Proposed energy conservation measures could double electricity consumption and reduce natural gas to near zero.

Category	Description	Campus	Building	Budgetary Cost	GHG Savings (tonnes CO2/year)	Project Start	Project Completion	Annual MWh Saved	Annual NG-m³ Saved
Heat Recovery	DHW Pre-Heat from Chillers	Main - South	Powerhouse	$ -	342	2024	2025	-	180,000
Fossil Fuel Conversion	Domestic Hot Water Boilers (Quittenton)	Main - South	Residence	$ 180,000	-	2025	2025	-	-
HVAC	Existing Building Recommissioning	Main - South	Main Building	$ -	-	2024	2025	-	-
HVAC	HRV with new RTUs (Quittenton)	Main - South	Residence	$ 1,200,000	30	2024	2025	-	16,000
Fossil Fuel Conversion	Quittenton Electric Boilers/Heat Pump (Quittenton)	Main - South	Residence	$ -	-	2025	2025	-	-
HVAC	Receiving Dock Air Curtain	Main - South	Powerhouse	$ -	-	2025	2025	-	-
Fossil Fuel Conversion	Sourcing "Renewable" Natural Gas	All	All	$ -	-	2025	2025	-	-
Self Generation	Chatham Campus - Solar PV (296 kW)	Chatham	Health Plex	$ 690,000	10	2026	2026	328	-
Fossil Fuel Conversion	DHW Boiler Electrification	Main - South	Sports Plex	$ -	90	2025	2026	- 613	57,000
Fossil Fuel Conversion	Electric Boiler Conversion	Main - South	Powerhouse	$ -	3,106	2025	2026	- 21,307	1,972,200
HVAC	Media Plex RTU	Downtown	Media Plex	$ -	-	2025	2026	-	-
Self Generation	South Campus - Solar PV (271 kW)	Main - South	Sports Plex	$ 678,460	9	2026	2026	298	-
Self Generation	South Campus - Solar PV (506 kW)	Main - South	FCEM	$ 1,079,189	17	2026	2026	555	-
Heat Recovery	DHW Pre-Heat from Chillers	Downtown	SCCCA	$ -	269	2026	2027	-	141,500
Fossil Fuel Conversion	Electric Boiler Conversion	Downtown	SCCCA	$ -	851	2026	2027	- 5,800	540,000
HVAC	FCEM RTU-1 thru 5 and MAU Upgrades	Main - South	FCEM	$ 1,500,000	57	2024	2027	-	30,000
Self Generation	South Campus - Solar PV (407 kW)	Main - South	Main Building	$ 914,445	15	2027	2027	489	-
Heat Recovery	DHW Pre-Heat from Chillers	Main - South	Sports Plex	$ -	524	2027	2028	-	276,000
Other	Metering - Natural Gas building & major equipment	All	All	$ -	-	2026	2028	-	-

3.1 ECM 1 – Boiler Replacement

Overview

Hot water and/or steam used for heating and domestic water use needs to be generated at higher efficiency, lower cost, and reduced GHG emissions. Heat pumps, electric, and condensing boilers will be considered in this order of priority whenever heating water is required, or an existing boiler must be replaced.

A. Completed Measures

South Campus FCEM (Ford Building) was initially planned to receive an upgrade to improve natural gas efficiency by replacing its non-condensing boilers with condensing boilers. This plan was put on hold until a study could be completed to assess the viability of air sourced heat pumps. It was determined that heat pumps would not meet the demands of the building, and electric hot water boilers were recommended (see Current Measure below).

B. Current Measures

South Campus FCEM (Ford Building) hot water hydronic heating system replace of 3 existing non-condensing boilers with 2 new electric boilers and 1 condensing boiler for backup. This will reduce GHG emission by switching fuels and improve natural gas efficiency when required. South Campus (Powerhouse) study to identify the potential rightsizing of the existing boilers, with consideration for electrification of the small summer boiler.

C. Proposed Measures

South Campus Residence (Quittenton Hall) hydronic heating, and domestic hot water systems replace of 4 existing non-condensing boilers, each with 2 new heat pump or electric boilers with 2 condensing boilers for extremely cold weather, or demand backup. This will reduce GHG emission by switching fuels and improving natural gas efficiency when needed.

3.2 ECM 2 – HVAC Re-Commissioning

Overview

HVAC systems need to provide efficient temperature control and the right amount of fresh air, at the right time, using the minimal amount of energy. Re-commissioning improves energy efficiency by verifying all components are functioning properly, and restoring or improving the sequence of operation so there is no wasted, or unnecessary use of energy.

A. Completed Measures

South Campus Main Building (AC-1C, AC-2B, SAF-2A and SAF-4A) had duct sealing completed to several of the oldest original HVAC systems as an initial step to re-commissioning.

B. Current Measures

South Campus (Sports Plex) and Downtown Campus (SCCCA) are being re-commissioned as part of the Existing Building Re-Commissioning (EBCx) program offered by Save on Energy (IESO). We are focusing on these two buildings since they have the highest energy and emissions intensities in our portfolio.

C. Proposed Measures

South Campus (SAF-3A and AC-1B) continue duct sealing large air handling units.

3.3 ECM 3– HVAC Retrofits

Overview

The HVAC systems manufactured today are available with higher energy efficiency. Roof top units can be specified to have energy or heat recovery (ERV/HRV) to extract heat for the exhaust air, and heat pumps to reduce or eliminate the use of natural gas. HVAC equipment that has reached it useful life will be retrofitted or replaced with the latest technology.

A. Completed Measures

South Campus (Automotive Building) air handling unit, makeup air unit, and slip air conditioning units replaced for higher energy efficiency.
South Campus Residence (Quittenton Hall) split air conditioning units with higher efficiency.
South Campus (Main Building) VFD upgrade to variable airflow SAF-1 through 4, and AC-1B.
Downtown Campus (SCCCA) VFD upgrade to variable airflow AHU-11 through 16.
Chatham Campus (Main Building and Health Plex) four variable flow roof top air handling units.

B. Current Measures

South Campus (FCEM Building) two roof top units with hybrid heat pump and natural gas backup, and three split air conditioning units.
South Campus (Main Building) three air handing units, three roof top units, and three split air conditioning units.
Chatham Campus (Mari Uniac Building) three roof top units with hybrid heat pump and natural gas backup, and one energy recovery unit.
Chatham Campus (Main Building and Health Plex) four variable flow roof top air handling units.

C. Proposed Measures

South Campus (Quittenton Hall) four roof top makeup air units with hybrid heat pump and natural gas backup. To include four energy recovery ventilation units to recover heat from thirty-two suite exhaust fans.
South Campus (FCEM Building) four remaining roof top units with hybrid heat pump and natural gas backup, and three split air conditioning units.

3.4 ECM 4 – HVAC Controls

Overview

Previously there was limited information to determine whether HVAC systems were operating as per design conditions. The college has begun to standardize the building automation system across all campuses to provide live monitoring and control, with automated alarms, and trends.

A. Completed Measures

South Campus (Sports Plex) building automation system upgrades to Ecostructure.
Downtown Campus (SCCCA and Media Plex) building automation system upgrades.
Chatham Campus (All Buildings) upgraded to Ecostructure.

B. Current Measures

All Campuses are having a complete preventative maintenance of the building automation system (BAS) to verify all HVAC equipment is operation as efficiently as possible, and updated to the latest standard with trending. We expect this work will improve energy and emissions intensities similar to the EBCx program.

C. Proposed Measures

South and Downtown Campuses (Quittenton Hall and the TD Student Center) adding the remaining buildings to the building automation system to improve energy efficiency.

3.5 ECM 5 – LED Lighting and Controls

Overview

Indoor and outdoor lighting systems need to provide the right amount of light with the most efficient type of lighting (dimmable LED), and only operate when required (occupancy controls and daylight sensors).

A. Completed Measures

South Campus – Main Building (Blocks 100, 300, and 500), Automotive Building, Powerhouse, Health Science, and Sports Plex
Downtown Campus – SCCCA, Media Plex, and TD Student Center.
Chatham Campus - Main Building, Health Plex, and Mary Uniac.

B. Current Measures

South Campus – Retrofit remaining rooms in Main Building (600 Block), CCIP, and G-Building.

C. Proposed Measures

South Campus – Upgrade network lighting controls.

3.6 ECM 6 – Domestic Water Conservation

Overview

Domestic water fixtures need to provide the proper amount of water, when needed, using the minimal amount of water.

A. Completed Measures

All Campuses converted sinks to hands free operation with low flow aerators. All urinals and toilets converted to low flow sensor flush valves.

B. Current Measures

South Campus repair stormwater collection for use in irrigation systems.

C. Proposed Measures

South Campus expand rainwater irrigation system.

3.7 ECM 7 – Building Envelope Upgrades

Overview

Building envelopes need to provide the highest possible insulation and air sealing performance available to minimize the amount of thermal energy loss through walls, windows, doors, and roofs.

A. Completed Measures

South Campus (Main Building and Automotive) perimeter building sealing, roof, and window replacements.

B. Current Measures

Downtown Campus (SCCCA and TD Student Centre) perimeter building sealing.
Chatham Campus (Main Building) perimeter building sealing, and window replacements.

C. Proposed Measures

South Campus (FCEM Building) perimeter building sealing.

3.8 ECM 8 – Distributed Energy Sources

Overview

Distributed energy sources (DESs) are electricity-producing sources or controllable loads that are directly connected to the host facility. DESs can include solar panels, combined heat and power plants, electricity storage, natural gas generators, electric vehicles, and controllable loads, such as HVAC systems and electric water heaters.

A. Proposed Measures

The following options are being considered for short and medium terms:

- Solar PV Roof Top and Parking Lots having un-shaded and unobstructed spaces ideal for solar photovoltaic panels. Having over 800,000 square feet of parking space at our South Main Campus and 200,000 square feet at the Chatham Campus, St. Clair College plans on exploring the opportunity for solar carports. Adding shade structures to a parking lot can reduce lighting costs through the installation of energy-efficient LED lighting under the structures, in place of the often low-efficiency light poles in many lots. Additionally, the panels protect both the asphalt and cars from damaging solar radiation and hail while also eliminating the need for snow removal in the winter.
- BESS (Battery Energy Storage Solutions) for Global Adjustment mitigation as well as electricity cost reduction beyond the GA portion.

3.9 ECM 9 – Energy Management Information System

Overview

Monitoring of the college's electricity, gas and water consumption can raise awareness and identify excessive consumption in real-time. The monitoring itself can also be used to measure the effectiveness of other ECMs that may be implemented in the future.

A. Existing Conditions

Some of the buildings on the main campus are sub-metered for electrical consumption. The three water chillers are also sub-metered. Newer buildings, not being supplied by the main electrical room on the main campus are not currently sub-metered. Software for the Energy Management Information System (EMIS) exists but is not being used to its full potential.

B. Proposed Measures

South Campus EMIS needs to be configured to accurately monitor and report the energy consumption for existing sub-meters on the Main Campus. The EMIS will be updated to allow access to key personnel on an as-needed basis. Future developments may include posting key data on public displays or on the College website. Expand the EMIS to include natural gas

consumption and water consumption, on a campus-wide or building-specific basis. Expand the sub-metering to include other satellite buildings on this campus.
Downtown and Chatham Campuses install new metering equipment and integrate into the EMIS to provide hourly or daily consumption reports for electricity, natural gas and water.

4. Obstacles and Challenges

4.0 Overview

Based on the Energy Feasibility Studies, as well as internal reviews of the design and condition of the buildings on campus, the following list of obstacles and challenges were selected to be discussed in detail:

- Funding for Capital Projects
- Economics and GHG Emissions of Natural Gas versus Electricity.

4.1 Funding for Capital Projects

A. Overview

The capital funding available for projects that improve energy efficiency and GHG emissions is forecasted to lag behind demand.

B. Specifics

St. Clair College, like many other post-secondary institutions in Ontario, has a large inventory of buildings that are more than 20 years old, and limited capital funds to perform campus wide or synergistic deep retrofit projects to the buildings to improve the energy efficiency.

It is expected that the cost of energy will increase faster than the rate of inflation, and as the cost of energy increases, more projects will be viable from a financial perspective (return on investment). However, this may not occur quickly enough to insulate St. Clair College from energy price spikes or reach the mandated GHG emission reduction targets.

To address this challenge, the Facilities Services department will strive to fully map a 7-to-10-year plan for St. Clair College, with the support and budget approval by Senior Management, while utilizing all sources of outside funding available including government grant programs and utility incentives.

4.2 Economics and GHG Emissions of Natural Gas versus Electricity

A. Overview

The mandated GHG emissions reduction targets strongly imply moving away from natural gas as a fuel source. Increased cost and taxation of natural gas is making the economics of switching to electricity more favourable, but our systems must be the most efficient to reduce the demand on the electricity grid.

B. Specifics

Natural gas is a safe, clean burning and affordable fuel source. When combusted, it produces very low levels of nitrous oxide compounds, and virtually no sulfur oxides or particulates, unlike liquid or solid fossil fuels such as gasoline, kerosene, diesel, or coal. The primary emission from natural gas usage is carbon dioxide (CO_2), which is the second most significant long-lived greenhouse gas in Earth's atmosphere. Since the Industrial Revolution, anthropogenic emissions – primarily from use of fossil fuels and deforestation – have rapidly increased their concentration in the atmosphere, leading to global warming. The CO_2 released into the atmosphere as a result of the use of fossil fuels "represents 99.4% of CO_2 emissions in 2013". Carbon dioxide also causes ocean acidification because it dissolves in water to form carbonic acid.

Replacing virtually all of the usage of natural gas at St. Clair College is technically feasible with today's technology. The primary systems where usage could be eliminated would be the boilers and the (Roof Top) heating units directly burning natural gas. Without using natural gas for heating, St. Clair College would need to convert the building heating systems from natural gas or hot water to air sourced heat pumps. Air source heat pumps operate solely on electricity and would be effective and efficient in the Windsor area as the winter temperatures rarely approach -30 C, with a record low being -28 C, recorded on January 19, 1994.

Given that the electricity purchased from Ontario's grid is very clean from a GHG emissions perspective due to the large amount of baseload nuclear and hydroelectric, St. Clair College could potentially meet the 2030 and 2050 GHG emissions targets of 37% percent and 80% percent reductions respectively, by aggressively moving ahead with converting the building heating systems to air sourced heat pumps. The first result of this conversion would result in running only one and occasionally two boilers, at very low load. Eventually converting to electric boilers, and the campus energy system would be entirely electrical based.

However, the economics of this action plan are still not favourable. The cost of electricity in Ontario is now about 4 times higher than the cost of natural gas when looking at the equivalent energy capability. Converting buildings to utilize more electricity with new air sourced heat pumps and decommission natural gas boilers is forecasted to increase St. Clair College's operating expenses. In addition to the utility cost impacts, air sourced heat pumps are also more expensive to install and maintain than natural gas or hot water coil HVAC equipment.

Further research and planning is required over the next 5 years to understand how to achieve the proper balance of economics and GHG emissions between the usage of natural gas and electricity.

5. Summary and Targets

5.0 Summary

St. Clair College's organizational culture for promoting energy conservation and sustainable initiatives is evident through its planning for both existing and new infrastructure, as well as through education, outreach, and awareness. This ECDMP is a dynamic document intended to not only ensure compliance with Ontario regulations, but also highlight and document the organization's energy and demand management conservation goals, and to measure its progress against them. St. Clair College understands its responsibility towards promoting energy conservation and sustainability and commits to providing leadership for current and future generations at its organization.

This report provides a background of St. Clair College's current energy conservation practices and highlights the measures that will be taken to further reduce campus-wide consumption over the *2024-2028* period.

Building on past successes and many existing efforts, the EDCMP is anticipated to result in improved efficiencies, improved energy management, future cost avoidance, and lower greenhouse gas emissions. All measures outlined beyond 2025 are dependent on approved annual College capital funding allocations as well as funding from the Provincial and Federal governments to support these targets and initiatives. This plan will be updated annually to reflect actual projects and reductions.

5.1 General Targets

Through this EDCMP, it is expected that by 2029, St. Clair College will achieve a minimum of:

- 30% Energy reduction target for the 2029 ECDMP report, below 2013 Baseline levels
- 30% GHG emissions reduction for the 2029 ECDMP report, below 2013 Baseline levels
  Maintaining our goal of 3% per year, or 15% for each 5-year reporting period.

5.2 Planned and Proposed Reductions

To achieve these targets over the next 5-years St. Clair College will continue to look for efficiency improvements to reduce energy use by 48,000 GJ while continuing to focus on GHG reduction measures having the least impact on electricity consumption. It will be necessary to implement onsite generation as the natural gas reduction measures necessary to reach NetZero are expected to increase electricity consumption.

Appendix A – List of Acronyms

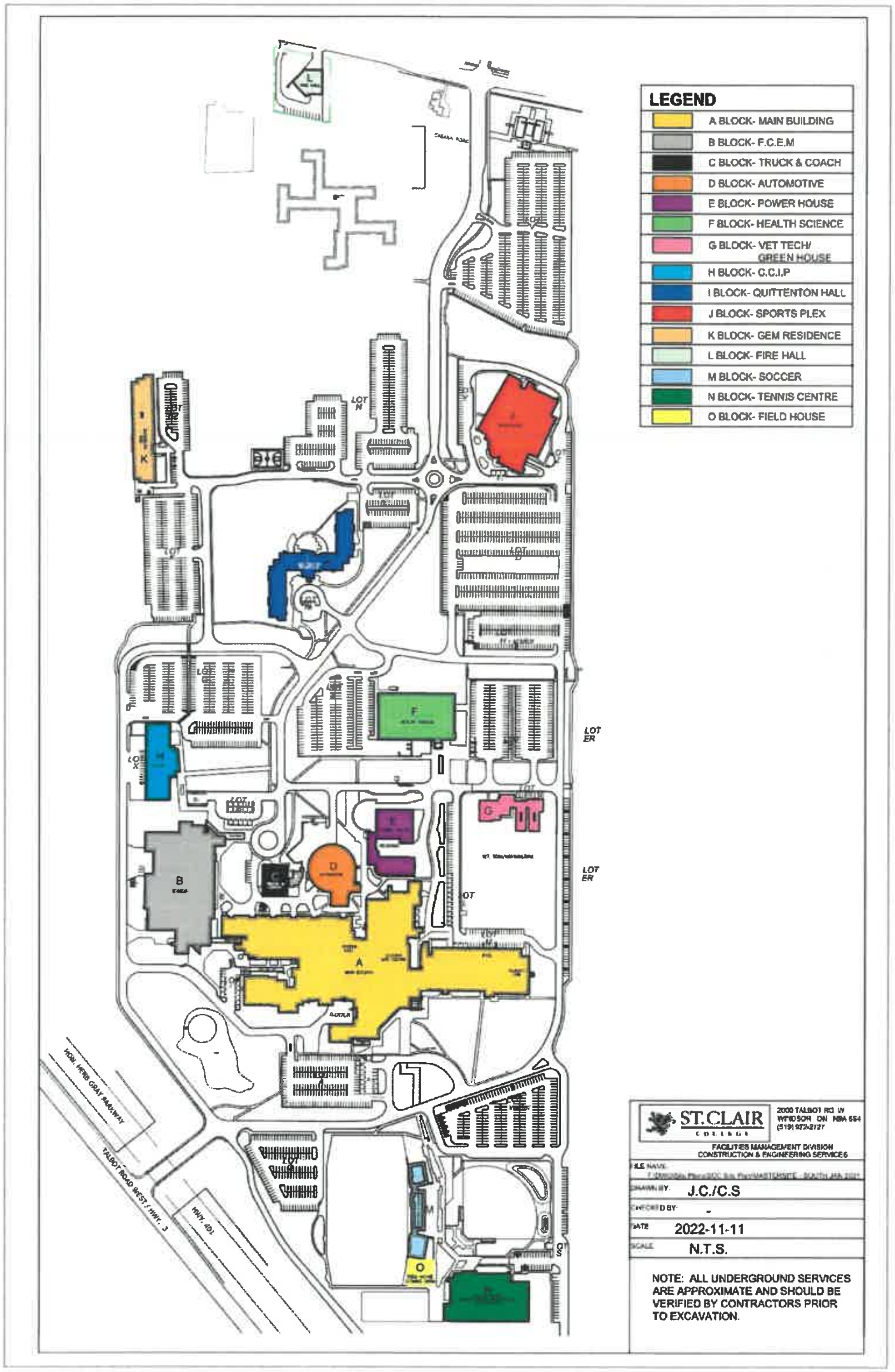
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BAS	Building Automation System
CAV	Constant Air Volume
COP	Coefficient of Performance
ECDMP	Energy Conservation and Demand Management Plan
ECM	Energy Conservation Measure
EMIS	Energy Management Information System
GEA	Green Energy Act
GJ	Gigajoule
HVAC	Heating, Ventilation, and Air Conditioning
IESO	Independent Electricity System Operator
LED	Light Emitting Diode
VAV	Variable Air Volume
VFD	Variable Frequency Drive

Appendix B – ECDMP Approval from Senior Management

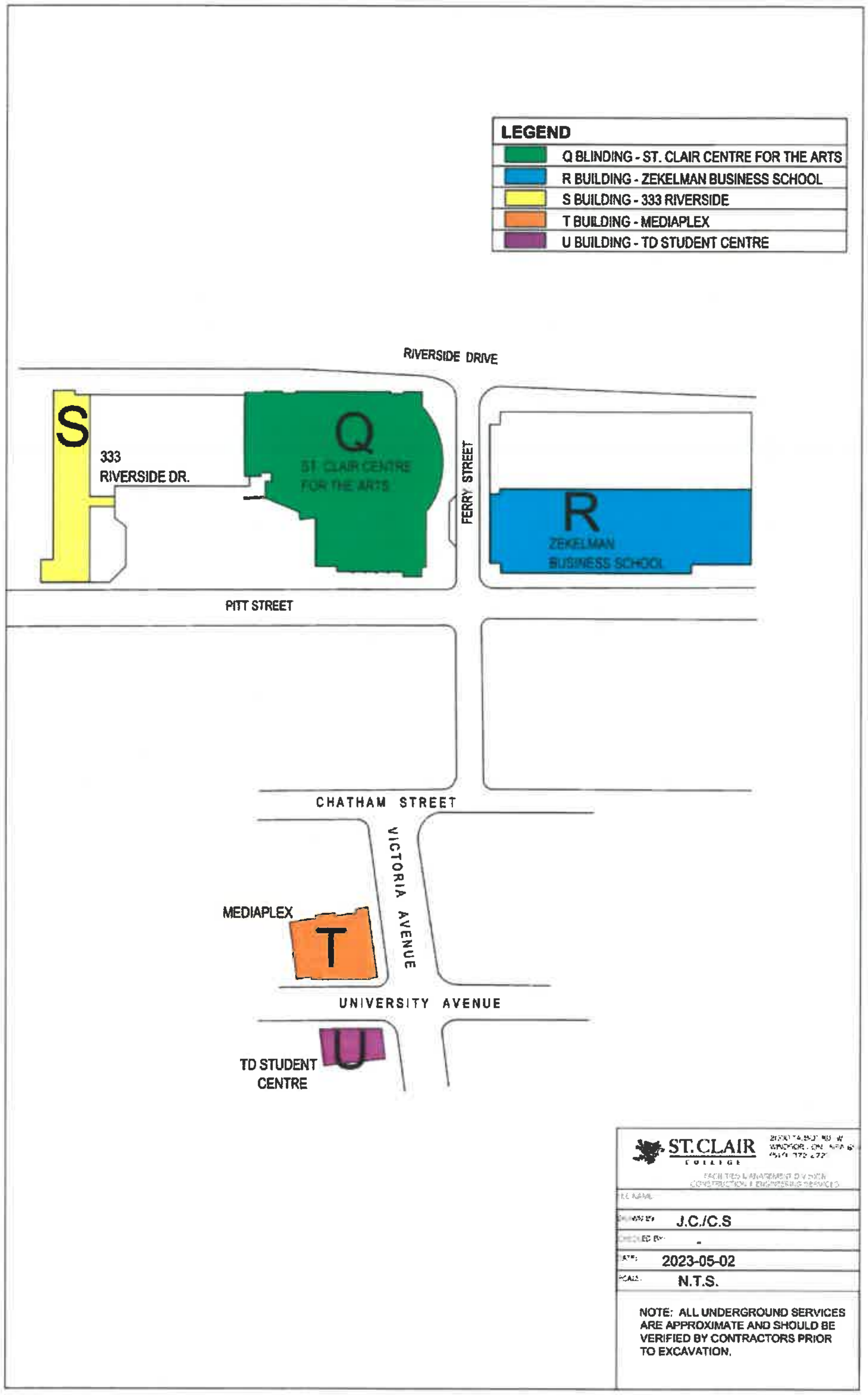
This document has been reviewed and approved by:

ST. CLAIR COLLEGE

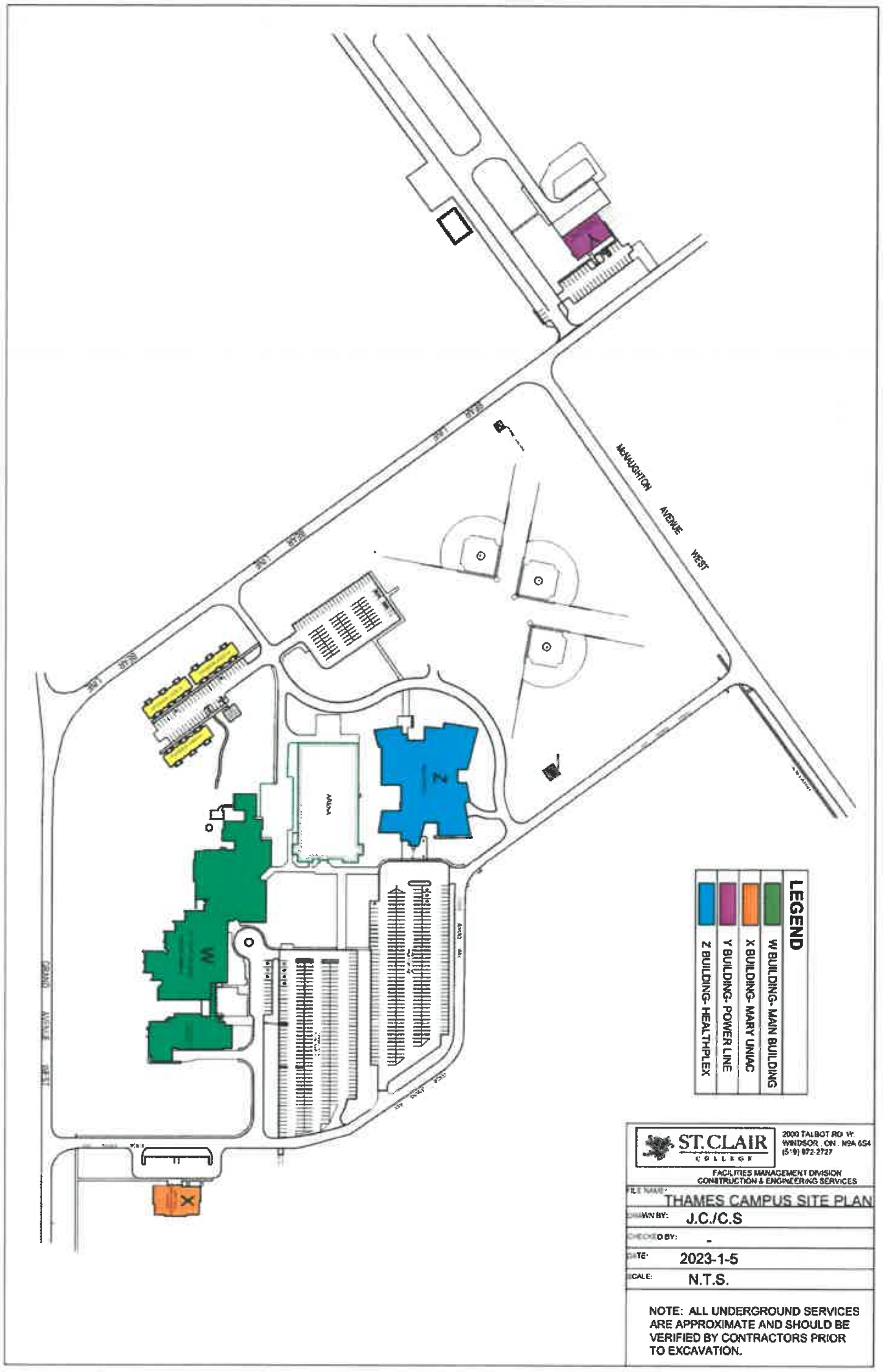
Appendix C – South Campus Site Map



Appendix D – Downtown Campus Site Map



Appendix E – Chatham Campus Site Map



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