



Energy Conservation and Demand Management Plan

LAND ACKNOWLEDGMENT

"Brock University acknowledges the land on which we gather is the traditional territory of the Haudenosaunee and Anishinaabe peoples, many of whom continue to live and work here today. This territory is covered by the Upper Canada Treaties and is within the land protected by the Dish with One Spoon Wampum agreement. Today this gathering place is home to many First Nations, Métis, and Inuit peoples and acknowledging reminds us that our great standard of living is directly related to the resources and friendship of Indigenous people."

Brock Aboriginal Education Council, 2018

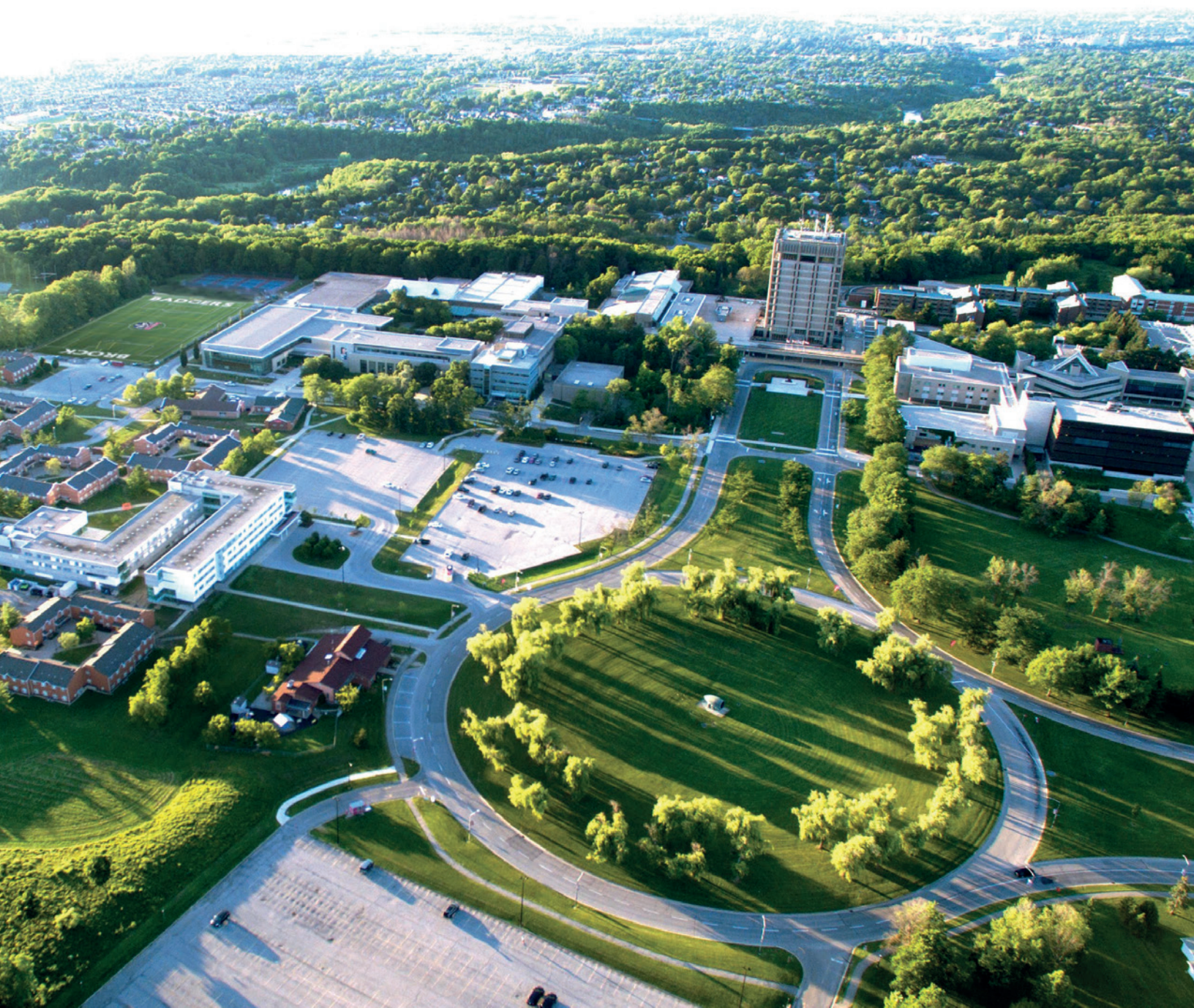


TABLE OF CONTENTS

Confirmation of Approval by Senior Management	4
Executive Summary	5
Charter Between the ESRC and FM	5
Guidance from the Institution	6
Report on Actual Results (2014-2019)	7
DEEP I & II	8
Plaza Chilled Water	9
Proposed Measures For 2019-2024.....	11
Measures - Future (2019 – 2024).....	11
Energy Management Team at Brock.....	12
Sustainable Development Goals Training Day + Open Resource Toolkit.....	13
Campus Sustainability Dashboard.....	16
Renewable Energy Generation Facilities.....	16
Appendix A: 2017 Ontario Regulation 507/18 Report.....	18
Appendix B: Notes for the 2019-2024 ECDM Plan	20
Appendix C: Glossary of Terms	22



CONFIRMATION OF APPROVAL BY SENIOR MANAGEMENT

To: Ontario Ministry of Energy, Northern Development and Mines

With the issuance of this revised energy conservation and demand management plan (ECDM), Brock University is re-affirming our commitment to energy conservation and sustainable operations. The conservation and demand management plan will be periodically reviewed, revised and updated to meet the dynamics of energy efficiency and conservation while still providing the highest quality experience for the faculty, staff and most importantly the students of Brock University.

Gervan Fearon
President & Vice-Chancellor
Brock University

EXECUTIVE SUMMARY

Brock University, in the completion of this plan, is committed to following Ontario Regulation 507/18 under the Electricity Act 1998 which requires all broader public sector (BPS) organizations to report on their annual energy consumption and greenhouse gas (GHG) emissions, as well as update their Energy Conservation and Demand Management (ECDM) plan every five years. This plan is an update to Brock University's prior ECDM plan, which can be found in Appendix A, and will be utilized from 2019 to 2024.

This plan documents the University's:

- Updated energy conservation goals, objectives, and plans for completion;
- Ongoing energy conservation measures and proposed next steps;
- Updated results and benchmark comparisons; and
- Changes based on the **previous plan** and **scorecards** to guide new initiatives and goals.

Brock's ECDM plan aligns with, and is supported by, the Institution's new **Strategic Plan**, the **Environmental Sustainability Plan**, the Environmental Sustainability Research Centre's (ESRC) **Strategic Plan**, as well as the Institution's **Sustainability Policy**, which is to be updated after the publication of this report.

CHARTER BETWEEN THE ESRC AND FM

Facilities Management (FM) and the Environmental Sustainability Research Centre (ESRC) hold a shared vision and commitment towards a more sustainable campus. This has been fortified by a formal charter which allows for a multitude of sustainability initiatives across campus which furthers engagement with sustainability campus-wide, bringing together academic and operational units. Facilities Management and the ESRC cooperate on projects of mutual benefit and collaboratively establish mechanisms that effectively communicate information with the broader Brock community about Sustainability on campus. They both contribute resources in the form of monetary support and in-kind contributions over an initial five-year period to enable 'Sustainability at Brock'.



GUIDANCE FROM THE INSTITUTION

Brock University's new Institutional Strategic Plan, Niagara Roots – Global Reach: Brock University Institutional Strategic Plan 2018-2025, serves to guide the University into the future by providing a framework of values, priorities, and expectations that are to be upheld and integrated into all Institutional developments. This plan sets out four strategic priority areas to guide the institution's planning and decision making over the next seven years:

- Providing a transformational and accessible academic and student experience;
- Increasing the University's research capacity;
- Enhancing the life and vitality of communities across the Niagara Region and beyond;
- Fostering a culture of inclusivity, accessibility, reconciliation and decolonization.

These four priorities influence and contribute to the goals developed in this plan and will continue to be upheld in future versions of the ECDM. Additionally, the Strategic Plan outlines Brock's commitment to human, financial, and environmental stewardship, as it is one of Brock's eight guiding principles. This principle is a similarly strong source of guidance within this document.

Overview of ECDM Plan Goals

To align with and support Brock University's priorities outlined in its **Strategic Plan**, the objectives of this ECDM plan have been created and updated in accordance to our commitment to energy management and the priorities of the University.

1. Generation: Improving the efficiency and diversity of on-site energy generation;
2. Operations: Smart and efficient building operations and renewal;
3. Procurement: Leveraging strategic and collaborative procurement of energy and carbon instruments;
4. Education: Raising awareness and promoting engagement of the Brock Community in energy conservation;
5. Buildings: Energy efficient design, construction, and renovation of buildings.

The following goals will support the implementation of measures that will help achieve our objectives.

- a. Demonstrate leadership in energy and GHG emissions management in the sector, increasing the participation of the Brock Community in energy and emission reduction efforts;
- b. Reduce GHG emission intensity (GHGEI) by 20% below 2013 baseline levels by 2023;
- c. Maintain a cost-effective, reliable, and resilient energy supply to campus;
- d. Enhance energy and data management processes to maximize opportunities for conservation and efficiency;
- e. Improve the operation of existing buildings and design new buildings to be energy efficient while incorporating alternative and low-carbon sources of energy.

The goals and objectives outlined in this plan are applicable to three types of measures– Technical, Organizational, and Behavioural – which will ensure that Brock maintains a holistic commitment to sustainability. Brock is committed to sustainability and is aware of its impact on the community, the Niagara Region, Canada and the world.

REPORT ON ACTUAL RESULTS (2014-2019)

Brock University has followed through with the measures proposed in the 2016 ECDM Plan, which updated the institution's goals and measures from the original 2014 plan. While most of the measures were successfully implemented, others such as solar and wind installations were deemed as not feasible after further study.

The results achieved can be summarized as follows:

- 14,000,000 kWh saved over the past five years;
- \$2,975,000 in avoided energy costs since 2014;
- Energy Use Intensity [GJ/m²] has increased by an average of 2% between 2014 and 2019;
- GHG Emissions Intensity [TCO_{2e}/m²] has reduced by 2% on average over the past five years.

Brock's increase in Energy Use Intensity (EUI) is the direct result of the unprecedented growth in enrollment, significantly increasing the size of its community since 2014. Brock's buildings are experiencing an increased space utilization (i.e., used during extended hours) and are more densely occupied (i.e., more occupants per square foot). In addition, Brock's research operations have intensified during the same time-frame. This is reflected in the increase in electrical use, which is the main source of power used by research equipment (e.g., nuclear resonance imaging) yet our emissions intensity, mostly linked to HVAC, reduced over the same time period. Serving a community of over 20,000 people has posed unforeseen challenges to reduce energy use.

Over the past 5 years, Brock University has undertaken multiple Technical, Behavioural, and Organizational measures aimed at achieving the results outlined in the previous ECDM Plan. These measures included lighting retrofits, upgrades to mechanical and Heating, Ventilation, and Air Conditioning Systems (HVAC), building & chiller recommissioning, upgrades to the Co-generation plant, and staff training and awareness on energy usage. A summary of the measures that Brock implemented between 2014 and 2019 are included in the following pages, including the costs incurred and the savings achieved.

Technical Measure	T8 to LED lighting upgrades. Replacing 32 W T8 tubes with low-voltage efficient LED lighting (avg. 13 W). Brock has replaced approximately 800 T8 tubes with LED replacement bulbs.
Actual Cost	\$641,349
Annual Savings	\$34,893/year
Lifetime of measure	Rated life of replacement bulbs is 50,000 hours (Approx. 20 years)

Technical Measure	Installation of Variable Frequency Drives (VFD's) on campus HVAC and pumping systems. VFD installs have also allowed for the turndown and setback of conditioned air flow to various teaching and office spaces by up to 35%.
Actual Cost	\$130,938
Annual Savings	\$122,290/year
Lifetime of measure	25 Years (Life of the Equipment)



DEEP I & II

The Ministry of Training, Colleges and Universities (MTCU) provided \$7.9 million in funding to Brock through its Greenhouse Gas Campus Retrofits Program (GGCRP) Innovation Grant Fund. The grant was used to complete Phase 2 of the District Energy Efficiency Project (DEEP), which has upgraded and modernized the University's co-generation facility - a reliable and energy-efficient source of electricity, cooling, and heating on campus. The completed DEEP project will result in Brock's annual NOx (nitrogen oxide) gas emissions dropping from 55 tons to just 8 tons, and non-methane hydrocarbons reducing from 15 tons to four. The new co-generation engines consume 26 per cent less fuel per kWh produced, resulting in hundreds of thousands of dollars in utility cost savings each year.

Technical Measure	Installation of Energy Transfer Skid (ETS) in the Schmon Tower basement mechanical room. The ETS skid allowed for efficient and controlled transfer of heating from the District Energy Loop for the 208,582 sq.ft Schmon Tower.
Actual Cost	\$84,783
Annual Savings	\$19,500/year
Lifetime of Measure	25 Years (Life of the Equipment)

Technical Measure	Central Utility Plant Engine/Chiller plant upgrades (DEEP I & II). The replacement of 8 aging CAT 3516 SITA, 820 KW reciprocating natural gas fired engines with 4 new CAT 3516 H engines. The project also included the replacement of an aging Trane centrifugal chiller and McQuay electric chiller with a new Broad absorption chiller and Smardt magnetic bearing-less electric chiller.
Actual Cost	\$18,277,528
Annual Savings	\$343,527/year
Lifetime of Measure	25 Years (Life of the Equipment)

Technical Measure	Plaza chilled water adjustments. Changing the valving to allow for the building to be supplied with chilled water from the district chilled water system, which allowed for the locally installed 140-ton electric chiller to be turned off and only utilized during planned power outages.
Actual Cost	\$25,000
Annual Savings	\$71,853/year
Lifetime of Measure	Indefinite

Technical Measure	Decew Residence District Energy Heating Adjustments. Adjustments were made to the district energy heating supply valve configuration that allowed for the 152,133 sq.ft student residence to be heated through the district energy heating system and eliminated the need for the two 850 kW electric heating boilers to be running consistently. With the changes, the local boilers are only utilized during planned outages and emergency situations.
Actual Cost	\$30,000
Annual Savings	\$18,500/year
Lifetime of Measure	Indefinite

Technical Measure	Conducting demand management activities (HVAC setbacks, chilled and heating water setbacks, etc.) to reduce electrical demand from the Ontario grid during peak times.
Actual Cost	\$20,000
Annual Savings	\$45,000/month (2-5 mW reduction in campus demand)
Lifetime of Measure	5 Years



PLAZA CHILLED WATER

This last year, valves were changed in the Plaza building to allow for the building to be supplied with chilled water from the district chilled water system. This allowed an electric chiller to be turned off and only used during planned outages and emergency situations. These new valves, and the ability to turn off the 140-ton chiller, have saved over \$70,000 per year, and will continue to do so throughout their lifetime.

Technical Measure	Plaza and International Centre Chiller Re-commissioning. Renteknik Group was brought in to monitor and recommend performance enhancements to the chiller operation in the International Center and Plaza buildings. The projects involved installation of sensing and monitoring equipment and observation of the chiller operation for an entire chilling season.
Actual Cost	\$32,606
Annual Savings	\$45,000/month (2-5 MW reduction in campus demand)
Lifetime of Measure	5 Years

Technical Measure	Replacement of high flow shower heads (3 gpm to 1.6 gpm) in student residences. In total approximately 220 were replaced.
Actual Cost	\$5,000
Annual Savings	Approximately 1,100,000 gallons of heated domestic water per year.
Lifetime of Measure	Indefinite

Technical Measure	Replacement of aging stand-alone chest freezers in research and laboratory spaces with new high-efficiency Energy Star rated units.
Actual Cost	\$20,000
Annual Savings	10% minimum above Federal Standard for non-energy star appliances.
Lifetime of Measure	20 years (Lifetime of the Equipment)

Organizational Measure	Provide staff with energy efficiency and sustainability training opportunities. Training programs include: Certified Energy Manager (CEM) training, Certified RETScreen expert, LEED Certification, Certified Measurement & Verification Professional, etc.
Actual Cost	\$2,000 to \$5,000 per course per individual
Annual Savings	2-3% savings on overall campus wide energy consumption
Lifetime of Measure	Indefinite

Organizational Measure	Consider alternative fuel and energy generation technologies as they become more commercially available and viable. Additionally, investigate the possibility of implementing alternative generation sources to power the district heating and cooling loops.
Actual Cost	To be determined
Annual Savings	To be determined
Lifetime of Measure	10 years (dependent on individual technology)

Organizational Measure	Training of Facilities Management staff working on energy-related portfolios (i.e., RETScreen, Certified Energy Manager course, etc.)
Actual Cost	\$1,000 to \$5,000 per person per course
Annual Savings	To be determined
Lifetime of Measure	Not Applicable

PROPOSED MEASURES FOR 2019-2024

Based on the results from the 2014-2019 ECDM Plan and their subsequent analyses, new measures have been identified under the 2019-2024 ECDM Plan to address the challenges experienced during Brock's fast-paced growth over the past five years. Those measures, which have proved successful, will continue to be monitored throughout the 2019-2024 ECDM Plan. The new measures identified also consider technological advancements and innovation that could be harnessed in the near future and/or as they become economically viable. A breakdown of all the measures that Brock University intends to pursue in the next five years are presented in the following pages.

MEASURES - FUTURE (2019 – 2024)

Organizational Measure	Energy and water efficiency performance requirements beyond Ontario Building Code (OBC) will be incorporated on all new construction and major renovation projects. Major components and systems related to energy performance will not be eliminated as part of value engineering efforts.
Actual Cost	2 – 10% additional capital
Annual Savings	5 – 40% in annual energy costs
Lifetime of Measure	Permanent



ENERGY MANAGEMENT TEAM AT BROCK

With the hiring of Brock’s first ever Energy Manager, Ryan Stewart, in August 2017, Brock established an Energy Management Team. This team included Stewart, as well as Drew Cullen, District Energy Manager, and Mary Quintana, Director of Asset Management and Utilities. As the Energy Manager, Stewart is responsible for energy conservation and efficiency projects campus-wide, as well as at Brock’s satellite sites. Cullen, the District Energy Manager, is accountable for the management of the University’s District Energy operations for the centralized distribution of electrical, heating and cooling being provided to the main campus buildings. This includes managing the operational efficiency of the generators, chillers, boilers, thermal storage, cooling towers, pumps and heat exchangers, water treatment and valving. Stewart is also responsible for providing the Independent Electricity System Operator (IESO) with quarterly and annual reporting on progress against Brock’s yearly target of 1000 MWh in annual savings. The establishment of this Energy Management Team is a prime operational measure that showcases Brock’s deep-rooted commitment to energy conservation today and going into the future.

Organizational Measure	Brock will consider, on a project-by-project basis, the feasibility and relevance of formally pursuing a certification under a well-respected green building rating system. Facilities where a certification is pursued will be actively used as a living lab, supporting the academic mission of the University.
Actual Cost	\$10,000 - \$15,000 per project
Annual Savings	5 – 25% in annual energy costs
Lifetime of measure	Permanent

Organizational Measure	Advance formal and experiential training and education on energy-related topics among Facilities Management staff.
Actual Cost	\$10,000/year
Annual Savings	1,000 mWh/year
Lifetime of measure	Permanent

Behavioural Measure	Implement Campus Sustainability Dashboards for the Brock Community to: <ul style="list-style-type: none"> a) Inform the public of energy usage in buildings and building emissions; b) Raise awareness of energy conservation and efficiency topics; c) Promote attitudes and behaviours that support energy conservation.
Estimated Cost	\$20,000
Estimated Annual Savings	595,000 kWh/year
Lifetime of measure	Five years

Organizational Measure	Promote collaboration and knowledge transfer between administrative, operational, and academic departments to advance energy/carbon management and sustainability.
Actual Cost	\$12,500
Annual Savings	To be determined
Lifetime of Measure	Permanent

SUSTAINABLE DEVELOPMENT GOALS TRAINING DAY + OPEN RESOURCE TOOLKIT

On November 16th, 2019, the ESRC, in partnership with Facilities Management and the Model United Nations (MUN) student group, will be holding a UN Sustainable Development Goals (SDG) Training Day event. The event will consist of presentations from prominent experts and UN representatives regarding the SDGs, as well as workshops wherein attendees will have the opportunity to apply that which they have learned throughout the Training Day. This will equip them with the tools to speak about and act upon the SDGs within their personal lives, in the workplace, and beyond. Following the event, the ESRC in partnership with Facilities Management hopes to create an open resource toolkit, available to all, to help Brock students, faculty and staff to better understand the SDGs. This event and the open access toolkit will assist in furthering not only the public conversation surrounding sustainability, but also efforts at both the individual and institutional levels.

SUSTAINABLE DEVELOPMENT GOALS



Organizational Measure	Harness Brock's knowledge and leadership to mobilize energy/climate action and sustainability in the Niagara region.
Actual Cost	To be determined
Annual Savings	To be determined
Lifetime of Measure	Five years

Behavioural Measure	Create programs and initiatives to promote student, faculty, and staff engagement, education, and participation in energy conservation and carbon emission reductions (e.g., competitions, scavenger hunts, etc.)
Estimated Cost	\$12,500/year
Estimated Annual Savings	1,190 mWh/year
Lifetime of Measure	Permanent

Technical Measure	Building envelope improvements in older buildings, focusing on high-traffic building entrances and exits where heat exchange is occurring between indoor and outside air.
Estimated Cost	\$15,000 to \$20,000 per building
Estimated Annual Savings	75,000 to 125,000 kWh per year
Lifetime of Measure	10 to 15 years

Technical Measure	Manage electrical and thermal loads to reduce Brock's electrical demand from the Ontario grid, using behind-the-meter generation and load shedding initiatives.
Estimated Cost	\$8,000/year
Estimated Annual Savings	\$45,000/month
Lifetime of Measure	Five years

Technical Measure	Continue the replacement of T12, T8 and CFL lights and fixtures with LED tubes and fixtures.
Estimated Cost	\$10/per replacement tube, \$50-\$500 per fixture
Estimated Annual Savings	40% savings in kW based on lamp rating
Lifetime of Measure	50,000 hrs (approx. 25 years)

Technical Measure	Installation of Variable Frequency Drives (VFD's) on Heating, Ventilation and Air Conditioning Systems (HVAC), pumping, and exhaust fan systems.
Estimated Cost	\$3,000 to \$25,000 per drive dependent on motor sizing
Estimated Annual Savings	20-35% dependent on the amount that the system can be turned down or set back
Lifetime of Measure	20-25 years, dependent on the size of the motor

Technical Measure	Installation of electrical metering equipment in buildings campus-wide. The system is portable, wireless, and scalable based on the size of and the number of individual desired loads to be measured per building.
Estimated Cost	\$35,000 to \$40,000
Estimated Annual Savings	1-3% of total building electrical load
Lifetime of Measure	Permanent

Technical Measure	Optimization of the district energy heating and chilled water supply loops. Optimization would focus on valving improvements, installation of secondary loops, elimination of unnecessary pumping circuits and valving, as well as improving flow rate and delta T.
Estimated Cost	\$1,000,000 to \$1,500,000
Estimated Annual Savings	500,000 to 775,000 kWh
Lifetime of Measure	10 years

Technical Measure	Conduct individual building level audits of the electrical and HVAC systems (ASHRAE Level I and II equivalent) to identify efficiency and conservation measures.
Estimated Cost	\$15,000 per study
Estimated Annual Savings	An average savings of 150,000 to 200,000 kWh per building (assuming all identified energy projects are implemented).
Lifetime of Measure	Permanent

RENEWABLE ENERGY GENERATION FACILITIES

Brock University does not currently have any renewable generation within its current electrical generation portfolio. Studies have been undertaken to identify the feasibility of installing solar and wind generation assets on the grounds of the main campus. As of the publishing of this document, none of the identified renewable generation projects have been deemed technically and/or economically feasible, and thus have not been implemented. Brock University remains at the forefront of renewable energy generation and will continue to create opportunities to diversify our energy generation fleet with special emphasis on renewable generation infrastructure.

CAMPUS SUSTAINABILITY DASHBOARD

Starting in 2019, Facilities Management, in partnership with the ESRC as facilitated by their Charter Agreement, will be installing Campus Sustainability Dashboards throughout the Brock Main Campus. The dashboards will serve as an open-access hub for the general public to see Brock's energy usage in its various buildings, as well as their energy savings that have emerged as a result of the University's various conservation efforts. This information will be provided in real-time via the energy tracking meters that are to be installed simultaneously. In addition to the live energy usage data, the Dashboards will also showcase up-to-date news regarding sustainability efforts on campus, including new initiatives, building projects, funding, and interactive opportunities. It will also provide actionable items that will be applicable to all who may see the Dashboards - including Brock staff, faculty, administration, students, and visitors - which will allow them to not only make more sustainable choices while on campus, but to also lead more sustainable lives. In this way, the Campus Sustainability Dashboards will fulfill two primary functions: to raise general public consciousness around energy usage and sustainability at Brock in real time, as well as provide next steps to allow all those who view the dashboard to make more sustainable choices in their everyday lives.



Appendix A

2017 Ontario Regulation 507/18 Report

2017 ONTARIO REGULATION 507/18 REPORT

Operation Name	Operation Type	Address	Total Floor Area (Square m ²)	Average Hours/Week	Electricity Quantity (kWh)	Natural Gas Quantity (m ³)
Main Campus - Core Campus	●	1812 Sir Isaac Brock Way St.Catharines, L2S 3A1	210451	168	11208917.55	14010729
Main Campus - East Academic 1	●	460 St. David's Road St.Catharines, L2S 3A1	675	50	93530.11	10723
Main Campus - East Academic 2	●	460 St. David's Road St.Catharines, L2S 3A1	675	50	47534.01	11645
Main Campus - East Academic 3	●	460 St David's Road St.Catharines, L2S 3A1	675	50	69964.6	13247
Main Campus - 573 Glenridge	●	573 Glenridge Avenue St.Catharines, L2S 3A1	2979	70	574443.53	26106
Main Campus - International Complex	●	4 John Macdonell Street St. Catharines, L2S 3A1	4280	60	647770.64	33920
Main Campus - Quarryview	●	5 John Macdonell Street St. Catharines, L2T 4E4	10773	168	1463495	78330
Main Campus - Gateway Suites Residence	●	49 John Macdonnell Street St. Catharines, L2T 4E4	3675	168	405279.19	9755
Hamilton Campus	●	1842 King Street East Hamilton, L8K 1V7	6729	70	864691.12	321016.226
Marilyn I. Walker School of Fine and Performing Arts	●	15 Artists Common St. Catharines, L2R 4H8	8826	84	1249584.8	163111
Rodman Hall	●	109 St. Paul Crescent St. Catharines, L2S 1M3	2090	71	157130.92	33606
John Decew School (BRIC)	●	130 Lockhart Drive St. Catharines, L2S 3A1	1604	50	229841.73	19451

● Classrooms and related facilities ● Student residence

[Energy Consumption and Greenhouse Gas Emissions Reporting Link](#)

Appendix B

Notes for the 2019-2024 ECDM Plan

NOTES FOR THE 2019-2024 ECDM PLAN

The implementation and staging of any of the proposed measures is subject to change in response to resource availability, technical feasibility, institutional priorities, or needs.

Estimated Cost of Proposed Energy Measures:

- All costs presented are high-level estimates, developed by Brock University using case-studies, consultant reports, data from current or past projects, feasibility studies, and engineering best practices;
- The costs calculated remain vulnerable to error and are subject to change due to unforeseen existing conditions, inflationary factors, and variations in details of the actual project scope;
- Costs presented as a range are meant to capture typical variations directly associated with the performance requirements (e.g., targeting different levels of a LEED® rating system), which will be determined by appropriate representatives from Brock on a project-by-project basis.

Estimated Annual Savings of Proposed Energy Measures:

- Savings identified in the plan represent a high-level estimate, developed by Brock University using case-studies, consultant reports, data from current or past projects, feasibility studies and engineering best practices;
- The estimates presented remain vulnerable to error and are subject to change due to unseen existing conditions, inflationary factors and variations in details of the actual project scope;
- Staging of the measures (e.g., year occurring, buildings) will affect the estimated annual savings. The estimates presented on the plan refer to a measure once fully deployed;
- Estimated savings are not to be used in the development of measurement and verification plans. A suitable measurement and verification approach, preferably in conformance with the International Performance Measurement and Verification Protocol (IPMVP) must be determined on a project-by-project basis;
- Using this document as a guide, Brock will refer to the goals presented to aid future development and monitor progress;
- The lifetime of a measure might be revised (i.e., extended or reduced) depending on the success achieved once the measure is implemented;
- Brock's efforts toward enhanced energy conservation, efficiency, demand management, and carbon reduction will not be limited to the measures identified above. Additional and/or different measures and projects supporting our institutional energy objectives will be incorporated/undertaken whenever feasible.

Appendix C

Glossary of Terms

GLOSSARY

Baseline - A minimum or starting point used for comparisons

Charter – A written constitution or description of an organization's functions

Chiller - A machine for cooling something, especially a cold cabinet or refrigerator

Co-generation - The generation of electricity and useful heat jointly, especially the utilization of the steam left over from electricity generation for heating

DEEP – District Energy Efficiency Project

District energy loop - The Hot/Chilled water distribution system that supplies heat or cooling to the connected buildings on campus

District energy plant - The systems that generate the heating and cooling for the district energy loop.
Eg. Chillers, boilers, etc.

EUI – Energy Use Intensity. Can be defined as the measurement of a building's annual energy consumption relative to its gross square footage

ECDM – Energy Conservation and Demand Management

Embedded Energy Manager - A position funded through the IESO and Save on Energy program whose mandate is to conserve energy

Energy Performance Scorecard - Part of the ECDM that is updated on a yearly basis to show progress against the goals laid out in the ECDM

Energy Transfer Skid - A heat exchanger/pump package designed to transfer heating from the district energy loop to the building for heating purposes

ESRC – Environmental Sustainability Research Centre

Experiential Training – Learning involving or based on experience and observation

Feasibility study - An assessment of the practicality of a proposed plan or method

FM – Facilities Management

HVAC – Heating, Ventilation, and air conditioning

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. Consumers with an average peak demand of above 1 MW and up to and including 5 MW are eligible to opt-in to the ICI

LED – Light-Emitting Diode

LEED Certification – Leadership in Energy and Environmental Design which shows that a building was built aimed at achieving high performance in human and environmental health, location and transportation, sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality

Low-flow technology – Toilets, shower heads, and faucets that reduce the flow rate of water and reduce water usage

Procurement - The action of obtaining or procuring something

Retrofit - Add (a component or accessory) to something that did not have it when manufactured

Sustainability – Development that meets the needs of the present without compromising the ability of future generations to meet their own needs

Variable Frequency Drive – A type of motor controller that drives an electric motor by varying the frequency and voltage supplied to the motor

