



**London Health
Sciences Centre**



Children's Hospital
London Health Sciences Centre

Broader Public Sector

**Energy Reporting and Conservation and Demand
Management (CDM) Plan**

2024 – 2029

Made for Ontario Regulation 25/23 – The Electricity Act, 1998

Prepared by Facilities Management

Great people. Great care.



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Background

About London Health Sciences Centre

London Health Sciences Centre (LHSC) is, one of Canada's largest acute-care teaching hospitals and is dedicated to excellence in patient care, teaching, and research.

Since 1875, we have provided patient care for the people of London, the region, and beyond. Many national and international medical breakthroughs have been pioneered at LHSC, to the benefit of patients at home and around the world. Through our affiliation with Western University and more than 30 other educational institutions, we train more than 1,800 medical and health care professionals annually.

Today, LHSC is home to:

- University Hospital
- Victoria Hospital
- Children's Hospital
- The London Regional Cancer Program
- Lawson Health Research Institute
- CSTAR
- Byron Family Medical Centre
- Victoria Family Medical Centre

Introduction

London Health Sciences Centre (LHSC) has created this conservation demand management (CDM) plan to promote environmental stewardship and to fulfill its obligations to O. Reg. 25/23 Electricity Act, 1998. LHSC posted its former CDM plan in 2019 under the O. Reg 507/18, which was revoked and replaced with O.Reg. 25/23. The following information is prescribed by the new regulation must include the following information:

1. A summary of annual greenhouse gas emissions for each of the public agency's prescribed operations, which shall be included in the summary of the public agency's annual energy consumption required under paragraph 1 of subsection 25.35.2 (3) of the Act.
2. A description of the results of previous activities and measures to conserve the energy consumed by the public agency's prescribed operations and to otherwise reduce the amount of energy consumed by the public agency, including by employing such energy conservation and demand management methods as may be prescribed.
3. The cost and saving estimates for the public agency's current and proposed activities and measures referred to in paragraph 2 of subsection 25.35.2 (3) of the Act.
4. A description of any renewable energy generation facility operated by the public agency and the amount of energy produced on an annual basis by the facility.
5. A description of,
 - a. the ground source energy utilized, if any, by ground source heat pump technology operated by the public agency,
 - b. the solar energy utilized, if any, by thermal air technology or thermal water technology operated by the public agency, and
 - c. the proposed plan, if any, to operate heat pump technology, thermal air technology or thermal water technology in the future.
6. The estimated length of time the public agency's current and proposed activities and measures referred to in paragraph 2 of subsection 25.35.2 (3) of the Act will be in place.
7. A confirmation that the energy conservation and demand management plan has been approved by the public agency's senior management.

London Health Sciences Centre's energy conservation and demand management program will reduce overall energy consumption, operating costs, and greenhouse gas emissions. It will be posted on both the internal and external LHSC websites and available to anyone in hard copy upon request at head office.

Past CDM Results Summary (2019-2023)

From the energy projects completed since the posting of the previous CDM plan in 2019, LHSC has achieved the following results:

- 9% reduction in energy use intensity from 2018 - 2023
- \$750,258 in annual energy cost reduction
- 6,562,553 kWh decrease in electricity consumption
- 1,243,865 m³ decrease in gas consumption
- 4,156 tonnes reduction in annual carbon dioxide equivalent (tCO₂e) emissions

Annual utility costs are a significant part of overall operating costs. London Health Sciences Centre's annual energy consumption and related costs/emissions for 2023 were:

- Utility and related costs were approximately \$15,000,000 for the year.
- Energy related emissions for 2023 equaled 49,590 tCO₂e for the five sites.
- Total energy project investment over the 5 years was \$13,818,287.

Benchmarking: the Hospital's Site Energy Use Index (EUI) for 2018 compared to 2023:

LHSC Site	EUI (GJ/m ²)	
	2018	2023
Victoria Hospital	4.15	3.96 (-12%)
University Hospital	2.38	2.39 (+0.4%)
Victoria Family Medical Centre	0.90	0.76 (-15%)
Byron Family Medical Centre	0.63	0.53 (-16%)
Kidney Care Centre	1.86	1.97 (6%)

Past Measures from 2019 CDM Plan

In July 2019, London Health Sciences Centre developed goals and objectives for decreasing the facilities annual energy consumption and resulting greenhouse gas emissions. The following activities, completed between 2019 and 2024 are associated with managing overall energy consumption, lowering annual operating costs, and reducing greenhouse gas emissions.

Victoria Hospital – Large Project Work

Power Plant Backup Generators

The Victoria Hospital Power Plant commissioned three 3.3MW backup diesel generators in 2022. This multi-year, multi-million-dollar project helps LHSC ensure that the lights stay on and patient care can continue when our electricity grid goes down. In addition to functioning as a reliable back-up, LHSC also utilizes them in the IESO's peak shaving program. By reducing our grid load during the highest demand periods in the summer, we

are helping reduce the need for additional gas plants in Ontario's grid and depending on our success in this program, can save substantial amounts of money on our electricity costs.

LED Lighting Retrofit of Common Areas

VH underwent a mass relamping of 15,870 fluorescent tube T8 lighting with LED equivalents in a large proportion of the common areas of the hospital. This project work cost \$333,000, received \$47,000 in incentives, and is saving the hospital 2,200,000 kWh of electricity per year.

Greenhouse Gas Reduction Roadmap & Action Plan

In 2021, LHSC completed a multi-year, third-party, energy use and infrastructure audit that provided us with a greenhouse gas reduction roadmap and action plan. This report provides strategic direction to reduce emissions at LHSC over the next 30 years, with the ambitious goals of reducing emissions by 40% by 2030 and achieving net-zero carbon by 2050. These projects include both large and small changes to Victoria Hospital Power Plant operations, opportunities for renewable energy integration, building envelope improvements, and HVAC and lighting upgrades.

LHSC is now exploring how we can implement these targets and integrate them into our vision, planning, and financial strategies over the short and long-term.

Victoria Hospital – Small Project Work

Year	Description	Total Cost	Incentives	kWh/year reduction	m ³ /year reduction
2019	LED Lighting - 75 Linear ambient fixtures	\$25,000	\$3,500	10,750	-
2020	C/D Zone Booster Pumps Replacement	\$386,000	\$15,824	158,235	-
2020	Air Handling Unit Variable Frequency Drive Replacement	\$8,885	\$2,145	40,430	-
2020	Air Handling Unit Tilt Coil Controls Refurbishment	-	\$3,038	-	7,200
2021	LED Lighting - Parking garage – 20x fixtures	\$16,940	-	8,736	-
2021	LED Lighting - Clintar Building – 32x fixtures	\$17,515	\$620	10,750	-
2021	LED Lighting - T8 retrofit – Order 1	\$6,815	\$1,763	78,624	-
2022	LED Lighting - T8 retrofit – Order 2	\$33,800	\$12,900	560,640	-
2022	Steam Trap Inspection Fixes	\$16,440	\$8,220	-	858,545
2022	Upgraded air dryer for Power Plant	\$17,500	\$1,230	16,587	-
2022	Upgraded air compressor for power plant	\$37,000	\$4,890	28,908	-
2022	LED Lighting – T8 retrofit – E2-500's	\$7,475	\$1,380	12,866	-
2022	Piping insulation – New for F-building	\$12,800	\$2,034	-	29,849
2022	LED Lighting - North Tower	\$33,420	-	17,254	-
2023	Roof Replacement - F-Building - R15 to R23.6	\$541,218	-	-	2,167
2023	LED Lighting - Building 14 New fixtures	\$10,000	\$1,350	448	-

Year	Description	Total Cost	Incentives	kWh/year reduction	m ³ /year reduction
2023	LED Lighting – B7	\$3,336	\$240	1,357	-
2023	LED Lighting - B1	\$3,900	\$600	4,463	-
2023	Steam Trap Fixes - VH/Parkwood Main Line	\$8,280	\$4,140	10,750	346,104

University Hospital - Large Project Work

Window & Door Retrofit

University Hospital completed its 5-year window and door retrofit in 2021. Costing around \$2.7 million per year. The leaking and aging doors and windows were replaced with energy efficient models and upgraded seals that reduced energy loss, improved patient comfort, and provided increased protection against severe weather events.

LED Lighting Retrofit of Common Areas

University Hospital underwent a mass relamping of 16,470 fluorescent tube T8 lighting with LED equivalents in a large proportion of the common areas of the hospital in 2022. This project work cost \$315,342, received \$49,410 in incentives, and is saving the hospital 2,300,000 kWh of electricity per year.

Chilled Water Control Valve Refurbishment

In 2023 Phase 1 of a large chilled water system refurbishment upgrade was completed. The main goal of this phase was to replace leaky control valves and improve automated controls of the chilled water system. This project cost \$3.1 million and is saving the hospital around 400,000 kWh of electricity per year.

University Hospital – Small Project Work

Year	Description	Total Cost	Incentives	kWh/year reduction
2020	LED Lighting - T8 Retrofit - 130x T8's	\$ 2,600	\$ 1,175	18,171
2022	LED T8 retrofit across hospital - Order 1	\$ 40,668	\$ 14,199	661,560

Energy Management Vision

Energy Conservation

London Health Sciences Centre has a long history of energy conservation that supports both its financial and environmental responsibilities to the community. The CDM plan backs one of four areas of LHSC's Energy Management Plan alongside supply side management, monitoring and tracking, and regulatory compliance.

LHSC is now creating parallels between facility infrastructure, emergency preparedness & energy redundancy, asset management & reliability, and our energy management goals and objectives. These pieces are being brought together to form an integrated approach to facility management that supports the organization's strategic plan while addressing energy costs and environmental concerns. It is LHSC's vision to become a model for sustainability in this regard that will support future growth and expansion as we move toward a new design for healthcare in the province.

Conservation Demand Management Goals

The following goals will help to guide London Health Sciences Centre toward meeting its objectives for the conservation demand management of energy resources and greenhouse gas emissions over the next five years.

1. Energy Conservation and Demand Management Plan Approval

The goals and objectives for energy management over the next five years have been put together by the Facilities Management team and been approved by executive leadership in the organization. The CDM plan will be used as a road map to identify the potential projects, business cases, timelines, and funding mechanisms that may be scheduled over the next five years. LHSC will use this plan and the organization's commitment to financial and environmental responsibility to comply with energy and greenhouse gas emission legislation and be an environmental steward for the London community.

2. Implement Financial Practices and Decision-Making Processes

London Health Sciences Centre will continue to make use of programs such as the Hospital Infrastructure Renewal Fund (HIRF) and others such as the former Hospital Energy Efficiency Program (HEEP) to help finance projects. This funding is connected to the Facility Condition Assessment Program (FCAP) and so energy reduction can be achieved in parallel with infrastructure renewal. Business cases with proper risk assessments and life cycle costing analyses will be presented to the organization where capital dollars or alternative ways of financing projects are needed. Projects providing a reduction in energy and greenhouse gas emission cost will be viewed as an investment for the organization and reductions in utility budget spending will be considered in relation to the internal rate of return on the project. Facilities staff will also liaison with local utility companies and government programs to receive incentive money for audits, engineering studies, and energy saving projects.

3. Implement Strategic Energy Management Practices

London Health Sciences Centre will continue to include energy efficient technology such as variable frequency drives and LED lighting in the retrofit of existing buildings and space and make use of new emerging technology as it advances. LHSC will continue to improve building automation and control in order to match the use of equipment with the use of the space. The organization will consider energy efficiency standards when making large purchases and incorporate energy efficiency language in future requests for proposals. LHSC will continue to work with energy suppliers and procurement agents to ensure the best procurement

strategies are being applied. Employees will continue to help by turning off unused electrical equipment at the end of the day and reporting energy wastes to the facilities department where found. LHSC will continue to track and monitor the success of the energy management initiatives and greenhouse gas emission reduction through utility management software and facilities management systems.

LHSC is also participating in the IESO's Strategic Energy Management (SEM) Program, started in September 2023. Our participation in the SEM Hospital Cohort for twenty-four months is helping us establish and strengthen our capacity for energy management, including building skills among staff, having regular energy team meetings, and documented support from senior management. With that foundation in place, our organization will continue to identify and prioritize energy savings opportunities. We are monitoring our performance with new energy performance models, allowing our team to maintain course toward our long term goals and incremental targets.

4. Transition to a Low Carbon Hospital

London Health Sciences Centre is evaluating how to effectively transition to a low carbon hospital in the coming decades. This challenging work requires careful balancing of the desired change with the financial implications and impact to other areas of the hospital. We are leveraging the work done in our Greenhouse Gas Reduction Roadmap and Action Plan and synthesizing it with our Master Planning objectives.

We are working hard to establish best practices within our facilities management team so that we are always considering low carbon pathways over the conventional options with our infrastructure. The following diagram from Enerlife Consulting provides an excellent approach to this ongoing work that LHSC is evaluating for our construction and design guidelines.

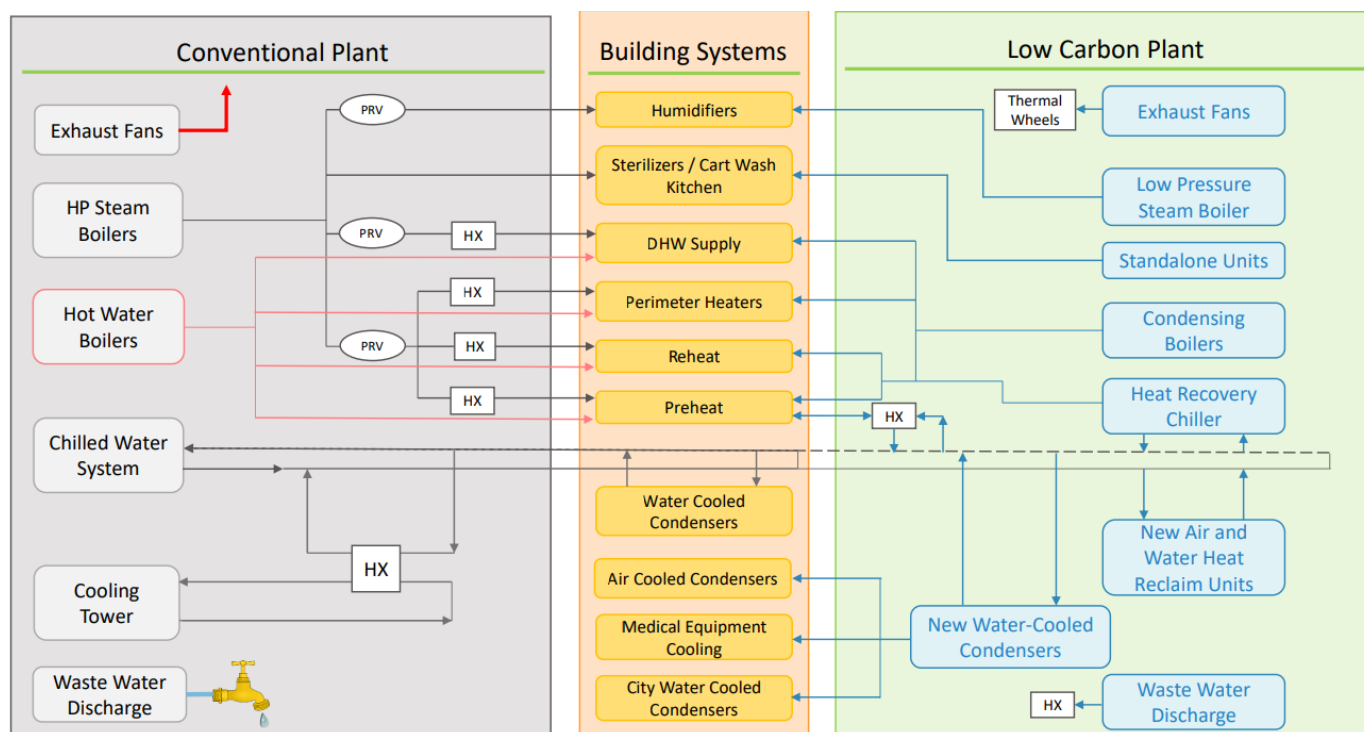


Figure 1: Transition from Conventional to low Carbon Plants. Courtesy of Enerlife Consulting.

Conservation Demand Management Objectives

LHSC's demand management objectives have been outlined below and have been quantified in terms of time, energy, cost savings, and greenhouse gas emission reduction. Facilities Management has put together a list of energy project work to support these objectives over the next five years. This work is derived from the most cost effective energy savings projects found within our Energy Management portfolio. Without knowing what level of funding will be available from year-to-year the objectives have been quantified by proposing that seventy percent of the project work may be completed in the next five years.

Future CDM Forecast Summary (2024-2029)

With energy management an integral part of the strategic direction, London Health Sciences Centre can expect to achieve the following targets by 2029:

- 20% reduction in energy consumption
- \$3,003,019 in annual energy cost reduction
- 8,941,098 kWh decrease in electricity consumption
- 11,095,978 m³ decrease in gas consumption
- 23,385 tonnes reduction in annual carbon dioxide equivalent (tCO₂e) emissions

To further strengthen and obtain full value from energy management activities, a strategic approach will be taken: the organization will fully integrate energy management into its business decision-making, policies, and operating procedures.

Active management of energy related costs and risks in this manner will provide a significant economic return to the organization and will support other key organizational objectives.

Victoria Hospital Future Projects

Victoria Hospital – Potential Energy Projects (\$Millions)

Project	2024	2025	2026	2027	2028
LED Lighting Upgrade - 10,000 lamps	\$0.20				
Tilt Coil Controls Upgrades	\$0.02				
BAS Recommissioning			\$0.61		
BAS Scheduling Capability Upgrades		\$0.02			
Airflow Control			\$0.64		
Heat Recovery				\$0.11	
AHU Replacement				\$4.45	\$4.45
Heat Exchanger Replacement & Upgrades		\$0.47	\$0.37		

- **Lighting Upgrade:** Continue LED T8 lighting retrofit for remaining 10,000 LED lamps
- **Tilt Coil Controls Upgrade:** Update tilt coil controls to integrate directly to our BAS system and improve the heat recovery efficiency.
- **BAS Recommissioning:** Recommissioning of the Victoria Hospital building automation system make sure that the building equipment and systems are performing according to design conditions to meet the needs of the occupants. This measure also includes optimizing the operation schedule of air handling units (AHUs) to minimize/eliminate unnecessary usage.
- **BAS Scheduling Capability Upgrades:** Add HVAC wall controls and occupancy detection to specific areas that would benefit from scheduling capabilities.
- **Airflow Control:** Improve airflow control with variable air volume damper controls and variable frequency drives to specific areas.
- **Heat Recovery:** Install a glycol loop heat recovery system in a specific high flow air handling unit.
- **AHU Replacement:** Replace or refurbish air handling units that are past their useful life.
- **Heat Exchanger Replacement & Upgrades:** Replace and upgrade sixteen heat exchangers due for replacement with higher efficiency flooded heat exchangers.

Summary

If funding can be acquired for the proposed projects, over the next five years, Victoria Hospital will:

- Invest \$11.3 million
- Save 4,992,424 kWh of electricity
- Save 2,183,331 m³ of natural gas
- Reduce 5,766,000 kg of greenhouse gas emissions

University Hospital Future Projects

University Hospital - Potential Energy Projects (\$Millions)

Project	2024	2025	2026	2027	2028
LED Lighting Upgrade - 10,000 lamps	\$0.20				
BAS Recommissioning			\$0.52		
BAS Scheduling Capability Upgrades		\$0.01			
Airflow Control				\$0.29	
Chiller Upgrade		\$0.94			

- **Lighting Upgrade:** Continue LED T8 lighting retrofit for remaining 10,000 LED lamps
- **BAS Recommissioning:** Recommissioning of the University Hospital building automation system make sure that the building equipment and systems are performing according to design conditions to meet the needs of the occupants. This measure also includes optimizing the operation schedule of air handling units (AHUs) to minimize/eliminate unnecessary usage.
- **BAS Scheduling Capability Upgrades:** Add HVAC wall controls and occupancy detection to specific areas that would benefit from scheduling capabilities.
- **Airflow Control:** Improve airflow control with variable air volume damper controls and variable frequency drives to specific areas.
- **Chiller Upgrade:** Replace an existing chiller with higher efficiency chiller.

Summary

If funding can be acquired for the proposed projects, over the next five years, University Hospital will:

- Invest \$2.0 million
- Save 3,948,674 kWh of electricity
- Save 287,646 m³ of natural gas
- Reduce 759,000 kg of greenhouse gas emissions

Power Plant Future Projects

Victoria Hospital Power Plant - Potential Energy Projects (\$Millions)

Project	2024	2025	2026	2027	2028
Duct Burner	\$0.15				
Valve Jacket Insulation		\$0.09			
Steam Piping Insulation			\$0.10		
Flue Gas Heat Recovery				\$6.5	\$6.5

- **Duct Burner:** Repair and recommission our KB7 turbine duct burner with integrated Delta V controls to take advantage of the higher efficiency steam production.
- **Valve Jacket Insulation:** Add insulation jackets to valves throughout the power plant.
- **Steam Piping Insulation:** Add insulation to uninsulated areas of the power plant steam pipes.
- **Flue Gas Heat Recovery:** Add heat recovery to power plant exhaust gases and utilize the energy for domestic hot water and zone reheat with a new hot water loop to Victoria Hospital.

Summary

If funding can be acquired for the proposed projects, over the next five years, Victoria Hospital Power Plant will:

- Invest \$13.3 million
- Save 8,625,304 m³ of natural gas
- Reduce 16,860,000 kg of greenhouse gas emissions

For more information on LHSC's Energy Management Plan please visit the LHSC Facilities Management website at <https://www.lhsc.on.ca/accountability/energy-management-plan> or contact the Facilities Management Department at Victoria Hospital.

This CDM Plan has been approved by

Signatures omitted for public posting

Abhi Mukherjee, CFO
Corporate Executive

Signatures omitted for public posting

Dipesh Patel, Executive
Capital redevelopment and
Environmental Services

Dated: June 28, 2024