ENERGY USAGE & CONSERVATION-DEMAND MANAGEMENT PLAN

2019 - 5 Year Plan and Update

June 30, 2023

Thunder Bay Regional Health Sciences Centre

Exceptional **care** for every patient, every time.

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ENERGY USAGE AND CONSERVATION - DEMAND MANAGEMENT PLAN

July 1, 2019 to June 30, 2024

Executive Summary

Thunder Bay Regional Health Sciences Centre is committed to continuous improvements in all aspects of our health care facility.

Energy management initiatives can produce environmental, economic and social benefits, including reducing greenhouse gas emissions, cost avoidance and increasing savings. As costs continue to rise, an energy management plan is a proactive step towards an effective long-term solution. Energy efficient capital and operating process improvements are key components to utilize our resources wisely and provide an optimal environment for patient care.

The following Energy Conservation and Demand Management Plan is written in accordance with the O. Reg. 507/18: (Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans).

TBRHSC Mission, Vision, Values, Philosophy

Mission: We provide quality Care to Patients and Families, supported and advanced by research, innovation, and education that is responsive to the needs of the population of Northwestern Ontario.

Vision: Exceptional care for every patient, every time.

Values:

Diversity

Compassion

Excellence

Innovation

Accountability

Philosophy: Patients at the centre of everything we do.

Energy Management Mission

At Thunder Bay Regional Health Sciences Centre, we recognize the critical relationship between environmental health and public health, and we aim to limit any impact on the environment resulting from the operation of our health care facility. Our energy management plan will address the interconnected issues of indoor environmental quality, energy use, and efficient facility operations.

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INTRODUCTION

The purpose of Thunder Bay Regional Health Sciences Centre's (TBRHSC) energy management plan is to promote sustainable stewardship of our environment and community resources.

TBRHSC's energy management program will aim to reduce operating costs while enabling us to provide excellent, efficient, and quality service to all those we serve in the community and region.

FACILITY INFORMATION

Thunder Bay Regional Health Sciences Centre is a tertiary acute care facility serving the healthcare needs of people living in Thunder Bay and Northwestern Ontario. The facility serves as the hub for a population base of approximately 250,000 people. An architectural showpiece situated on a landscaped site of nearly 70 acres, the Regional Health Sciences Centre is a stunning award-winning design. The Thunder Bay Regional Health Centre was constructed in 2004. The facility houses 389 beds.

The tables below provides a brief site description of the facilities involved in this report.

Type of Facility:	Hospital
Facility Use:	The facility provides both acute and chronic patient care.
Facility Name:	Thunder Bay Regional Health Sciences Centre
Address:	980 Oliver Road, Thunder Bay, Ontario
Year of Construction:	2004
Number of Buildings:	1
Gross Area (Sq. ft.)	716,657
Net Area (Sq. ft.)	686,000
Number of Floors:	4 (3 for patient services and 1 full-size penthouse)
Hours of Operation:	24/7 – 168 hours per week

Type of Facility:	Administrative Office
Facility Use:	Administrative, research, and related facilities
Facility Name:	ICR Discoveries
Address:	290 Munro Street, Thunder Bay, Ontario
Year of Construction:	Mid 1990, Renovations 2006-2009
Number of Buildings:	1
Gross Area (Sq. ft.)	51,787
Net Area (Sq. ft.)	43,485
Number of Floors:	3
Hours of Operation:	8/5 - 40 hours per week

ENERGY CONSUMPTION

Hospitals rank the highest energy intensity by sector. High energy consumption is the result of specialized and sophisticated equipment, as well as long hours of operation.

TBRHSC is a regional trauma centre - the Emergency Department is one of the busiest in the country. TBRHSC also features integrated Cancer Care with Brachytherapy, Linear Accelerators, Chemotherapy, a large inpatient oncology unit, and a developed supportive regional program. TBRHSC further includes a large Renal program that reaches out to assist patients in Sioux Lookout and Fort Frances. TBRHSC is the regional data centre for a shared clinical information system to 11 other hospitals in the region. The facility also contains many patient care services, a large number of diagnostic imaging services as well as a full service commercial grade laundry and full service kitchen and servery. Technology and innovation has been included within the design to include: negative pressure rooms for patient isolation; articulating arms featured in all the ICU rooms, Operating Rooms, the Emergency Department, and elsewhere; an Electronic Medical Records system; Diagnostic Picture, Archive and Communication system; Telehealth for regional communication; and wireless computer systems.

TBRHSC purchases natural gas and electricity for its energy needs. The greenhouse gas (GHG) emissions are calculated based on the energy purchased. TBRHSC also has a cogeneration facility on site since the end of 2015 to produce a significant amount of it's own power.

Table: Utility use for Thunder Bay Regional Health Sciences Centre

	Electricity - Purchased	Electricity - Produced by CHP	Total Electricity Consumed	Total Natural Gas Consumed	Energy Intensity	Total GHG Emissions –
980 OLIVER RD	kWh	kWh	kWh	m3	ekWh/ft2	CO2 tonnes
2022	3,680,270	14,847,833	18,528,103	6,965,761	112	13,592
2021	4,498,817	14,850,584	19,349,401	6,716,343	111	13,178
2020	4,047,546	15,014,090	19,061,636	6,663,406	109	12,701
2019	5,517,577	14,983,904	20,501,481	6,797,123	113	13,019
2018	5,762,869	15,414,917	21,177,786	6,690,073	112	12,819
2017	5,971,416	15,131,414	21,102,830	6,499,285	109	12,391
2016	6,025,259	15,554,365	21,579,624	6,475,915	109	12,476
2015	22,174,704	NA	22,174,704	4,115,556	96	8,668
290 MUNRO ST						
2022	1,792,621	NA	1,792,621	144,564	76	327
2021	1,730,352	NA	1,730,352	129,089	71	298
2020	1,870,240	NA	1,870,240	139,948	77	312
2019	1,991,827	NA	1,991,827	166,519	87	376
2018	1,930,400	NA	1,930,400	145,034	80	331
2017	1,865,385	NA	1,865,385	146,080	78	308

Note:

Based on 365 days annual consumption – January 1 to December 31

GHG based on yearly emission factors

GOALS & OBJECTIVES

Our organization will strive to fully integrate energy management into our practices by considering indoor environmental quality, operational efficiency, and sustainably sourced resources into major financial decision-making. We will continuously monitor our practices, so that maximal operating efficiency can be reached and resources can be allocated more appropriately to serve our community and region.

TBRHSC is committed to continuing its efforts in energy reduction and environmental stewardship. All strategic and facility capital projects considered will be evaluated for energy reduction and environmental opportunities. Projects will be assessed relevant to 1) improving quality of care; 2) impact on the internal and external environment; and 3) pay-back or net-present value.

PREVIOUS MEASURES

Commodities Management

An important aspect of energy management is putting in place an adaptable energy commodities procurement strategy to be able to adjust to fluctuating commodity prices. We currently work with Blackstone Energy Management Services Inc. to assist us in our natural gas procurement.

Energy Retrofit Project 2012-14

To better understand the energy use for the facility, an energy review was completed in 2011 - 2012. The largest contributors to energy use are associated with the heating-ventilation-air-conditioning (HVAC) loads in the form of heating loads, fans and pump energy. TBRHSC, issued a Request For Proposals (RFP) to request proposals for an "Energy Management Assessment". Johnson Controls Canada LLP (JCI) was selected through this process as a partner. Evolving from that, a multi-staged process was proposed for a path forward to assess and implement changes to realize energy savings at TBRHSC.

- Phase 1 Implementation: Boiler Controls and Heat System & Recovery: 2012
- Phase 2 Implementation: Air Handling Systems & Ventilation: 2012 - 2013
- Phase 3 Implementation: Chiller Plant Optimization: 2013 - 2014

✓ Estimated Savings: Natural Gas: 1,205,500 m3; Electricity: 5,247,100 kWh (source: JCI)

Steam Trap Survey & Repairs 2013 and ongoing

TBRHSC has implemented a steam trap survey program that will be completed over a three year cycle. A steam trap plays an extremely large role in the overall efficiency of a steam system.

✓ 2013 Savings: 13,820 m3/yr (source: Union Gas)

Building Exterior Lighting Upgrade 2013

TBRHSC commenced replacement of older fixtures and installed LEDs which are more efficient and less maintenance intensive.

✓ 2013 Savings: 1,000 kWh (source: TBRHSC Maintenance)

2014-2018

Environmental Policy

TBRHSC will finalize its overall environmental policy, which will formally include its commitment to the "Three R's", adoption of such in hospital processes, and subsequent staff education.

✓ Estimated Annual Savings: not measureable

COMPLETE

Apply for an Energy Manager with the IESO

The IESO has incentives for energy reduction – one of which is the support of funding for an energy manager to help identify and execute energy savings opportunities within an organization.

✓ Estimated Annual Savings: to be determined

CLOSED

Energy Retrofit Project – continued 2014

Study: Cogeneration / Combined Heat and Power (CHP) Study - an application was made to the Ontario Power Authority to support this project's detailed engineering study.

COMPLETE

Upgrade Ambulance Bay Lighting to LED 2014

To reduce temperature induced failures and increase energy efficiency, the lighting fixtures will be upgraded to LED.

✓ Estimated Costs: $10,000

✓ Annual Savings: 1,000 kWh

COMPLETE

Install an Air Curtain at the Main Emergency Department Entrance 2015

To reduce the loss of heated air from the frequent opening and closing of the main Emergency Department sliding doors, an air curtain will be evaluated and installed if suitable.

✓ Annual Savings: 10,000 m3 of natural gas per year

COMPLETE

Investigate Installation of Steam Economizers 2015 – 2016

This would allow for partial recovery of the heat from the steam boilers' flue gas, as preheat for a portion of the building heating water.

✓ Annual Savings: 90,000 m3 natural gas per year

COMPLETE

Interior Lighting Audit

Due to the long operational hours of hospitals, lighting makes up a significant portion of electricity consumption at TBRHSC. Therefore, there is further opportunity to upgrade the existing lighting with new LED options.

COMPLETE

New Computerized Preventative Maintenance Management System

TBRHSC will investigate new technology for its preventative maintenance management system which will allow better maintenance, and thus operation, of building system equipment – which in turn will utilize less energy and experience less deterioration or breakdowns.

COMPLETE

Commence a Study on Water Usage and Reduction Opportunities

TBRHSC has the opportunity to further reduce its use of utilities through examination of its water usage and opportunities for reductions.

COMPLETE

Cogeneration Plant 2015

Installation of a 2MW unit

✓ Savings $850k /yr

COMPLETE

PROPOSED MEASURES - 2023 UPDATE

Studies & Information

Metering and Energy Monitoring

- ✓ Description: implement additional metering and monitoring to provide more data around energy usage
- ✓ Estimated cost: $85k
- ✓ Expected result/savings: to provide additional energy information to building operators and plant decision makers to inform additional project opportunities

PHASE 2 IN PROGRESS

Evaluate Green Projects

- ✓ Description: to evaluate green initiatives for potential viability and cost-effectiveness at our facility
- ✓ Estimated cost: study costs up to $100k
- ✓ Expected result/savings: determine business viability of green initiatives to form the basis of a capital project recommendation

COMPLETE

Hospital Peak-shaving and Load-shifting Evaluation

- ✓ Description: to evaluate options to mitigate impact of the cost of the Global Adjust on the hospital
- ✓ Estimated cost: study costs up to $100k
- ✓ Expected result/savings: determine a strategy to mitigate GA impact to form the basis of a capital project recommendation (if applicable)

COMPLETE

Optimization

Optimization of Cogeneration Operation

- ✓ Description: further refine and optimize the cogeneration plant tuning and controls
- ✓ Estimated cost: $75k
- ✓ Expected result/savings: improve natural gas utilization by up to 5% of current cogeneration plant usage

COMPLETE

Hospital Building Automation System (BAS) Upgrade and Controls

- ✓ Description: upgrade the building automation system to improve process overview and control
- ✓ Estimated cost: $250k
- ✓ Expected result/savings: improve overall utility usage in the range of 1 to 3%

COMPLETE

Boiler controls upgrades

- ✓ Description: upgrade boiler controls and monitoring
- ✓ Estimated cost: $125k
- ✓ Expected result/savings: improve boiler natural gas usage by up to 3%

IN PROGRESS

Capital Projects

Interior Lighting Upgrade

- ✓ Description: to complete an LED retrofit for the interior hospital fixtures
- ✓ Estimated cost: $3,800,000
- ✓ Expected result/savings: to reduce power consumption by 2100 MWh/yr

COMPLETE

Domestic Water Reduction

- ✓ Description: Phase 1 - to implement infrastructure renewal to reduce wastage and loss
- ✓ Estimated cost: $975k
- ✓ Expected result/savings: reduction in overall facility water usage by 20,000 m3 per year and heat loss by 8500 MMBTU/yr – estimate tbd pending scope of project
- ✓ Description: Phase 2 – to implement low flow fixtures as appropriate
- ✓ Estimated cost: pending scope of project
- ✓ Expected result/savings: reduction in overall facility water usage – estimate tbd pending scope of project

PHASE 2 IN PROGRESS

Kitchen Hood Ventilation Controls

- ✓ Description: to install on-demand hood controls to reduce venting and heat loss
- ✓ Estimated cost: $95k
- ✓ Expected result/savings: to reduce natural gas by 2500 MMBTU/yr

COMPLETE

Shipping & Receiving Air Curtain Installation

- ✓ Description: to install full size air curtain for large shipping and receiving overhead doors
- ✓ Estimated cost: $175k
- ✓ Expected result/savings: to reduce natural gas by 2500 MMBTU/yr

COMPLETE

Develop Energy Retrofit Plan for ICR Discoveries

- ✓ Description: to develop a capital plan for facility renewal and energy savings
- ✓ Estimated cost: $50k
- ✓ Expected result/savings: pending scope of planned project

IN PROGRESS

ICR Discoveries Retrofits

- ✓ Description: New HVAC system for the lower level, south zone, upgrade existing AHUs/ERVs with VFDs, and retrofit interior lighting fixtures with LED
- ✓ Estimated Cost: $400k
- ✓ Expected result/savings: 850 MWh/yr

IN PROGRESS

Continued VFD Conversion

- ✓ Description: convert the hospital air-handling units to variable frequency drives to allow for reduced power usage
- ✓ Estimated cost: $200k
- ✓ Expected result/savings: to reduce electrical power consumption by 97,000 kW unit installed

COMPLETE

Chiller Plant Optimization

- ✓ Description: upgrade measurement and control strategy
- ✓ Estimated cost: $370k
- ✓ Expected results/savings: estimate annual 600,000 kWh reduction or $100k electricity costs

COMPLETE

Policies & Education

User Education

- ✓ Description: “Think Green” - the Green Team will work to educate building occupants on opportunities to reduce use of power and water
- ✓ Estimated cost: $10k
- ✓ Expected result/savings: staff and visitors will be champions for energy reduction and will help save energy through their actions

IN PROGRESS

Update Procurement Policies

- ✓ Description: to incorporate life cycle costing and energy efficiency considerations
- ✓ Estimated cost: $0
- ✓ Expected result/savings: the formalization of this in the procurement process will entrench energy efficiency in capital purchases

IN PROGRESS

ENDORSEMENT

We consider our facility an enabler of Patient and Family-Centred Care, and an integral part of the local community. The key is being able to use our facilities efficiently and effectively to maximize our ability to provide the highest quality of healthcare services while integrating environmental stewardship into all aspects of facility operations.

On behalf of the senior management team here at Thunder Bay Regional Health Sciences Centre, I approve this Conservation & Demand Management Plan.

Peter Myllymaa

Vice President, Operations, Clinical & Support Services & Chief Financial Officer

ACKNOWLEDGMENTS

This report was prepared by the Thunder Bay Regional Health Sciences Centre management and facilities staff.

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Thunder Bay Regional Health Sciences Centre

Information on the Ontario Electricity Act

https://www.ontario.ca/laws/regulation/r23025