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Energy Conservation & Demand Management Plan



Health Sciences North Horizon Santé-Nord



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Executive Summary

The following "Energy Conservation and Demand Management Plan" is written in accordance with sections 6 and 7 of the Green Energy Act, 2009, O. Reg. 397/11.

Energy management initiatives can produce environmental, economic, and social benefits, including reducing greenhouse gas (GHG) emissions, cost avoidance and increasing savings. As concerns surrounding energy availability and cost continue to rise, an energy management plan is a proactive step toward an effective long-term solution. Along with these benefits, energy efficiencies also promote local economic development opportunities, energy system reliability, and reduced-price volatility. Our energy efficient capital and operating process improvements are key components to our success and will be outlined in our report. The Health Sciences North community is committed to the path of sustainability, in all aspects of our health care facility.

Goals and Objectives

Our mission is to improve the health of northerners. We recognize the critical relationship between environmental health and public health, and we aim to limit any impact upon the environment resulting from the operation of our health care facilities. Implementing a strategic energy management plan will address the interconnected issues of indoor environmental quality, energy use, and facility operations. Our goal is to continuously monitor our current practices, so that optimal operating efficiency can be reached, and resources can be allocated more appropriately to serve our community.

Our Mission

Improve the health of northerners by working with our partners to advance quality care, education, research and health promotion.



1. Ontario's Green Energy Act – Overview

Ontario's Green Energy Act (GEA) was created to expand renewable energy generation, encourage energy conservation & promote the creation of clean energy jobs.

1.1. Promoting Energy Conservation

Conserving energy not only saves money, it also lowers demand on the electricity system and helps reduce greenhouse gas emissions.

Through conservation, Ontario homeowners, businesses and industry have saved more than 1,900 megawatts of peak demand electricity since 2005 – the equivalent of more than 600,000 homes being taken off the grid.

The GEA continues to promote conservation by:

Making energy efficiency a key element of Ontario's building code.	Working with local utilities to reach assigned conservation targets.
Creating new energy efficiency standards for household appliances.	Protecting low-income Ontarians through targeted conservation programs.



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2. Introduction

The purpose of Health Sciences North's energy management plan is to promote sustainable stewardship of our environment and community resources.

In keeping with our core values of excellence and accountability, Health Sciences North's (HSN) energy management program will aim to reduce operating costs while enabling us to provide innovative patient-centered care to a greater number of persons in the community. The plan will also meet the requirements outlined in sections 6 and 7 of the Green Energy Act, 2009, O. Reg. 397/11. To obtain full value from energy management activities, and to strengthen our conservation initiatives, a strategic approach will be taken. 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.

Our Mission

Improve the health of northerners by working with our partners to advance quality care, education, research and health promotion.

Our Vision

Globally recognized for patient-centered innovation.

Our Values

Excellence Respect Accountability Engagement.



3. Health Sciences North by the Numbers

We are the regional tertiary care center for Northeastern Ontario, with:

- 4,000 dedicated and resilient employees
- 600 highly skilled medical staff and scientists
- 2,100 learners
- 700 active volunteers
- 16 sites in Greater Sudbury and an additional 25 sites across Northeastern Ontario

HSN is a leading academic health sciences center in Canada. Research Infosource has ranked us among Canada's top 40 Research Hospitals, and our Regional Cancer Program ranks among the top five in Ontario on quality improvement indicators. Our patient experience survey results are above the Ontario teaching hospital averages on most indicators.



Picture 1 Ramsey Lake Health Centre



4. Building Survey

Health Sciences North (HSN) consists of three health care facilities that have each been audited for sustainability. Health Sciences North is a network of integrated facilities and programs serving the communities of northeastern Ontario in health promotion, prevention, diagnosis, treatment, research and patient care. Each facility provides a unique component of health care services to the Northeastern Ontario community. Facility #3 is maintained by Health Sciences North. The chart below provides a brief site description of each facility.

Health Sciences North							
Type of Facility: Healthcare Services Fotal Number of Buildings being Audited: 3							
	Facility #1						
Facility Name	Ramsey Lake Health Centre						
Address	41 Ramsey Lake Rd., Sudbury, ON						
Gross Area (ft ²)	1,046,298						
Number of Floors	Facility is comprised of five distinct but connected buildings ranging from single floor to 14-story						
Facility Use	The facility provides both acute and chronic patient care						
Facility #2							
Facility Name	Sudbury Outpatient Centre						
Address	865 Regent St. Sudbury, ON						
Gross Area (ft. ²)	185,000						
Number of Floors	6						
Facility Use	Outpatient Clinics						
	Facility #3						
Facility Name	Mental Health & Addictions Centre						
Address	680 Kirkwood Sudbury, ON						
Gross Area (ft. ²)	96,862						
Number of Floors	Facility is comprised of several separate buildings that are of single-floor construction and a five-story main building.						
Facility Use	The facility provides acute and chronic patient care. (Mental Health) (Owned by North Bay Regional Health Center)						

Table 1. Summary of Facilities



5. Energy Consumption

Energy, in cost and resource stewardship is a significant public policy issue. Hospital facilities are among the most energy intensive buildings in the public sector. Hospitals can substantially reduce energy costs while maintaining or improving the quality of patient care. Knowing where your facility stands in comparison to other buildings in the industry can provide insight into opportunities for improvement. Once a baseline is established, management can decide which energy efficient measures will best suit the needs of their facility.

5.1. Energy Consumption

Current utilities supplied for all our facilities consist of natural gas, electricity, and water. Utility consumption for each respective utility has been adjusted to fit a regular calendar year (365 days). Water consumption has been included below but excluded from further analysis.

Ramsey Lake Health Centre											
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
Energy Intensity (ekWh/sq. ft)	72.3	70.6	69.7	70.1	67.0	65.9	66.7	65.1	65.6	68.7	
Water (m ³)	206,265	188,974	183,889	198,547	192,382	206,486	204,159	178,841	191,661	206,590	
Sudbury Outpatient Centre											
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
Energy Intensity (ekWh/sq. ft)	49.6	47.0	42.7	40.4	42.5	39.3	41.2	36.8	37.4	39.7	
Water (m ³)	13,611	13,891	15,251	11,208	17,981	13,831	17,152	15,234	16,822	15,426	
			Mental	Health & A	ddictions C	Centre					
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
Energy Intensity (ekWh/sq. ft)	46.4	49.1	42.0	37.2	42.4	34.8	37.1	33.2	32.4	33.5	
Water (m ³)	3,611	4,496	4,514	5,192	6,627	9,061	7,286	8,790	4,791	7,511	

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Table 2. Historic Energy	[,] Intensity	and Water	Consumption



6. Utility Consumption

6.1. Ramsey Lake Health Centre

Current utilities supplied for Ramsey Lake Health Centre consist of natural gas, electricity, and water. Utility consumption for each respective utility has been adjusted to fit a regular calendar year (365 days). In the cooling season, when in operation, a privately owned on-site co-gen facility provides steam for a 680-ton absorption chiller and in the heating season the waste heat from the co-gen engines assists in heating the facility.

Utility		Annual Consumption (units)											
Source	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022			
Electricity (kWh)	26,809,899	25,920,155	25,776,485	25,387,063	24,251,698	24,468,807	24,333,583	24,765,344	25,803,587	25,180,265			
Co-Gen (kWh)	665,670	101,938	177,311	0	0	0	0	0	0	0			
Electricity (Total)	27,475,569	26,022,093	25,953,797	25,387,063	24,251,698	24,468,807	24,333,583	24,765,344	25,803,587	25,180,265			
Natural Gas (m ³)	3,194,424	3,503,395	3,171,908	2,305,937	3,217,099	4,095,485	4,200,882	4,030,241	4,028,452	4,446,798			
NG-Steam Production (m ³)	808,636	692,172	764,046	1,399,605	739,580	0	58,584	52,640	38,491	29,326			
NG-Hot Water Production (m ³)	580,985	360,479	537,662	863,292	411,870	133,586	71,436	39,840	82,013	43,457			
Natural Gas (Total)	4,584,045	4,556,046	4,473,616	4,568,834	4,368,549	4,229,071	4,330,902	4,122,721	4,148,956	4,519,581			
Water (m ³)	206,265	188,974	183,888	198,547	196,382	206,486	204,159	178,841	191,661	206,590			

Table 3. Historic Utility and Energy Consumption for Ramsey Lake Health Centre



Energy Initiatives Completed at the Ramsey Lake Health Centre in the past few years:

- Installation of VFD on AHU serving Kitchen
- Installation of 5-star energy efficient filters
- Replacement of ED and main canopy lighting to LED
- Replacement of exit signs to running man RCP & Lodge
- Replacement of exit signs to running man CTC
- VFD installation phase III
- VFD installation phase II
- Replacement of pendant lighting in the main lobby RCP to LED
- Level 7 mechanical room occupancy sensors
- Replacement of 25,000 standard T8 bulbs to LED
- Replacement of exterior canopy lighting to LED
- Replacement of exterior wall packs to LED
- Converted exterior bollard lighting to LED
- Exterior parking lighting changed to LED
- Installation of steam sub-metering
- Occupancy sensors in the clean/dirty utility rooms



6.2. Sudbury Outpatient Centre

Current utilities supplied for the Sudbury Outpatient Centre consists of natural gas, electricity, and water. Utility consumption for each respective utility has been adjusted to fit a regular calendar year (365 days).

Utility Source	Annual Consumption (units)											
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
Electricity (kWh)	2,605,915	2,321,662	2,418,264	2,314,880	2,067,151	1,847,107	1,815,475	1,809,411	1,909,042	1,798,694		
Natural Gas (m ³)	637,430	618,643	530,756	500,517	561,690	525,702	561,951	484,488	485,409	536,929		
Water (m ³)	13,611	13,891	15,251	11,208	17,981	13,831	17,152	15,234	16,822	15,426		

Table 4. Historic Utility Consumption for Sudbury Outpatient Centre

Energy Initiatives Completed at the Sudbury Outpatient Centre in the past few years:

- SOC building automation upgrades
- Replacement of lobby lighting to LED
- Exterior lighting replaced with LED
- Replacement of stairwell lighting to LED
- Replacement of 2500 T8's to LED
- Installation of new energy efficient AHU's
- Roof replacement(s)
- Upgrades of DDC controls for fan scheduling
- Lighting culture programs



6.3. Mental Health and Addiction Centre

Current utilities supplied for the Mental Health and Addiction Centre consists of natural gas, electricity, and water. Utility consumption for each respective utility has been adjusted to fit a regular calendar year (365 days).

Utility Source	Annual Consumption (units)										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
Electricity (kWh)	1,466,486	1,423,957	1,380,164	1,350,609	1,359,674	1,088,502	1,015,218	1,039,673	1,118,073	1,010,797	
Natural Gas (m ³)	306,537	337,292	272,853	228,855	278,720	231,469	249,723	210,997	195,143	215,846	
Water (m ³)	3,611	4,496	4,514	4,192	6,627	9,061	7,286	8,790	4,791	7,511	

Table 5. Historic Utility Consumption for Mental Health & Addiction Centre

Energy Initiatives Completed at the Mental Health and Addiction Centre in the past few years:

- BAS Upgrades
- Replacement of the elevators
- Replacement of the cottage's boilers
- Replacement of the cottages hot water tanks
- Replacement of Cottage II RTU's
- Installation of 5-star energy efficient filters
- Replacement of 1500 T8's to LED
- Culture programs



7. End Use – Energy

7.1. Ramsey Lake Health Centre

The following information outlines estimates of energy consumption in accordance with Natural Resources Canada Office of Energy Efficiency:

End Use – Energy Anr	nual Energy (%)
Lighting	4%
Fans	11%
Pumps	3%
Central Cooling Coils	6%
Miscellaneous Loads	12%
Central Heating Coils	11%
Space Heating	7%
Children's Treatment Centre	1%
Reheat or Hot Deck Coils	14%
Cooling Tower	1%
Domestic Hot Water	2%
Humidifiers	9%
Helipad	1%
Sterilizers	16%
Losses	2%
Total	100%

Table 6.	End Use	Energy	Summary	for Ramse	y Lake	Health	Centre
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Figure 1. End Use Energy Summary for Ramsey Lake Health Centre



7.2. Sudbury Outpatient Centre

The following information outlines estimates of energy consumption for the Sudbury Outpatient Centre in accordance with Natural Resources Canada Office of Energy Efficiency:

End Use – Energy Annual Energy (%)								
Space Heating	34%							
Space Cooling	4%							
Water Heating	44%							
Plug Load	3%							
*Aux. Equipment	0%							
Aux. Motors	6%							
Lighting	7%							
Servers	2%							
Totals	100%							

Table 7. End Use Energy Summary for Sudbury Outpatient Centre

•	3.12%	Plug Load
	0.00%	*Aux. Equipment
	6.39%	Aux. Motors
	7.02%	Lighting
· · · · · · · · · · · · · · · · · · ·	33.50%	Space Heating
/ 2	4.38%	Space Cooling
	1.65%	Servers
	43.94%	Water Heating

Figure 2. End Use Energy Summary for Sudbury Outpatient Centre



7.3. Mental Health & Addictions Centre

The following information outlines estimates of energy consumption for the Mental Health & Addictions Centre in accordance with Natural Resources Canada Office of Energy Efficiency:

End Use – Energy Annual Energy (%)								
Space Heating	56%							
Space Cooling	7%							
Water Heating	8%							
Plug Load	4%							
*Aux. Equipment	1%							
Aux. Motors	15%							
Lighting	6%							
Servers	3%							
Totals	100%							

Table 8. End Use Energy Summary for Mental Health & Addictions Centre



Figure 3. End Use Energy Summary for Mental Health & Addictions Centre



8. Energy Utilization Index

Energy Utilization Index is a measure of how much energy a facility uses per square foot.

Breaking down a facility's energy consumption on a per-square-foot-basis allows facilities of different sizes to be compared with ease.

	Annual Consumption (units)											
Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
Ramsey Lake Health Centre	72.3	70.6	69.7	70.1	67.0	65.9	66.7	65.1	65.6	68.7		
Sudbury Outpatient Centre	49.6	47.0	42.7	40.4	42.5	39.3	41.2	36.8	37.4	39.7		
Mental Health & Addiction Centre	46.4	49.1	42.0	37.2	42.4	34.8	37.1	33.2	32.4	33.5		

Table 9.	Historic	Energy	Use	Intensity
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Annual Consumption (EUI)

Figure 4. Historic Energy Use Intensity



9. Green House Gas Emissions

Greenhouse Gas (GHG) emissions are expressed in terms of equivalent tons of Carbon Dioxide. The GHG emissions associated with a facility are dependent on the fuel source—hydroelectricity produces fewer greenhouse gases than coal-fired plants, or light fuel oil produces fewer GHGs than heavy.





Electricity from the grid in Ontario is relatively 'clean' as the majority is derived from low-GHG hydroelectricity, and coal-fired plants have been phased out. Natural Gas and Electricity consumptions have been converted to their equivalent tons of greenhouse gas emissions in the tables below.

9.1. Ramsey Lake Health Centre

The GHG emissions are calculated based on the energy consumption data analyzed, as follows.

	GHG Emissions (tonnes)										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
Electricity	2,198	1,093	1,116	1,041	461	734	706	693	774	1,680	
Natural Gas	8,756	8,611	8,455	8,635	8,257	7,993	8,185	7,792	7,842	8,542	
Totals	10,954	9,704	9,571	9,676	8,717	8,727	8,891	8,485	8,616	10,222	

Table 10 Historic GHG Emissions for Ramsey Lake Health Centre

Historical Campus-wide Emissions (Scope 1 & 2) 12,000 10,000 GHG Emissions (tCO₂e) 8,000 8,756 6,000 8,542 8,611 8.455 8,635 8,185 7,993 7,792 7,842 8,257 4,000 2,000 2013 2018 2019 2020 2021 2014 2015 2016 2017 2022 Electricity Natural Gas

Figure 5. Historic GHG Emissions for Ramsey Lake Hospital

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9.2. Sudbury Outpatient Centre

The greenhouse gas emissions are calculated based on the energy consumption data analyzed.

	GHG Emissions (tonnes)											
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
Electricity	208	98	104	95	39	55	53	51	57	120		
Natural Gas	1,217	1,169	1,003	946	1,062	994	1,062	916	917	1,015		
Totals	1,426	1,267	1,107	1,041	1,101	1,049	1,115	966	975	1,135		

Table 11. Historic GHG Emissions for Sudbury Outpatient Centre



Historical Campus-wide Emissions (Scope 1 & 2)

Figure 6. Historic GHG Emissions for Sudbury Outpatient Centre

9.3. Mental Health & Addictions Centre

The greenhouse gas emissions are calculated based on the energy consumption data analyzed.

	GHG Emissions (tonnes)										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
Electricity	117	60	59	55	26	33	29	29	34	67	
Natural Gas	585	637	516	433	527	437	472	399	369	408	
Totals	703	697	575	488	553	470	501	428	402	475	

Table 12. Historic GHG Emissions for Mental Health & Addictions Centre



Figure 7. Historic GHG Emissions for Mental Health & Addictions Centre



10. Conservation & Demand Management

Conservation & Demand Management requires adequate planning to produce long-term success. This section of the report outlines the following:

Proposed Conservation Measures Summary

The following table summarizes the recommended energy efficiency measures discovered throughout the auditing process that requires further investigation; and it outlines the impacted utility for each category.

The following proposed conservation measures will be explored for feasibility. The table below details potential conservation measures based on our energy analysis and outlines the impacted utility for each measure. 'X's represent utilities that will be affected by the conservation measures.



Site	Site Sustainable Measures						
Ramsey Lake Health Center	Exterior Windows Replacement	Х	Х				
Ramsey Lake Health Center	South Tower Lighting Controls	Х					
Ramsey Lake Health Center	Window Replacement	Х	Х				
Ramsey Lake Health Center	Boiler Optimization	Х	Х				
Ramsey Lake Health Center	Replace Window Seals	Х	Х				
Ramsey Lake Health Center	Replace RO Water System			Х			
Ramsey Lake Health Center	Building Automation Upgrade and VFDs	X					
Ramsey Lake Health Center	Thermal Storage	Х		Χ			
Ramsey Lake Health Center	Steam Boiler Optimization		Х				
Ramsey Lake Health Center	Solar & Geothermal	Х	Х				
Ramsey Lake Health Center	Chiller Optimization	Х					
Ramsey Lake Health Center	Glycol Reclaim Optimization		Х				
Ramsey Lake Health Center	Fume Hood Optimization	Х	Х				
Ramsey Lake Health Center	Data Centre Optimization	Х					
Ramsey Lake Health Center	Cooling Tower New Design	Х					
Ramsey Lake Health Center	Primus Chiller Replacement	Х					
Ramsey Lake Health Center	Low Flow Toilets			Х			
Ramsey Lake Health Center	Recommissioning BAS	Х	Х				
Ramsey Lake Health Center	Airflow Control	Х	Х				
Ramsey Lake Health Center	Conversion of MUA units to MAUs	Х	Х				
Ramsey Lake Health Center	Convert Glycol Heating loops from Constant to Variable	x					
Ramsey Lake Health Center	Replace AHUs	Х	Х				
Ramsey Lake Health Center	Install a Combined Heat and Power (CHP) plant (Class A)	X	X				
Ramsey Lake Health Center	Solar PV rooftop 432kW	Х					
Ramsey Lake Health Center	Solar PV carpark 2,050kW	Х					
Ramsey Lake Health Center	Replace Absorption Chiller by Heat Pump 720ton	X	X				
Sudbury Outpatient Center	BAS Upgrade	X	X				
Sudbury Outpatient Center	LED Lighting Upgrade	x					
Sudbury Outpatient Center	VFD Installation	X					
Sudbury Outpatient Center	Steam Trap Survey		X				
Mental Health & Addictions Center Kirkwood Site	Lighting Controls	X					
Mental Health & Addictions Center Kirkwood Site	LED Lighting Upgrade	X					
Mental Health & Addictions Center Kirkwood Site	VFD Installation	х					
Mental Health & Addictions Center Kirkwood Site	BAS Upgrade	Х	х	_			



10.1. Energy Commodities Management

Energy management refers to both how energy is purchased and how energy is used for building operations. 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 energy commodities procurement. Working with Blackstone allows us to meet or reduce our energy commodity budgets. This process ensures that resources can be properly allocated to energy and water saving programs.



10.2. Cleaning, Sanitization and Disinfection

Cleaning, disinfection and infection control are important aspects of our hospital environment. As part of our Conservation and Demand Management Plan we believe that the right combination of housekeeping and infection control practices can further support our sustainable efforts while improving patient care. As part of our on-going commitment to sustainability, we are currently reviewing the use of different strategies such as microfiber cleaning systems, antimicrobial coatings, and environmentally friendly cleaning and disinfection products.

Health Sciences North Conservation & Demand Management Plan



11. Closing Comments

Thank you to all who contributed to Health Sciences North's Conservation & Demand Management Plan. We consider our facility a primary source of care, and an integral part of the local community. The key to this relationship 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 Health Sciences North, we approve this Conservation & Demand Management Plan.

DocuSigned by:

9/15/2023

Mark Hartman Interim President and Chief Executive Officer



12. Acknowledgement

This report was prepared through collaboration between the Health Sciences North's Facilities Management and the Blackstone Energy Service's Team.