NHH
Northumberland
Hills Hospital

Conservation and Demand Management Plan
2024-2029

Our Shared Purpose: People First

Our Values: Integrity, Quality, Respect, Compassion and Teamwork

August 2024

Northumberland Hills Hospital
1000 DePalma Drive
Cobourg, ON
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August 2024

On behalf of Northumberland Hills Hospital (NHH), we are pleased to share the latest five-year Energy Conservation and Demand Management (CDM) Plan as the next chapter in our strategic pursuit to reduce our overall energy intensity and carbon footprint. This Plan builds on the priorities and commitments set out in its predecessor, our 2019 CDM Plan, while providing an update on our progress and identification of possible new opportunities for future conservation in the years ahead.

NHH has continued to grow to meet the evolving needs of the communities we serve while implementing best practices when it comes to energy management. The sum of these efforts is not only being felt in improved energy efficiency – our team's work in energy conservation and demand management is also helping us to improve the experience of our patients, caregivers, visitors and healthcare teams.

In line with our initial CDM Plan in 2019, this document will act as a blueprint to focus and guide our efforts and actions toward furthering our energy vision over the coming years.

We look forward to providing an update on our efforts via our NHH communication channels, annual reporting and 2029 CDM Plan.

Sincerely,

Lola Obomighie
Vice President People, Culture & Organizational Effectiveness

Chuck Cudmore
Director Plant Operations, Facilities & Maintenance

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About Northumberland Hills Hospital (NHH)

Located approximately 100 kilometres east of Toronto, NHH delivers a broad range of acute, post-acute, outpatient and diagnostic services. Acute services include emergency and intensive care, medical/surgical care, obstetrical care and palliative care. Post-acute specialty services (PASS) include restorative care and rehabilitation. Mental health care, cancer and supportive care, dialysis and other ambulatory care clinics are offered on an outpatient basis through partnerships with regional centres and nearby specialists. NHH offers a full range of diagnostic services, including magnetic resonance imaging (MRI), computed tomography (CT) and mammography.

The hospital serves the catchment area of west Northumberland County. A mixed urban and rural population of approximately 67,000 residents, west Northumberland comprises the Town of Cobourg, the Municipality of Port Hope, Alderville First Nation and the townships of Hamilton, Cramahe and Alnwick/Haldimand.

NHH directly employs more than 850 people and relies on the additional support provided by physicians, midwives and volunteers. NHH is an active member of Ontario Health (East) - formerly the Central East Local Health Integration Network - and the Ontario Health Team of Northumberland.

Our Shared Purpose and Strategic Plan

Anchored around the acronym CARE, and grounded in our Shared Purpose of 'People First,' NHH is guided forward by four strategic priorities:

Our Core Values

Quality | Integrity | Respect | Teamwork | Compassion

Overview of Our Plan

In 2019, NHH developed a five-year conservation and demand management (CDM) plan to actively work towards decreasing our overall energy consumption and greenhouse gas (GHG) emissions. The plan outlined goals that our hospital wished to achieve over five years and listed several planned initiatives to successfully reach these goals. In particular, NHH implemented a Combined Heat and Power (CHP) system in 2020 which uses natural gas to generate electricity (power) while recovering thermal energy (heat) from the engine to offset traditional natural gas requirements. Based on this major change in energy sources, NHH estimated the following impacts relative to the baseline period, 2018.

- ✓ 54% reduction in electricity being pulled from grid.
- ✓ 32% increase in natural gas usage as a result of the CHP unit coming online.
- ✓ 21% increase in GHG emissions.

This plan, completed in 2024, is a reflection of our results over the past five years, the cumulative impacts of the CHP system in its first years of use, and a renewal of our commitment to reducing NHH's environmental impact even further. A comparison of our total utility demands, GHG emissions and Energy Use Intensity (EUI) from 2018 (last full calendar year reported in the 2019 Plan) and 2023 has been included on page 6.

	Electricity [kWh]	Natural Gas [m^3]	GHG [tCO_2e]	EUI [$ekWh^*/ft^2$]
2018	6,428,623	825,972	1,813	64.47
2023	4,560,004	917,077	1,936	60.44
2018 vs. 2023	-41%	10%	6%	-7%

*Equivalent kilowatt hours

Based on the information above, which is not adjusted for weather, NHH fell short of the estimated reduction in electricity usage but was able to keep natural gas and GHG emissions well below the prior estimates set out in our previous plan. Perhaps most relevant, our overall EUI has decreased by 7% despite increased service levels and air changes related to extreme weather events during the same period.

Looking forward to 2029, NHH is working to identify future projects which ultimately reduce overall energy intensity within the hospital. In particular,

the implementation of a new Building Automation System (BAS) will unlock the ability to optimize, track, and better monitor energy usages, while identifying opportunities for improvement in combination with engaging industry experts where applicable.

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

A Reflection on NHH's 2019 Energy and GHG Targets

NHH's overall mix of energy use was expected to be greatly influenced by the implementation of the CHP system in 2020. While a decrease in Energy Use Intensity of 4.1% was expected, a greater decrease in global energy consumption was also expected as waste heat is not typically recovered in grid electricity generation processes.

To achieve the energy intensity and GHG targets, a roadmap was developed as follows:

1. Energy Conservation Measures (ECMs) were outlined and were prioritized in order of simple payback period.
2. ECMs were assumed to be implemented between 2019 and 2023.
3. Changes in electricity and natural gas consumption along with GHG emissions associated with each ECM were projected in Table 7 from our 2019 CDM Plan.

Table 7: Summary of current and proposed ECMs considered

ECM category	ECM description	Electricity savings	Natural gas savings	GHG savings[1]	Utility cost savings	Capital cost[2]	Simple payback
[-]	[-]	[kWh/yr]	[m^3/yr]	[$mtCO_2e$/yr]	[$/yr]	[$]	[yr]
Current	Combined heat and power	2,366,852	-317,863	-498	238,546[3]	712,207	4.4
Proposed	Recommissioning	34,444	6,441	14	6,621	38,783	5.9
	Lighting upgrades	426,667	-7,542	4	95,995[4]	604,091	6.3
	Demand control ventilation	292,778	42,755	93	52,700	508,218	9.6
	Hot water pump conversion	47,500	0	2	5,232	56,942	10.9
	Water conservation measures	0	5,234	10	24,549	270,161	11.0
	Chiller plant control upgrade	160,833	0	7	22,190	248,613	11.2
	Building envelope seal	5,556	5,502	11	2,357	38,412	16.3
Combined	Totals	3,334,631	-265,473	-357	448,190	2,477,427	5.5

[1] GHG savings estimated assuming 0.000043 $mtCO_2/kWh$ for electricity (scope 2) and 0.001888 $mtCO_2/m^3$ for natural gas (scope 1).
[2] Northumberland Hills Hospital intends to explore options for achieving similar energy and GHG performance results at reduced capital costs.
[3] Includes $75,000 annual operating cost increase, based on detailed engineering study.
[4] Includes $35,500 annual operating cost savings, based on detailed feasibility study.

How We Achieve Success

Our success over the past five years has taught us that persistence is key. NHH will continue to apply the original energy management vision and six guiding principles introduced in 2014, expanded upon in 2019, and reaffirmed in this latest multi-year plan in 2024.

Energy Management Vision: "Leaders in Environmental Stewardship"

Guiding Principles:

1. **Taking A Strategic Approach**: NHH will continue to improve its energy-related performance by actively managing energy costs, by implementing opportunities as they are identified and by strategically developing plans for the future. Internalizing energy management into our organization's everyday decision-making, policies, and operating procedures will help assure substantial and long-lasting reductions in energy use throughout NHH.

2. **Supporting Mission-Critical Goals:** Strategic energy management will directly support NHH mission-critical goals, namely: caring for the environment and the community; optimizing the healing and working environment; improving the hospital's financial position by reducing unnecessary energy costs; and, optimizing the capacity of existing energy systems to meet current and expanding operational needs. The impacts of NHH's energy management efforts on those goals will be tracked wherever possible and reported on a regular basis to the Senior Leadership Team.

3. **Pursuing Long-Term Change to Core Business Practices:** The strategic approach implemented is the consistent incorporation of energy management into our organization's practices and decision-making process. Change in energy-related business practice will cover all applications of energy management, such as new construction and major renovations, existing facility operations and upgrades, and the economic analysis and procurement practices underlying these practices.

4. **Fostering Organizational Commitment and Involvement:** Executive and organizational commitment and involvement is critical to successful strategic energy management. NHH's Senior Leadership Team works with Engineering and other key teams to ensure that adequate organizational support and resources are provided to

maximize the benefits of energy management at NHH. Energy management will continue to be integrated into the strategic planning and capital budgeting processes.

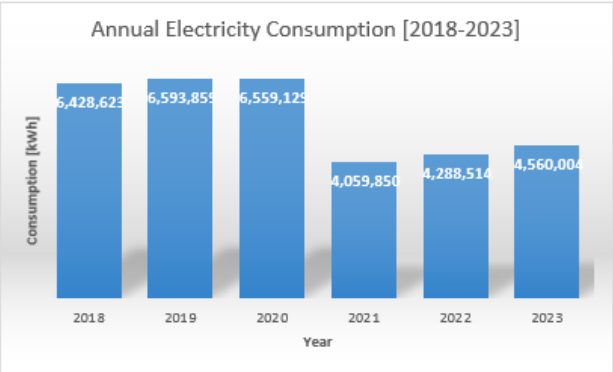
5. **Solid Economic Returns:** Capital energy projects are expected to yield solid economic returns and meet NHH's return on investment and additional criteria requirements applied through the hospital's capital budgeting process. NHH will consistently apply financial analysis methods to all capital projects.

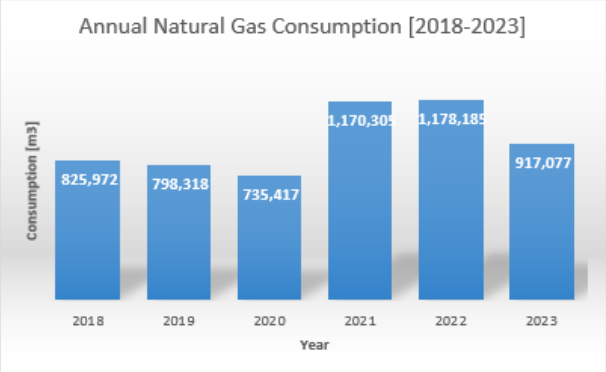
6. **Using Available Resources and Assistance:** National, regional, and local sources of strategic, technical, and financial assistance are helping NHH achieve its energy management goals. Some of these resources include utility suppliers, specialty grants and funding, and private partnerships. We are committed to sustaining and growing our networks with these resources as we move forward.

Annual Energy Consumption and Greenhouse Gas Emissions

As part of Ontario Regulation 25/23 under the Electricity Act, 1998, NHH prepares, publishes, and makes available its annual energy consumption and resulting greenhouse gas (GHG) production. The table and graphs on pages 8 and 9 show NHH's usages over the past 5 years and the benchmark year (2018) from the previous plan. Further monthly usages over the past years are also included under Monthly Usages.

	Electricity [kWh]	Natural Gas [m^3]	GHG [tCO2e]	EUI [ekWh/ft2]
2018	6,428,623	825,972	1,813	64.47
2019	6,593,859	798,318	1,757	63.95
2020	6,559,129	735,417	1,625	61.01
2021	4,059,850	1,170,305	2,417	69.52
2022	4,288,514	1,178,185	2,440	70.86
2023	4,560,004	917,077	1,936	60.44





In addition, the numbers above show that the CHP system supplies approximately 1.8 million kwhs/year of electricity while using just over 500,000m3 of natural gas and recovering almost half of that gas in the form of useful thermal energy (heat). Overall, the CHP project provides reduced energy intensity (ekwhs), especially when normalized for weather. To account for how cold/warm it was outside from year to year and the impact of these fluctuations, energy usage in ekwhs can be weather normalized. Weather normalizing uses Total Degree Days (TDD) and measures how cold the winter (heating season) is and how hot the summer (cooling season) is in a specific year. The TDD allows for a comparison of how efficient the building operation is relative to TDDs. NHH has seen a 10% reduction in ekwhs consumed per TDD since the CHP became operational.

Conservation and Demand Initiatives Undertaken Since 2019

In July 2019, NHH developed goals and green initiatives to decrease the facility's annual energy consumption and resulting greenhouse gas emissions. The following activities, completed between 2019 and 2024, are our past initiatives that were undertaken in addition to day-to-day efforts to manage overall energy consumption, lower annual operating costs, and reduce greenhouse gas emissions.

Project Name & Description	Electricity [kWh]	Natural Gas [m^3]	GHG Emissions [tCO_2e]	Money Saved [$]
Insulation Jackets				
To optimize energy efficiency and thermal performance by minimizing heat loss, NHH installed insulation jackets	-	22,560	44.25	10,332

around steam valves in 2019. By reducing energy consumption and preventing condensation, insulation jackets enhance operational efficiency, reduce greenhouse gas emissions, and save costs in the long run. NHH was also able to capture $4,512 in incentives on this project.				
New Chillers As part of the ongoing efforts to replace aging infrastructure with newer and more energy efficient equipment, NHH has replaced the old chillers, original to the building when it first opened in the fall of 2003. The new chillers went into service in early 2024 with the aim of reducing overall electricity to meet cooling demand and this project will result in an incentive of $86,830.	165,390	-	4.96	25,470
Combined Heat and Power (CHP) In November 2020, NHH installed a CHP system consisting of a natural gas-fired internal combustion engine (ICE) with a nominal capacity of 287 kW or 2,367 MWh/year and hot water heat recovery system. The CHP also received a $450,000 incentive.	437,457*	-	(213)	67,368
LED Lighting in Public Areas NHH undertook a comprehensive lighting upgrade project in various hallways to improve energy efficiency and lighting quality. These upgrades resulted in reduced energy consumption, better lighting quality, and lower maintenance	122,693	-	3.68	18,895

costs, contributing to overall operational efficiency.				
LED Lighting Ambulance Bay To enhance energy efficiency and improve lighting quality, NHH replaced 14 old Metal Halide lights (100 Watts each) in the Ambulance Bay with new 40 Watt LEDs. This upgrade reduces energy consumption significantly, providing better illumination and lowering maintenance costs over time.	3,679	-	0.11	557
TOTAL	**729,219**	**22,560**	**(160.00)**	**122,632**

**Net ekWh savings per year mainly in the form of recovered heat from the CHP.*

In addition to the energy savings outlined above and resulting reductions in operating costs, each one of these measures provided additional benefits for the hospital and the community we support, including but not limited to improved comfort for our patients, caregivers and healthcare teams, and safety with enhanced infection control measures. Furthermore, NHH has been recognized for our conservation measures and sustainability efforts over the past several years. Some of the more recent awards received include:

2022 Hospital Scorecard Top Score in Community Peer Group

- ✓ Waste Management – Ontario
- ✓ Leadership – Ontario
- ✓ Water Excellence – Ontario

2021 Hospital Scorecard Top Score in Community Peer Group

- ✓ Green Hospital of the Year Honourable Mention– Canada Wide
- ✓ Energy – Ontario
- ✓ Leadership – Canada Wide
- ✓ Pollution Prevention – Canada Wide
- ✓ Water Excellence Honourable Mention – Ontario

Going Forward – Our New Objectives

In 2019 NHH developed an extensive list of objectives that we wished to achieve over the previous five-year CDM Plan. Many of these are long-term objectives, requiring persistent effort over time. To that end, NHH is renewing a number of commitments with this Plan, while also adding new. Our current objectives and proposed measures are set to be implemented for, at

minimum, the five years that this Plan covers but most will be in place well beyond 2029.

- ✓ **Energy policy enhancement**. NHH has implemented and will continue to enhance our energy policies as originally outlined in 2014's CDM plan. This includes finance, purchasing, design and construction practices that incorporate energy efficiency considerations. Consideration will be given to enhancing (making more advanced and detailed) and extending (applying to additional business areas) NHH energy policies in the coming years.

- ✓ **Proactive staff engagement.** Effective programs involving increased awareness (conscious focus), education (technical competency), and empowerment of staff (authority, encouragement, and reward) to make changes that improve energy efficiency. Consideration will be given to the more advanced energy training and empowerment of hospital staff to improve energy efficiency.

- ✓ **Focus on identifying and/or exploring ECMs via additional energy audits and various energy studies**. Consideration will be given to performing additional energy audits/studies focused on identifying and exploring lower-cost ECMs.

Establish Commitment & Accountability

The Senior Leadership Team at NHH has approved this CDM Plan and continues to support the efforts to conserve energy and reduce overall impact to the environment. In addition, commitment and accountability will be sustained through the following actions:

- Engagement of key staff (purchasing/procurement, construction, building operations, etc.) via communication, education, and recognition for their efforts to reduce energy use. This will be critical to the success of our objectives and measures.
- Enhance energy training and awareness program. The change of human behaviour through energy education and awareness are often a cost- and resource-efficient approach to improving energy efficiency. NHH will focus on this opportunity in coming years
- Continued accountability to the NHH Board's Facilities and Campus Development Committee regarding energy usage.

Initiate Low Cost No Cost Actions

Implement Cost-Effective Facility Upgrades

- Replace equipment and supplies identified at end of life with energy efficient equivalents.
- Implement equipment and system upgrades where justifiable by life-cycle cost analysis.
- Continue to deliver proper Preventative Maintenance Programs.
- Expand the use of qualified service providers as needed. Utilize standard RFP documents, contract terms, and reporting standards.

Actively Manage Energy Commodity

- Minimize utility costs and exposure to market risks. Utility costs include natural gas, electricity, water, district energy, and sewer.
- Participate and keep abreast of energy/utility regulatory process.

Improve Building Operating Performance

- Optimize performance through equipment tune-up and improved Operations and Maintenance (O&M) while supporting patient care, and facility comfort and safety.
- Optimize Building Systems (BAS) between current and expanded facility to ensure synchronization.

Determine New Capital Requirements

Implement Financial Practices and Decision-Making Processes

- Advance the philosophy that money spent to achieve energy efficiency is viewed as an investment, not a cost.
- Ensure financial decision makers consistently use Life Cycle Cost Analysis (LCCA) on all new construction, major renovations, and equipment replacements.
- Ensure decisions about energy management investments are part of NHH's high-level, long-range process of budgeting for capital and operations.
- To support the achievement of our energy conservation measures, maximize utilization of available energy-related capital and operating improvements via municipal, provincial, and federal sources.
- Apply established purchasing procedures and specifications and include incentives and tax credits wherever available.

Measure and Report on Results

- Report energy reductions and unexpected increases to Senior Leadership management and the Board Facilities and Campus Development Committee.
- Involve and inform appropriate interest holders on status of the Plan, savings, and return on investment, etc.
- Energy monitoring and targeting program. A systematic approach to measuring and regularly reviewing energy performance data can lead to significant energy performance improvements through the identification and root cause analysis of data anomalies. It also typically results in improved equipment condition and longevity.
- Learn from setbacks.

Going Forward – Our Proposed Measures

In addition to the above-mentioned objectives, NHH has identified several specific projects that are planned for completion over the next five years. These projects will not only improve the hospital environment for both patients and staff, but also further improve the hospital's energy efficiency and performance.

Department Redevelopment

The following redevelopment projects are broad in nature but will include the addition of new energy efficient equipment, lighting, and building materials that will further reduce energy intensity.

- ✓ Food Services Department
- ✓ Medical Device Reprocessing Department (MDRD)
- ✓ Operating Room (OR) Suite

Continued Education, Awareness and Training

NHH will continue with our energy training and awareness program. As noted, the change of human behaviour through energy education and awareness is often an effective approach to improving energy efficiency.

Effective programs typically involve increasing the awareness (conscious focus), education (technical competency), and empowerment (authority, encouragement, and reward) of staff to make changes that improve energy efficiency. Consideration will be given to the more advanced energy training and empowerment of hospital teams to improve energy efficiency.

These efforts can also be leveraged by highlighting awards and recognition NHH has already received for its conservation measures.

Building Automation System (BAS) Upgrade

Upgrading an obsolete BAS platform provides a solid foundation for future energy-saving initiatives and overall building optimization. While the straight upgrade may not directly result in energy savings, it lays the groundwork for future efficiency improvements by providing access to advanced features, data analytics, and integration capabilities. This positions the hospital to better leverage their building systems and data in pursuit of energy efficiency goals over the long term. Here's how:

- ✓ Enhanced Monitoring and Control - enables more granular monitoring and control of building systems. This increased visibility helps identify inefficiencies and areas for improvement, paving the way for targeted energy-saving strategies.

- ✓ Integration of Advanced Energy Management Features - including sophisticated algorithms for optimizing Heaving, Ventilation and Air Conditioning (HVAC) for heating and cooling operation, intelligent lighting control, and demand response capabilities, all of which contribute to energy savings.

- ✓ Access to Data Analytics - robust data analytics capabilities, allowing NHH to analyze historical energy consumption patterns and identify trends. This data-driven approach enables informed decision-making and the implementation of tailored energy-saving measures.

- ✓ Integration with Renewable Energy Sources - integrate with renewable energy systems, such as solar panels to maximize their impact on overall energy savings. By coordinating renewable energy production with building energy demand reducing reliance on fossil fuels.

- ✓ Scalability for Future Upgrades - by upgrading, the hospital gains a scalable platform that can accommodate future upgrades and expansions. This flexibility ensures that as new energy-saving technologies and strategies become available, they can be seamlessly integrated into the building management system.

Overall, an updated BAS platform offers a holistic approach to energy management, combining advanced automation, data analytics, and control

strategies to optimize energy usage and improve sustainability in the hospital.

Identify New Opportunities

As outlined throughout this plan, NHH has already taken significant steps toward reducing energy intensity and waste while improving safety and comfort for all that use our building. We also realize that improvement is an ongoing process and therefore requires NHH to continue to find new opportunities to become more efficient and reduce waste. This is particularly important as more pressure is put on healthcare providers to increase service offerings, improve patient/staff safety and comfort while meeting evolving needs, such as EV Charging Stations. To identify new opportunities, NHH continues to track and monitor energy usage while engaging with industry experts.

Monthly Usages