




June 2024

Grand River Hospital
2024-2029 Energy Conservation and
Demand Management Plan

Management sign-off

I confirm that Grand River Hospital's senior management has reviewed and approved this 2024-2029 Energy Conservation and Demand Management Plan.

Signature: 

Name: Mike Gourlay

Date: Aug-29-2025 | 5:51 AM PDT

Title: VP, Finance and Support Services & CFO

Under Ontario Regulation 25/23, Ontario's broader public sector organizations are required to develop and publish an Energy Conservation and Demand Management (ECDM) Plan by July 1, 2024. Technical advice and analysis for this ECDM Plan were provided by [Enerlife Consulting Inc.](#)

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Part 1: Introduction

1. About Grand River Hospital

Grand River Hospital is the largest health service provider in Waterloo Region and Guelph-Wellington and provides regional care services. Our aim is to be a world class hospital for our community. We are dedicated to a quality patient, family, team, learner and partner experience at the heart of everything that we do.

This Energy Conservation and Demand Management (ECDM) plan addresses Grand River Hospital’s (Grand River) two campuses: Kitchener-Waterloo Campus and Freeport Campus.

We are committed to improving our energy efficiency, while maintaining occupant comfort and meeting the expectation of the general public and the Ministry of Health to deliver the highest quality of healthcare services to our community.

Table 1 Grand River sites

Site	Address	Building Area (ft²)	Description
Kitchener-Waterloo Campus	835 King Street West Kitchener, ON N2G 1G3	662,538	Acute care facility
Freeport Campus	3570 King Street East, Kitchener, ON N2A 2W1	315,896	Continuing care facility

2. Planning horizon and scope

The horizon for this plan is the 5-year period from 2024 to 2029, prioritizing projects and organizational improvements which are manageable within this period. The direct scope of the plan covers our two primary sites.

3. Leadership in sustainability

Grand River has been participating in Greening Health Care for over 11 years, a program that helps hospitals work together to lower energy costs, raise their environmental performance, and contribute to health and well-being of communities. In 2019, we were recognized for environmental leadership with the Greening Health Care Leadership award. This award recognizes exceptional environmental commitment, programs and significant energy and water savings.

Part 2: Results from the past 5 years (2019-2023)

1. Energy and water progress compared to targets

In the 2019 ECDM plan, Grand River set an overall target of 18.3% reduction based on the individual site-specific targets that incorporate electricity and natural gas targets. From 2019 – 2023, the Kitchener-Waterloo campus had an improvement in electricity use while the Freeport campus show an overall increase.

1.1 Kitchener-Waterloo Campus

In the 2019 ECDM plan, Grand River was targeting a 16.5% reduction in total energy for the Kitchener-Waterloo Campus. Table 2 presents actual, weather-normalized performance results from the 2023 calendar year compared to the 2018 baseline, which resulted in net utility cost savings of \$3,062.

Table 2 Kitchener-Waterloo Campus: Energy and water savings vs 2018 baseline

	2019 Plan Target savings				Actual savings (2023 vs 2018 baseline) ¹			
	Units	%	\$	GHG (tonnes eCO ₂)	Units	%	\$	GHG (tonnes eCO ₂)
Electricity (kWh)	2,175,656	12.7%	\$326,348	44	991,159	5.8%	\$158,585	30
Natural Gas (m ³)	448,173	19.2%	\$134,452	859	-50,636	-2.2%	-\$16,710	-97
Total Energy (ekWh)	6,814,248	16.5%	\$460,800	902	467,079	1.2%	\$141,876	-67
Water (m ³)	19,039	13.5%	\$98,239	0	-32,282	-23.6%	-\$138,814	-4
Total			\$559,039	902			\$3,062	-72

Monthly savings graphs help identify the periods of recorded savings or increases. On the graphs in Figure 1 through Figure 6, the blue points are actual monthly energy use, and the red points are the comparative, weather-normalized 2018 baselines. Blue dots below red represent real savings.

The electricity consumption trend over the last 5 years in Figure 1 demonstrates consistent savings in each of the 5 years. The 5-year cumulative improvement was 4,530,663 kWh valued at \$724,906.

¹ Using 2024 utility rates: Electricity \$0.16/kWh, gas \$0.33/m³, water \$4.30/m³.

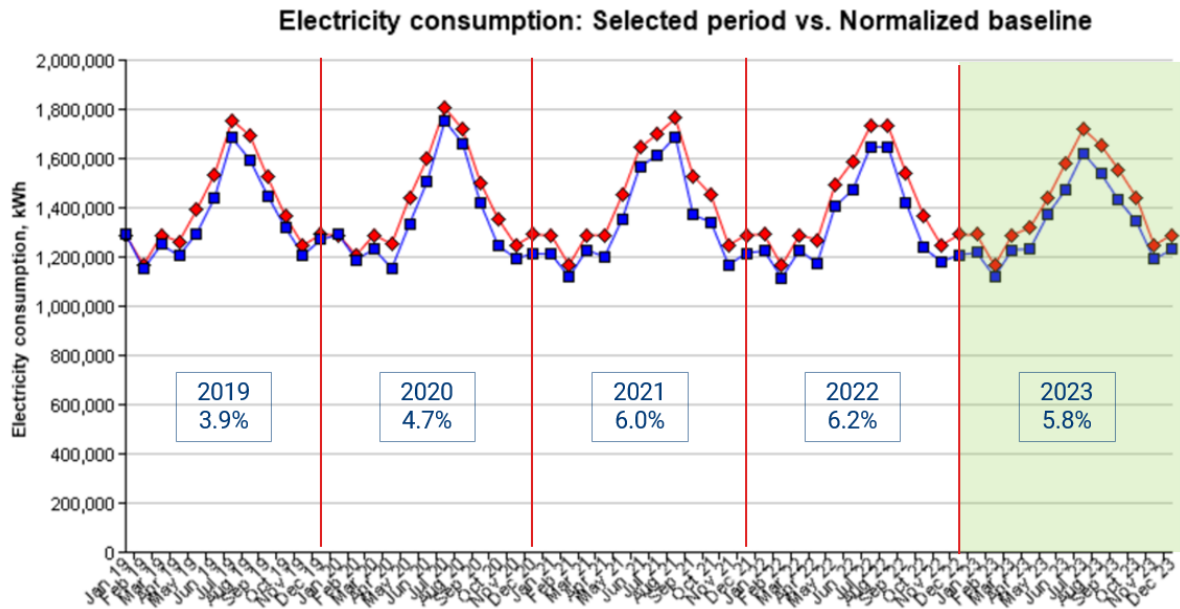


Figure 1 Kitchener-Waterloo Campus: Electricity consumption (kWh) in 2019-2023 vs 2018 baseline

The natural gas trend in Figure 2 indicates minimal savings in 2019 followed by increases in 2020 through 2023. The 5-year cumulative increase was 261,975 m³ valued at \$86,452.

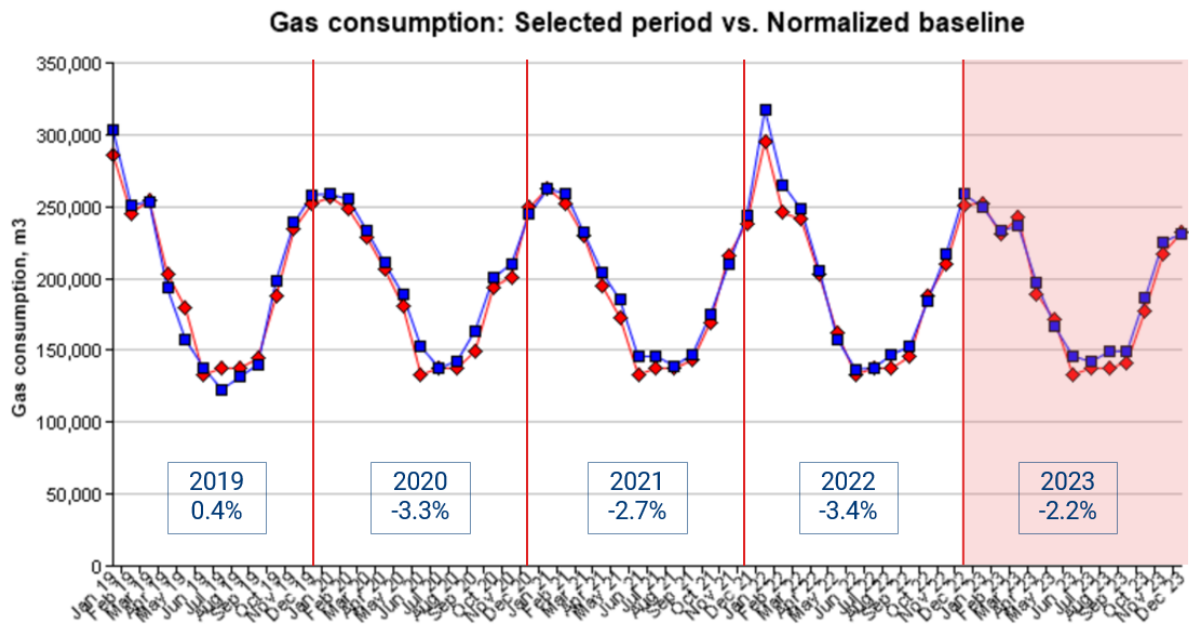


Figure 2 Kitchener-Waterloo Campus: Natural gas consumption (m³) in 2019-2023 vs 2018 baseline

The water use trend in Figure 3 shows significant increases across all five years. The 5-year cumulative increase was 211,351 m³ valued at \$908,809.

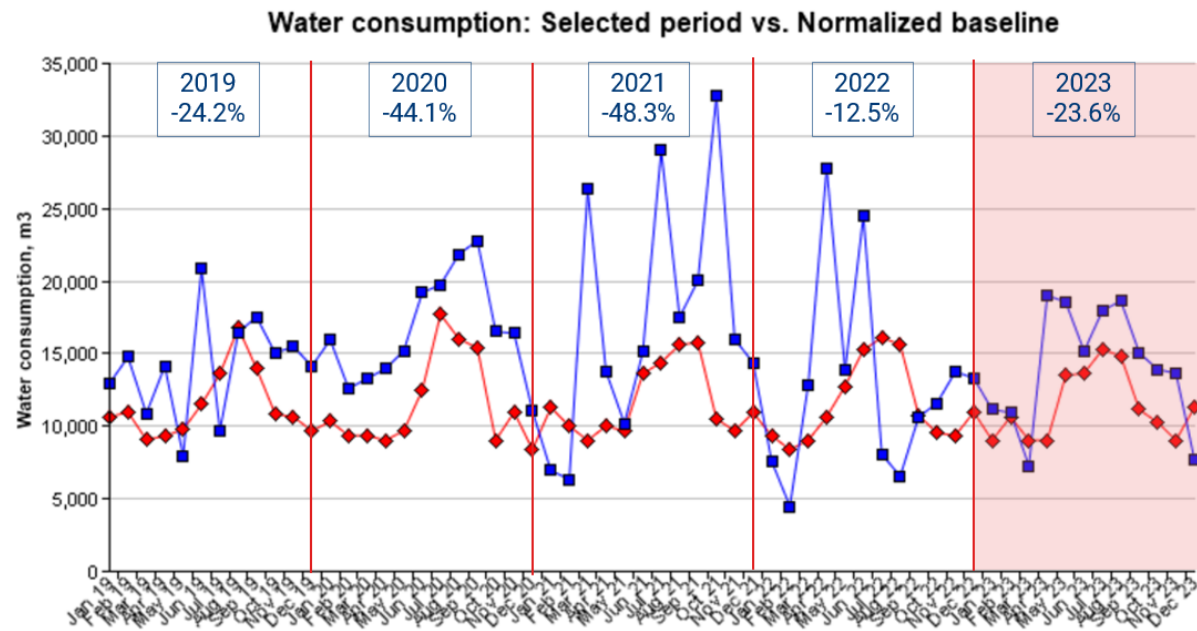


Figure 3 Kitchener-Waterloo Campus: Water consumption (m³) in 2019-2023 vs 2018 baseline

1.2 Freeport Campus

The 2019 target total energy savings was 21.1% for the Freeport Campus. Table 3 lists the hospital’s energy savings in the 2023 calendar year compared to the 2018 baseline, which resulted in net utility cost increase of \$96,249.

Table 3 Freeport Campus: Energy and water savings vs 2018 baseline

	2019 Plan Target savings				Actual savings (2023 vs 2018 baseline) ²			
	Units	%	\$	GHG (tonnes eCO ₂)	Units	%	\$	GHG (tonnes eCO ₂)
Electricity (kWh)	584,412	10.6%	\$87,662	12	-205,787	-3.8%	-\$32,926	-6
Natural Gas (m³)	198,950	29.2%	\$59,685	381	-127,310	-20.3%	-\$42,012	-244
Total Energy (ekWh)	2,643,539	21.1%	\$147,347	393	-1,523,447	-12.8%	-\$74,938	-250
Water (m³)	-	-	-	-	-4,956	-16.3%	-\$21,311	-1
Total			\$147,347	393			-\$96,249	-251

² Using 2024 utility rates: Electricity \$0.16/kWh, gas \$0.33/m³, water \$4.30/m³.

As shown in Figure 4 electricity consumption between 2019 to 2023 had increases in each of the 5 years, although 2023 shows an improvement over the previous two years. The 5-year cumulative increase was 1,294,432 kWh worth \$207,109.

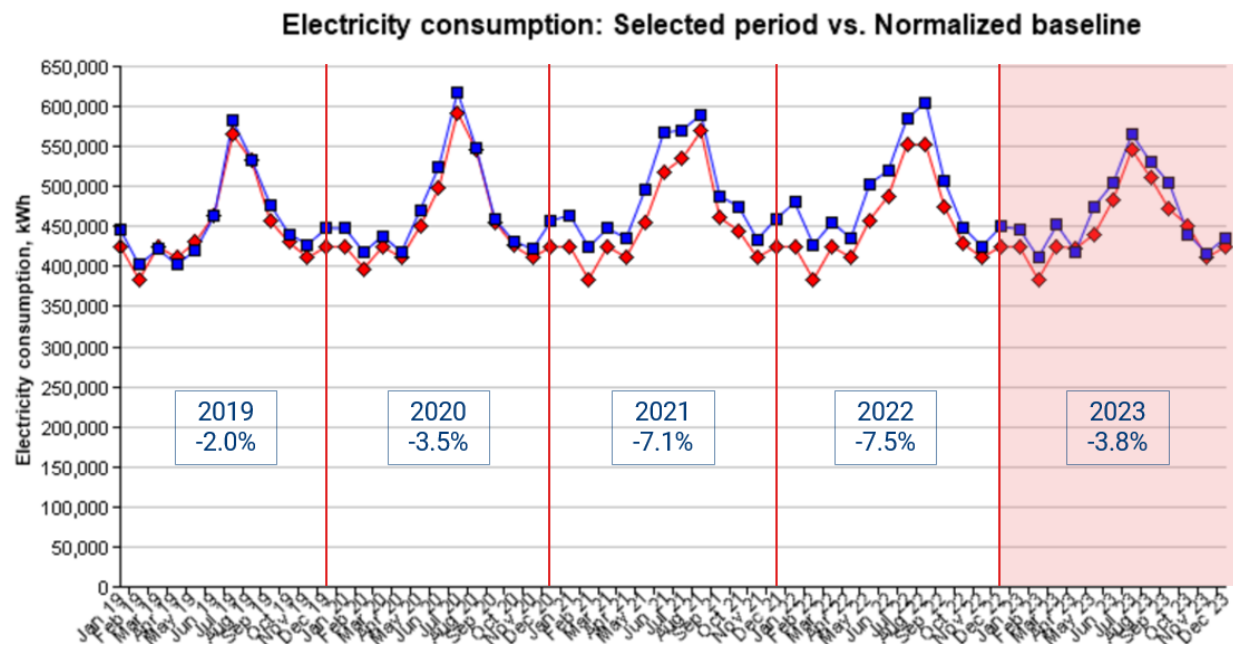


Figure 4 Freeport Campus: Electricity consumption (kWh) in 2019-2023 vs 2018 baseline

Natural gas consumption presented in Figure 5 shows substantial increases in 2019 through 2023. The 5-year cumulative increase was 473,050 m³ valued at \$156,107.

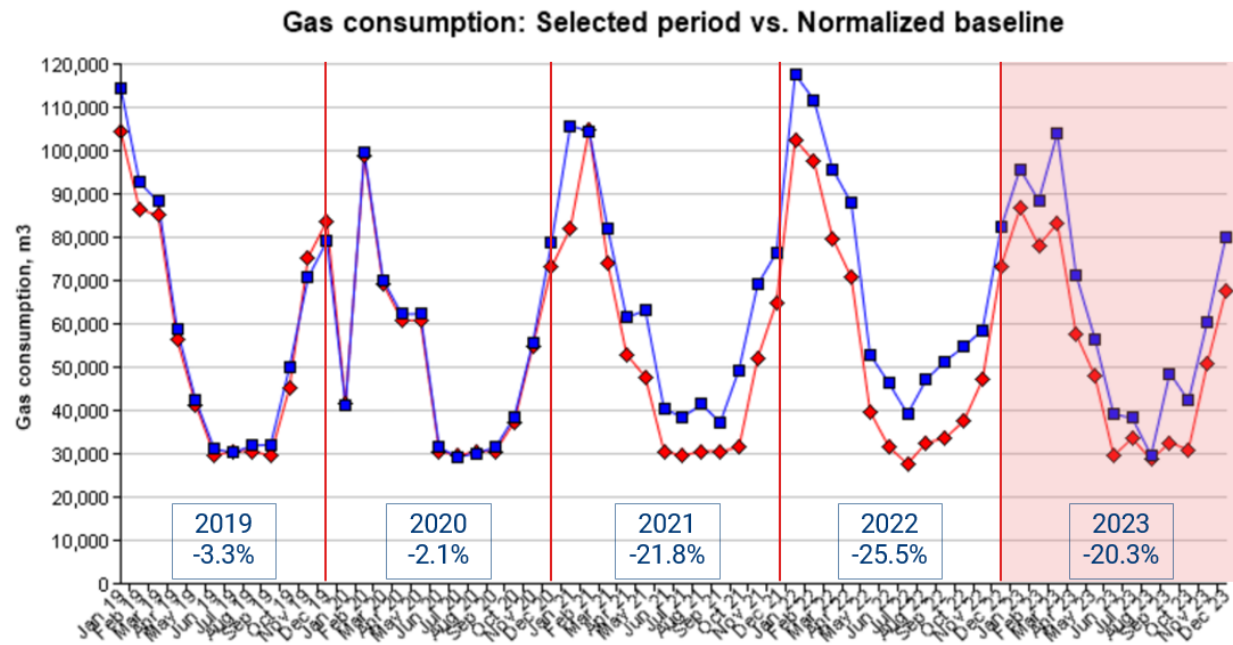


Figure 5 Freeport Campus: Natural gas consumption (m³) in 2019-2023 vs 2018 baseline

Water consumption presented in Figure 5 shows savings in 2019, followed by significant savings in 2020 through 2023. The 5-year cumulative increase was 10,841 m³ valued at \$46,616.

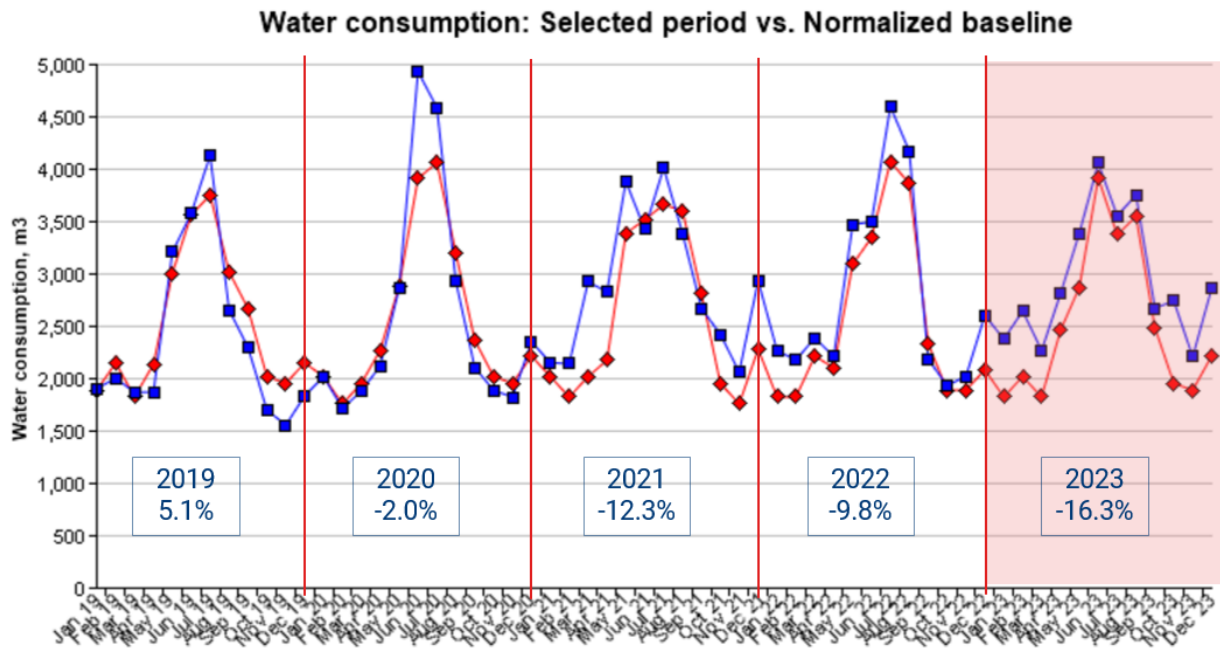


Figure 6 Freeport Campus: Water consumption (m³) in 2019-2023 vs 2018 baseline

2. Measures implemented in 2019-2023

The following are the energy efficiency measures proposed in our 2019 ECDM plan. Due to other hospital priorities, we were unable to complete all of these proposed projects during this period.

- Ventilation - Testing and air balancing and refurbishment
- Building Automation – System upgrade
- Heating Plant – Testing and design brief (Kitchener-Waterloo Campus only)
- Heating Plant – Optimize condensing tower loop (Kitchener-Waterloo Campus only)
- Heating Plant – Heat recovery chiller (Kitchener-Waterloo Campus only)
- Heating Plant – Testing and reconfiguration (Freeport Campus only)
- Heating Plant – Pump testing and install variable frequency drive (Freeport Campus only)
- Cooling Plant – Testing and optimization
- Building Envelope – Air sealing and re-insulation

The following projects were completed during this time period:

Kitchener-Waterloo Campus:

- Extensive lighting LED Retrofits
- Ventilation – Extensive scheduling
- Ventilation – Install variable frequency drives (80% completed)
- Building Automation – Extensive programming
- Heating Plant – Optimize condensing tower loop, with substantial water savings confirmed
- Building Envelope – Thermographic analysis completed for some roofs

Freeport Campus:

- Extensive lighting LED Retrofits
- Heating Plant – Boiler retrofit, with results pending
- Heating Plant – Limited pump testing and install variable frequency drives

3. Project successes and lessons learned

Over the past five years, there have been successes, along with lessons learned, which will help make future progress and have informed the Plan.

Some of the lessons learned include:

- Prioritization changed with COVID-19, as it impacted facility staff capacity and project implementation.
- Use of the hospital space intensified significantly with higher occupancy rates, making it more challenging to reduce energy use.
- Facility and operations staff are fully employed already with facility maintenance and upkeep. Any new projects should be straightforward and take into account staffing realities.
- With an increased need for resilience in the face of climate change related air quality issues, proposed ventilation system alterations will have greater focus on control of air flows and pressurization in line with the latest CSA regulations.

4. Renewable Energy Generation

Grand River has a small solar installation of 10 kW. It feeds into the hospital's MCC to reduce energy use.

Part 3: The plan for the next 5 years (2024-2029)

Grand River has potential to improve the energy efficiency of its hospitals. The Kitchener-Waterloo Campus is already within the top-quartile in the Greening Health Care energy efficiency benchmark charts, while the Freeport Campus is slightly below. The targeted energy use reduction is 1% reduction every year for a total of 5.0% and 2% reduction every year for a total of 10.2%, for Kitchener-Waterloo Campus and Freeport Campus respectively by 2029 compared with the 2023 baseline. The projects and measures described below are designed to achieve this goal along with utility cost savings worth approximately \$282,906/year at 2024 rates and GHG emissions reduction of 423 tonnes eCO₂/year.

1. 2023 energy and water use

Table 4 below presents the 2023 baseline energy and water use, costs, and emissions for both Grand River campuses.

Table 4 Grand River 2023 energy and water use

Site	Energy Type	2023 Use	2023 Costs (\$)	Greenhouse Gas Emissions (tonnes eCO ₂)
Kitchener-Waterloo Campus	Electricity	16,014,769 kWh	\$2,402,215	577
	Thermal	2,320,916 m ³	\$766,642	4,458
	Water	174,973 m ³	\$787,379	2
Freeport Campus	Electricity	5,594,326 kWh	\$839,149	201
	Thermal	763,661 m ³	\$252,251	1,467
	Water	35,773	\$160,979	0
Total	Electricity	21,609,095 kWh	\$3,241,364	778
	Thermal	3,084,577 m ³	\$1,018,893	5,925
	Water	210,746 m ³	\$948,358	2

2. Energy and water intensity benchmarks and targets

Greening Health Care sets energy and water intensity targets for its 69 member hospitals based on the average of top-quartile performance of comparable buildings in the Greening Health Care database and adjusted for weather and material site specific variables. Top-quartile is considered good practice, requiring no special technology, just consistent application of good design and operational practices which are already in wide use. Figure 7 and Figure 8 show the relative energy intensity of the Kitchener-Waterloo Campus and Freeport Campus respectively, in 2018, 2023 and at the target 2029 performance level, which is the goal for the Plan.

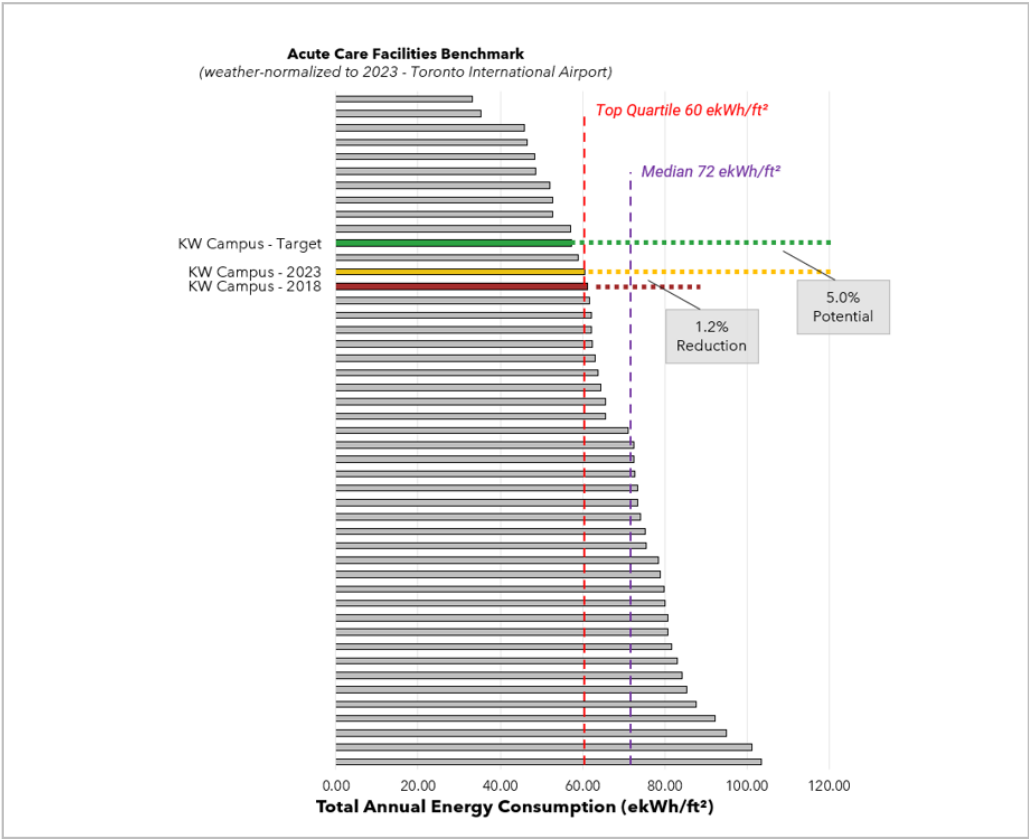


Figure 7 Annual energy intensity benchmarks for 2018, 2023, and 2029 target for Kitchener-Waterloo Campus

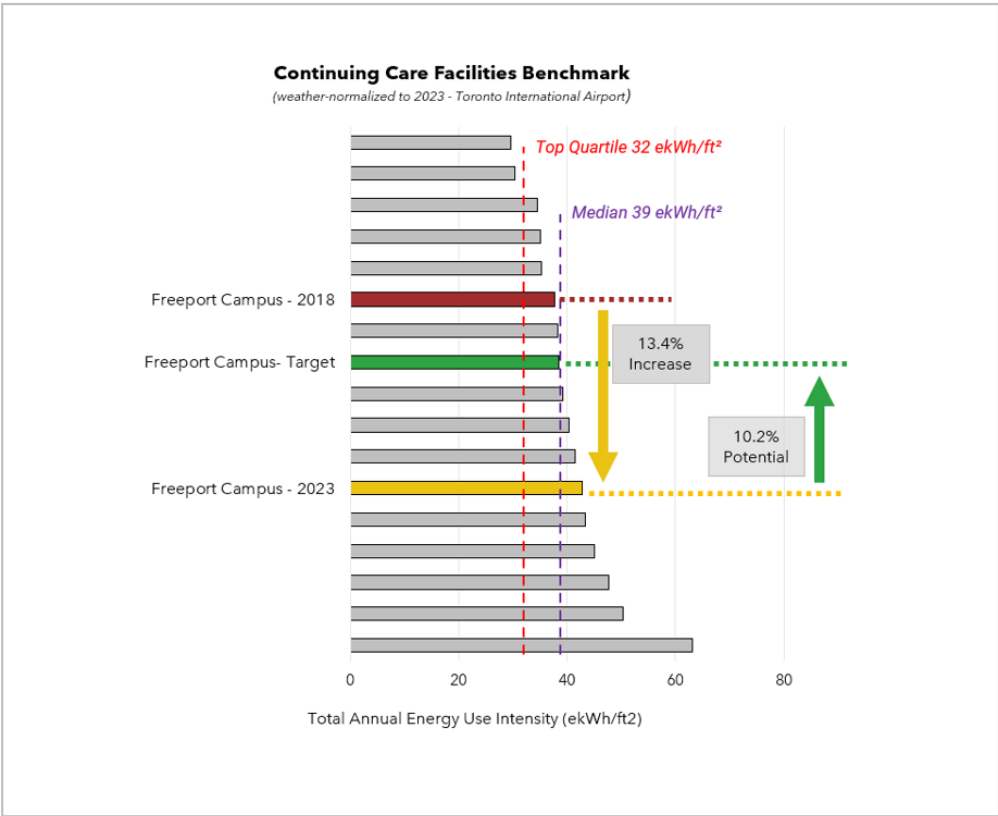


Figure 8 Annual energy intensity benchmarks for 2018, 2023, and 2029 target for Freeport Campus

Table 5 below presents Grand River’s current and target energy intensities once the measures included in this plan are implemented. The energy intensities are broken down by energy components, which indicates where the greatest savings are to be found and helps direct efforts to the building systems with the biggest opportunities. The energy components and associated potential opportunities for savings are as follows:

- Base electricity systems consist of fans, pumps, equipment, and lighting. The savings potential lies mostly in fans and pumps.
- Electric cooling is air conditioning plant and equipment, with some further savings potential in how the equipment is controlled.
- Base thermal energy is primarily used for reheat in ventilation systems, along with domestic hot water and kitchens and heating distribution losses. Optimization measures will help reduce base thermal energy use.
- Heating thermal systems are space and ventilation heating and humidification, with further targeted savings potential through improved control of ventilation and scheduling optimization.

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Table 5 Hospital energy and water targets

Site	Energy Component	Energy Usage Intensity (ekWh/ft ²)		Annual Savings Potential	
		Actual	Target	%	\$
Kitchener-Waterloo Campus	Base Electricity	21.9	20.5	6.1%	\$141,615
	Electric Cooling	2.3	2.2	4.9%	\$12,080
	Base Thermal	27.4	25.9	5.8%	\$33,422
	Heating Thermal	8.9	8.9	0.0%	\$0
	Total Energy	60.5	57.4	5.0%	-
	Water (liters/ft ²)	264.1	264.1	0.0%	\$0
	Total				\$187,116
Freeport Campus	Base Electricity	16.5	15.4	6.7%	\$56,234
	Electric Cooling	1.2	1.1	14.1%	\$8,721
	Base Thermal	13.8	12.1	11.8%	\$16,269
	Heating Thermal	11.3	9.8	12.8%	\$14,566
	Total Energy	42.8	38.4	10.2%	-
	Water (liters/ft ²)	113.2	113.2	0.0%	\$0
	Total				\$95,790

3. Energy efficiency measures

Table 6 and Table 7 summarize the proposed energy efficiency measures for each site together with their estimated costs, savings, and payback. No water efficiency measures are recommended at this time, as both sites have seen water savings and are meeting the water target. The energy efficiency measures are described in more detail in the following section.

Table 6 Energy efficiency projects summary – Kitchener-Waterloo Campus

Measures	Estimated Costs		Savings			Incentives	Payback (with incentives)	GHG emissions reductions (tonnes eCO ₂ /year)
Ventilation								
Schedule air handling units	\$82,500	\$407,500	759,113 kWh	31,162 m³	\$131,742	\$83,702	2.5	87
Canadian Standards Association's air change rates validation	\$97,500							
Testing and re-balancing	\$127,500							
Outside air percentage % control and optimization	\$45,000							
Optimize control sequence of operations including reheat operations	\$55,000							
Heating plant								
Boiler economizer testing, optimization and summer operations integration	\$29,000	\$115,000	71,378 kWh	46,744 m³	\$26,846	\$18,824	3.6	92
Review heating plant operations and implement new optimized sequences	\$47,000							
Pump testing and sequences optimization	\$39,000							
Cooling Plant								
Testing, balancing and optimization of cooling plant operations	\$55,000	\$55,000	58,722 kWh	23,372 m³	\$17,108	\$11,715	2.5	47
Lighting								
Upgrade to LED lighting	\$60,000		71,378 kWh	0 m³	\$11,421	\$7,138	4.6	3
Total	\$637,500		960,592 kWh	101,278 m³	\$187,116	\$121,379	2.8	229

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Table 7 Energy efficiency projects summary – Freeport Campus

Measures	Estimated Costs		Savings			Incentives	Payback (with incentives)	GHG emissions reductions (tonnes eCO ₂ /year)
Ventilation								
Install variable frequency drives and associated controls	\$48,000	\$180,750	240,955 kWh	66,497 m³	\$60,497	\$40,720	2.3	136
Schedule air handling units	\$16,500							
Canadian Standards Association air change rates validation	\$31,250							
Testing and re-balancing	\$35,000							
Outside air percentage % control and optimization	\$30,000							
Optimize control sequence of operations	\$20,000							
Building Automation and Lighting Controls								
System upgrade	\$25,000	\$60,000	24,760 kWh	7,452 m³	\$6,421	\$4,339	8.7	15
Re-programming / trend logs archiving	\$35,000							
Heating plant								
Heating plant optimization and review new controls operations	\$27,000	\$59,000	46,861 kWh	19,490 m³	\$13,930	\$9,559	3.5	39
Add new variable frequency drive on heating pumps	\$21,000							
Pump testing and upgrades	\$6,000							
Manually close isolation valves on air handling unit heating coils	\$5,000							
Cooling Plant								
Testing and balancing	\$12,500	\$31,000	46,532 kWh	0 m³	\$7,445	\$4,653	3.5	2
Cooling plant upgrades and optimization	\$18,500							
Lighting								
Continue replacing T8s for LED	\$50,000		46,861 kWh	0 m³	\$7,498	\$4,686	6.0	2
Total	\$380,750		405,969 kWh	93,439 m³	\$95,790	\$63,957	3.3	194

3.1 Ventilation system

- Kitchener-Waterloo Campus and Freeport Campus:
 - Optimize air handling unit (AHU) scheduling to align operating hours with departmental hours. For AHUs serving 24/7 zones, schedule variable air volume boxes in unoccupied zones to match space occupancy and adjust the AHU fan based on static pressure sensor feedback. Ensure AHU variable frequency drive (VFD) speed aligns with expected unoccupied turn-down levels during off-hours.
 - Test space air change rates to ensure compliance with Canadian Standards Association's recommended levels. Reduce air change rates in areas where over-ventilation is identified.
 - Test and rebalance air handling unit airflows, refurbishing ductwork, and dampers as necessary to enhance system performance and resiliency.
 - Test AHU outside air percentages, comparing them against CSA Z317.2 requirements. Then, adjust damper positions and/or balance return and supply air to ensure airflow aligns with CSA Z317.2 recommendations.
 - Optimize control sequence of operations including reheat operations.
- Freeport Campus only:
 - Install VFDs and associated controls

3.2 Building Automation System and Lighting Controls

- Freeport Campus only:
 - System upgrade/expansion – retrofit control devices including actuators, control valves and sensors as needed to achieve savings.
 - Re-programming – update BAS programming to implement new optimized sequences of operations.

3.3 Heating Plant

- Kitchener-Waterloo Campus and Freeport Campus:
 - Pump testing and upgrades: test pumps flow and head requirements, match with design and field test static pressure setpoints to reduce overall system pressure drops.
- Kitchener-Waterloo Campus only:
 - Boiler economizer testing, optimization and summer operations integration.
 - Review heating plant operations and implement new optimized sequences.
- Freeport Campus only:
 - Heating plant optimization and review new controls operations.
 - Add new VFD on heating pumps.

- Manually close isolation valves on AHU heating coils.

3.4 Cooling Plant

- Kitchener-Waterloo Campus and Freeport Campus:
 - Testing, balancing and optimization of cooling plant operations.
- Freeport Campus only:
 - Cooling plant upgrades and optimization.

3.5 Lighting

- Kitchener-Waterloo Campus and Freeport Campus:
 - Upgrade to LED. Upgrade the existing fluorescent fixtures to energy-efficient LED fixtures and add lighting controls where possible. This includes installing occupancy sensors to automatically turn lights on or off based on room occupancy, implementing daylight sensors to adjust lighting levels based on the amount of natural light available, integrating dimming capabilities for adjustable lighting levels, and utilizing networked control systems for centralized management and automation of the lighting (where applicable).

4 Organization role and impact

From the onset of the COVID-19 pandemic, Grand River has been challenged on numerous fronts, with increased occupancy and stretched staff capacity. Support for day-to-day operations has been the priority. As a result, this plan focuses on straightforward, small scale operational improvements that can be mostly implemented by current staff and service contractors at the Kitchener-Waterloo Campus and would need additional support at the Freeport Campus. Measures have been designed to minimize disruption of hospital operations. This approach provides the most likely path to successful implementation and improved facility performance.