RUNNYMEDE
HEALTHCARE CENTRE

June 2024

Runnymede Healthcare Centre 2024-2029 Energy Conservation and Demand Management Plan

Management sign-off

I confirm that Runnymede Healthcare Centre's senior management has reviewed and approved this 2024 - 2029 Energy Conservation and Demand Management Plan.

Signature: 

Name: Kevin Fernandes Date: June 26th 2024

Title: Chief Technology Officer, Information Services

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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Table of Contents

Part 1: Introduction

1 About Runnymede Healthcare Centre (RHC)

RHC is a continuing-care facility converted from a 1945 school building in 2009, consisting of one basement level, five above-grade floors including mechanical penthouse. With a total area of 179,070 square feet, RHC houses 206 beds and 500+ staff. The following development project is in progress:

- Long-term care building construction on RHC property that began in 2020 and is currently ongoing with a completion date of January 2025.

RHC has a long history of energy conservation, with support for energy conservation projects and a focus on the total life cycle costs of equipment replacements.

2 Planning horizon and scope

The horizon for this plan is the 5-year period from 2024 to 2029, prioritizing operational improvements which are manageable within this period.

3 Other sustainability achievements

RHC aims to be a leader in energy efficiency and corporate sustainability among our peers. Through our participation in Greening Healthcare, we have achieved the 5% Club Award, Leadership Award, and Rising Star Award, and been recognized by the Canadian College of Health Leaders for our achievements.

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

1 Energy and water progress compared to targets

In the previously approved ECDM plan posted July 1, 2019, RHC set a goal to reduce total energy (electricity and natural gas) cost by 28% over the plan's 5-year term.

Table 1 presents actual results achieved. A net total of 0.3% utility use reduction (0.9% electricity savings, 0.1% natural gas increase, and 0.3% water savings) were recorded in 2023 compared to our 2018 weather-normalized baseline, lowering 2023 utility costs by approximately $12,341.

Table 1 Electricity, gas, and water cost and GHG emissions savings (target vs actual)

	2019 Plan Target savings				**Actual savings (2023 vs 2018 baseline)[1]**			
	Units	**%**	**$**	**GHG (tonnes eCO_2)**	**Units**	**%**	**$**	**GHG (tonnes eCO_2)**
Electricity (kWh)	377,684	12.0%	$56,653	15	25,594	0.9%	$4,095	1
Natural Gas (m^3)	188,497	37.0%	$62,204	361	-584	-0.1%	-$193	-1
Total Energy (ekWh)	**2,328,628**	**27.7%**	**-**	**-**	**19,549**	**0.3%**	**-**	**-**
Water (m^3)	1,849	8.0%	$7,378	0	1,963	8.4%	$8,439	0
Total			**$126,235**	**376**		**0.3%**	**$12,341**	**0**

Monthly savings graphs help identify the periods of recorded savings or increases. On the graphs in Figure 1, Figure 2 and Figure 3, 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 consumption in each of the 5 years. The 5-year cumulative savings were 98,734 kWh valued at $15,797.

[1] Using 2024 utility rates: Electricity $0.16/kWh, gas $0.33/$m^3$, water $4.30/$m^3$.

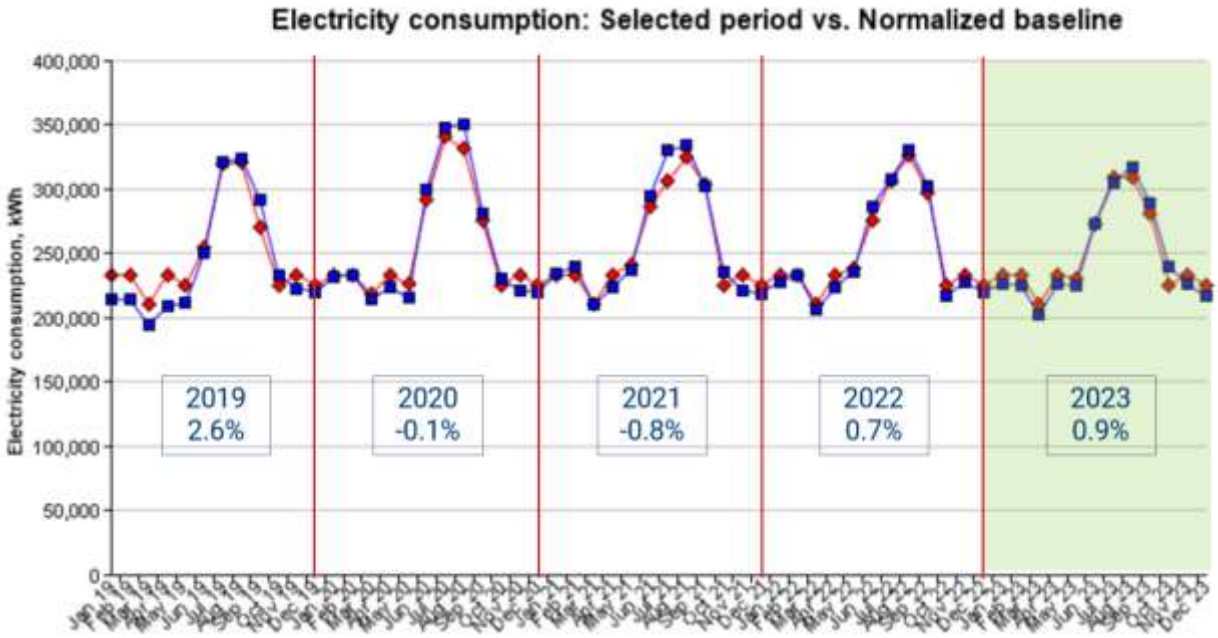

Figure 1 Electricity usage (kWh) in 2019-2023 compared to 2018 baseline

The natural gas trend in Figure 2**Error! Reference source not found.** also indicates increases through each of the five previous years, with the exception of 2022. The 5-year cumulative increase was 157,729 m³ valued at $52,051.

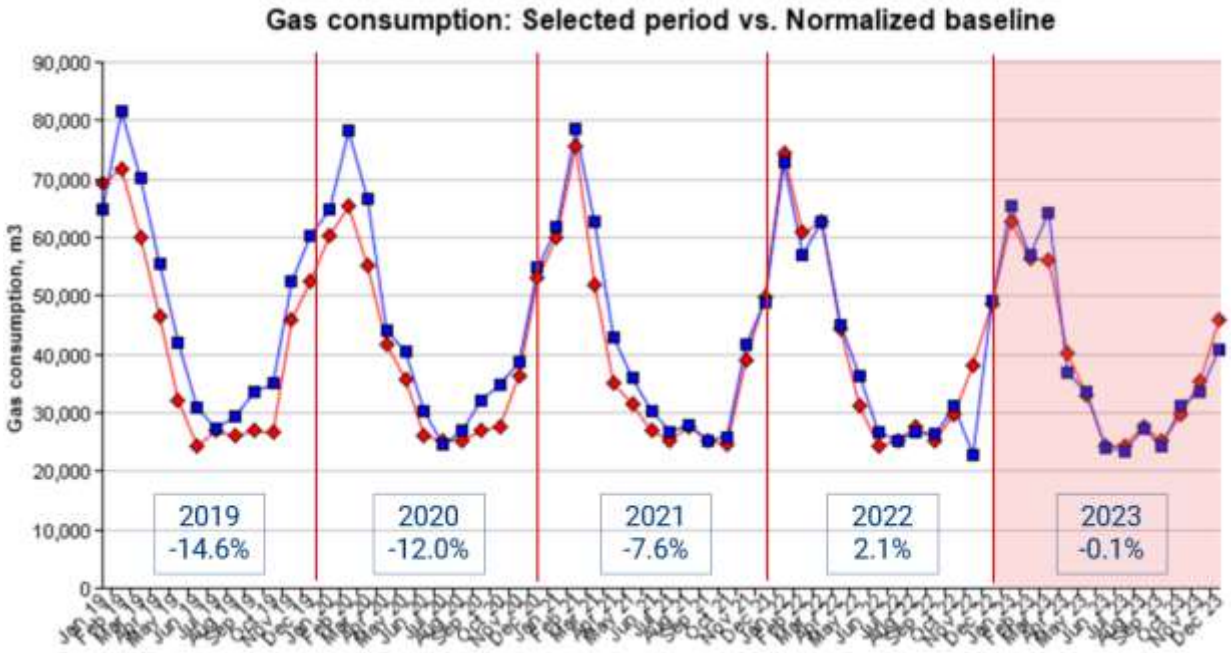

Figure 2 Gas usage (m^3) in 2019-2023 compared to 2018 baseline

The water use trend in Figure 3 shows moderate increases in 2019 and 2020, followed by savings in the next 3 years. These savings are attributed to the shut down of water due to construction. The 5-year cumulative improvement was 1,544 m³ valued at $6,639.

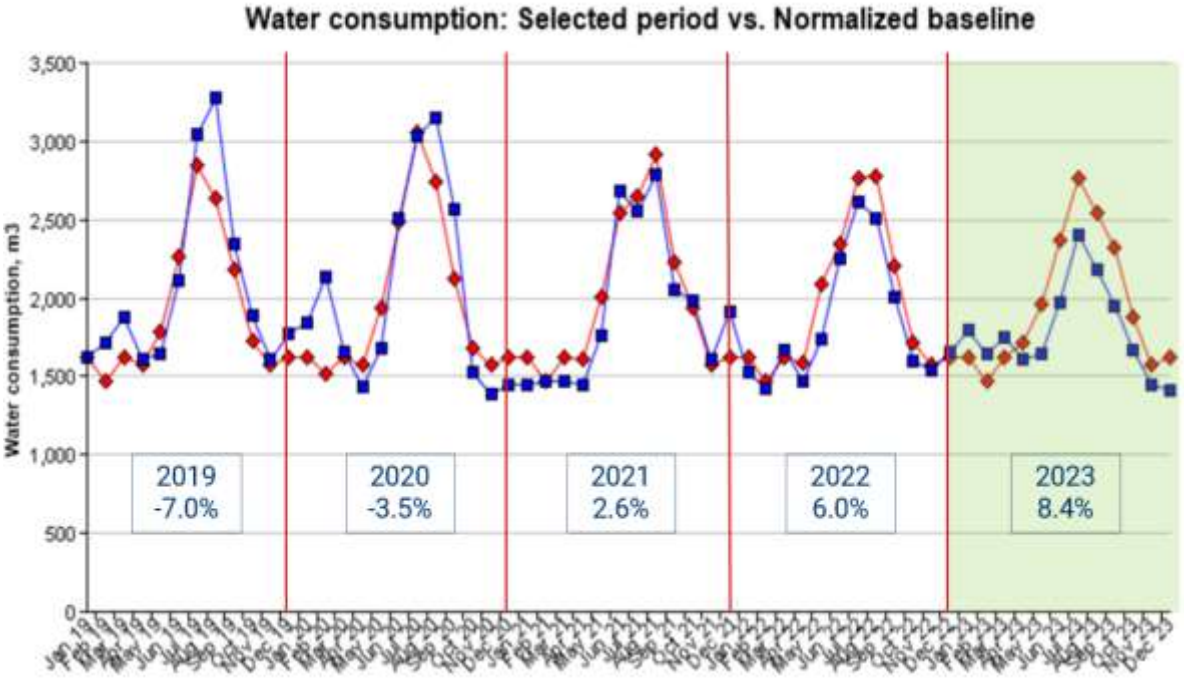

Figure 3 Water usage (m³) in 2019-2023 compared to 2018 baseline

2 2019 measures

The following measures were identified in the 2019 ECDM Plan, however, due to COVID-19 and site construction, they were not implemented.

2.1 AHU5 and AHU6 optimization

- Rebalance and thermal wheel optimization

2.2 Chiller control logic

- Automate controls logic and incorporate peak efficiency calculations and temperature reset

2.3 Base thermal usage reduction

- Radiant loop shut off
- Boiler plant and controls optimization

2.4 Water fixture upgrades

- Washroom and shower aerators

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

RHC is aiming for a total energy reduction of 7.9% by 2029 compared with the 2023 baseline. The projects described below are together designed to achieve this goal along with utility cost savings worth $24,984/year at 2024 rates and GHG emissions reduction of 108 tonnes eCO_2/year.

1 2023 energy and water use baseline

Table 2 below presents 2023 energy and water use, costs and emissions for RHC.

Table 2 RHC's 2023 energy and water use

Utility	2023 Consumption	2023 Cost	GHG Emission (tonnes eCO_2)
Electricity	2,974,827 kWh	$446,224	195
Gas	460,825 m^3	$152,219	885
Total Energy	**7,744,361 ekWh**	**$598,443**	**1,080**
Water	21,623 l/ft^2	$97,302	0
Total	**-**	**$695,746**	**1,080**

2 Benchmark positioning and targets

Greening Health Care sets good practice energy and water targets for its 69 member hospitals based on top-quartile performance of comparable buildings in the Greening Health Care database and adjusted for weather and material site specific variables. The figure below shows RHC positioning in 2018, 2023 and at the target performance level which is the goal for the Plan.

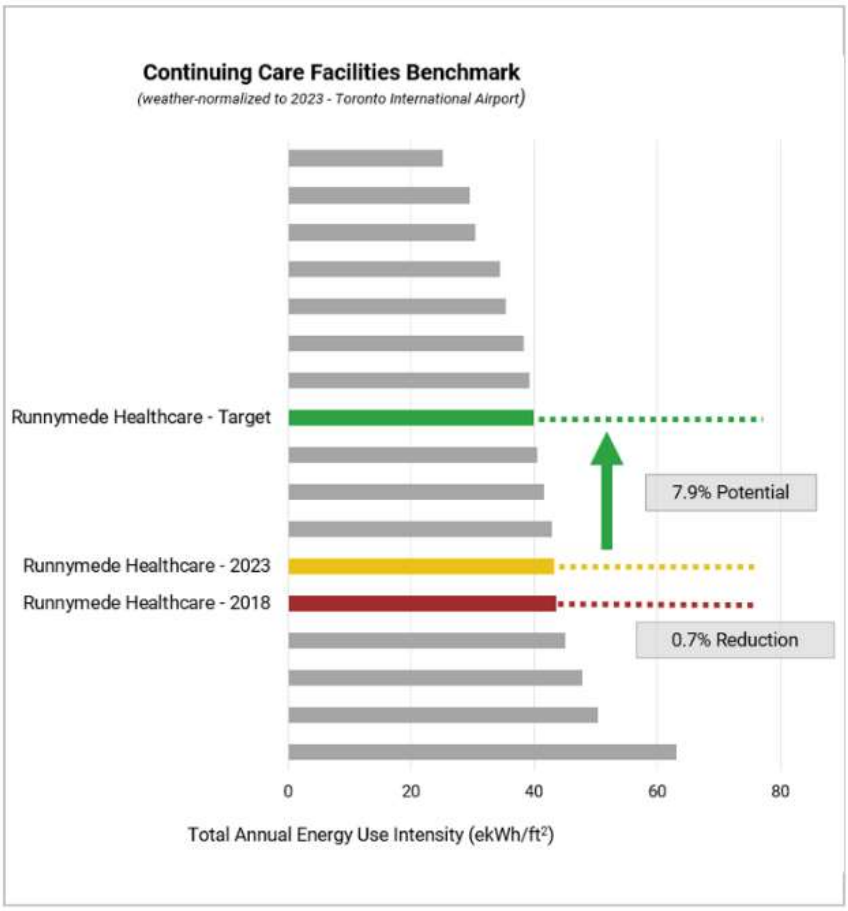

Figure 4 2023 total energy and intensity benchmark chart

The table below presents RHC actual energy intensities and energy intensity targets with overall savings potential of 7.9%. Achievement of these targets will result in $24,984 in annual utility cost savings.

The targeted savings potential is further separated by energy components, which help direct efforts to the building systems with the biggest opportunities:

- Base electricity systems consist of fans, pumps, equipment and lighting with modest savings potential;
- Cooling electricity systems are chiller plants and local AC units with modest savings potential;
- Base thermal systems consist of domestic hot water, sterilizers, kitchens and reheat in ventilation systems with medium savings potential;
- Heating thermal systems consist of space and ventilation heating and humidification with medium savings potential.

Table 3 Hospital energy and water targets

Energy Component	Energy Usage Intensity (ekWh/ft^2)		Annual Savings Potential	
	Actual	Target	%	$
Base Electricity	14.8	14.6	1.4%	$5,728
Electric Cooling	1.8	1.8	2.1%	$1,105
Base Thermal	17.3	15.4	10.9%	$10,790
Heating Thermal	9.4	8.1	13.8%	$7,360
Total Energy	**43.3**	**39.9**	7.9%	**$24,984**
Water (liters/ft^2)	120.8	120.8	0%	-

3 Energy efficiency measures

Table 4 summarizes the proposed efficiency measures for the site together with the estimated costs, savings, and payback. The measures are described in more detail in the following section.

Table 4 Energy efficiency projects summary

Measures	Costs	Savings	Incentives	Payback (with incentives)	GHG emissions reductions (tonnes eCO_2/year)
Ventilation					
Air-handling unit balancing, optimization of scheduling	$15,000	$6,530	$4,547	1.9	50
Test and optimize heat wheels on air handling units #5 and 6	$15,000	$4,907	$3,717		
Heating plant					
Field inspect & heating pumps differential pressure setpoint and reprogram (P5, P6, P9 and P10)	$25,000	$4,964	$3,254	4.4	8
Steam boilers control optimization	$12,244	$8,583	$6,502	0.7	50
Install O2 trim on domestic hot water boilers	$24,000	$2,913	$2,207	7.5	17
Total	**$91,244**	**$27,898**	**$20,229**	**2.5**	**125**

Notes:

1. *No lighting or water measures are considered for this ECDM Plan.*

3.1 Ventilation

- Scheduling: 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 speed aligns with expected unoccupied turn-down levels during off-hours.
- Test and optimize heat wheels on AHUs #5 and #6

3.2 Heating Plant

- Field inspect and establish the heating pumps differential pressure setpoint and reprogram (P5, P6, P9 and P10).
- Steam boilers control optimization – steam & hot water boiler controllers were upgraded recently however were not fully integrated with building automation system and limited through BAS to control ON/OFF & Sequence. Steam boiler scheduling will be programmed to align with operational hours. This measure includes integrating the boilers to BAS and utilizing the full potential of the new controllers to avoid unnecessary scheduling during low load conditions.
- Install O2 Trim on Domestic Hot Water Boilers – controlling the air combustion ratio using O2 trim will improve overall boiler efficiency and reduce gas consumption.

4 Management and organizational alignment

With the ongoing construction at the Runnymede site, staff have been focusing on maintaining an optimal building environment under these conditions. This plan focuses on straightforward, small scale operational improvements that can be implemented by current staff. This approach provides the most likely path to successful implementation and improved facility performance.