HURON PERTH HEALTHCARE ALLIANCE

ENERGY CONSERVATION AND DEMAND MANAGEMENT PLAN

2024-2029

HURON PERTH HEALTHCARE ALLIANCE

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EXECUTIVE SUMMARY

The Ontario Government is committed to helping public agencies better understand and manage their energy consumption. As part of this commitment, Ontario Regulation 25/23 under the Electricity Act requires each public agency, including healthcare systems, to report energy consumption and greenhouse gas (GHG) emissions annually, to implement an Energy Conservation and Demand Management (ECDM) Plan, and to update its ECDM Plan every five years.

Huron Perth Healthcare Alliance is committed to the ECDM Plan outlined in this document to reduce its environmental impact. This ECDM Plan pertains to the following Huron Perth Healthcare Alliance sites: Stratford General Hospital (SGH), Seaforth Community Hospital (SCH), St. Marys Memorial Hospital (SMMH) and Clinton Public Hospital (CPH) and addresses the following objectives.

- **Baseline performance**: To document previous and current energy and GHG performance.
- **Energy conservation measures (ECMs)**: To document previous, current and proposed ECMs.
- **Energy and greenhouse gas (GHG) plan**: To establish 5-year energy and GHG performance targets and develop a road map to achieve those targets, as well as to achieve net zero by 2050.

Table 1 summarizes the annual energy and GHG performance for the baseline year of 2023.

Table 1: Huron Perth Healthcare Alliance 2023 energy consumption and GHG emissions summary

Utility	Unit	CPH	SCH	SMMH	SGH	Total
Electricity Consumption	[kWh]	826,969	957,944	1,016,104	2,276,412	5,077,429
Natural Gas Consumption	[m3]	94,874	127,222	91,312	3,165,404	3,478,812
GHG Emissions	[tCO2e]	220	288	222	6,185	6,915

Table 2 summarizes the goals that Huron Perth Healthcare Alliance plans to meet by 2029.

Table 2: Huron Perth Healthcare Alliance 2029 goals summary

Utility	Unit	CPH	SCH	SMMH	SGH	Total
Electricity Consumption Reduction	[kWh]	41,814	78,482	56,000	-7,214,959	-7,038,663
Electricity Consumption Reduction	[%]	5	8	6	-317	-139
Natural Gas Consumption Reduction	[m3]	17,131	27,397	27,182	2,170,996	2,242,706
Natural Gas Consumption Reduction	[%]	18	22	30	69	64
GHG Emissions Reduction	[tCO2e]	16	35	31	3,610	3,692
GHG Emissions Reduction	[%]	7	12	14	58	53

Table 3 summarizes the goals that Huron Perth Healthcare Alliance plans to meet by 2050.

Table 3: Huron Perth Healthcare Alliance 2050 goals summary

Utility	Unit	CPH	SCH	SMMH	SGH	Total
Electricity Consumption Reduction	[kWh]	-72,010	379,585	252,094	-7,183,333	-6,623,664
Electricity Consumption Reduction	[%]	-9	40	25	-316	-130
Natural Gas Consumption Reduction	[m3]	60,895	102,384	76,830	2,182,207	2,422,316
Natural Gas Consumption Reduction	[%]	64	80	84	69	70
GHG Emissions Reduction	[tCO2e]	220	288	222	6,185	6,915
GHG Emissions Reduction	[%]	100	100	100	100	100

To paraphrase Tables 1, 2, and 3, Huron Perth Healthcare Alliance's 2029 and 2050 energy and GHG performance targets are as follows.

2029:

- **Electricity**: To limit total annual electricity consumption of all its facilities to 12,116,092 kWh.
- **Natural gas**: To limit total annual natural gas consumption of all its facilities to 1,236,106 m^3.
- **GHG emissions**: To limit total annual GHG emissions of all its facilities to 3,223 tCO_2e.

2050:

- **Electricity**: To limit total annual electricity consumption of all its facilities to 11,701,093 kWh.
- **Natural gas**: To limit total annual natural gas consumption of all its facilities to 1,056,496 m^3.
- **GHG emissions**: To limit total annual GHG emissions of all its facilities to 0 tCO_2e.

1 INTRODUCTION

1.1 Background

This is Huron Perth Healthcare Alliance's five-year Energy Conservation and Demand Management (ECDM) Plan, which has been developed in accordance with the requirements described in Ontario Regulation 25/23 under the Electricity Act.

This plan pertains to the following Huron Perth Healthcare Alliance sites: Stratford General Hospital (SGH), Seaforth Community Hospital (SCH), St. Marys Memorial Hospital (SMMH) and Clinton Public Hospital (CPH), which are depicted in Figure 1.

(a) Stratford General Hospital (SGH)

(b) Seaforth Community Hospital (SCH)

(c) St. Marys Memorial Hospital (SMMH)

(d) Clinton Public Hospital (CPH)

Figure 1: Huron Perth Healthcare Alliance sites

1.2 Objectives

In alignment with Ontario Regulation 25/23, the objectives of this ECDM Plan are as follows.

- **Baseline performance**: To document previous and current energy and GHG performance.
- **Energy conservation measures (ECMs)**: To document previous, current and proposed ECMs.
- **Energy and greenhouse gas (GHG) plan**: To establish 5-year energy and GHG performance targets and develop a road map to achieve those targets.

In addition, in alignment with current best practices, HPHA is targeting net zero GHG emissions by 2050. In this plan, a road map to achieve net zero by 2050 is also presented.

2 OVERALL

2.1 Baseline

2.1.1 Energy Consumption

Figure 2 summarizes the Huron Perth Healthcare Alliance's annual electricity and natural gas consumption from 2014 - 2023.

Annual electricity consumption from 2014 - 2016 is relatively constant, but decreases slightly in 2017 before dropping off significantly in 2018, and gradually increasing from 2020 to 2022. Annual natural gas consumption steadily decreases from 2014 - 2017 with a significant increase in 2018, with a gradual decrease from 2020 to 2022. These observations are a direct result of specific projects implemented at SGH which will be elaborated on in Section 3.

Figure 3 benchmarks Huron Perth Healthcare Alliance's facilities against other hospitals in Southern Ontario using 2019 data reported through the Broader Public Sectors (BPS) program. Huron Perth Healthcare Alliance's facilities compare favourably against other hospitals as they operate close to or below the median.

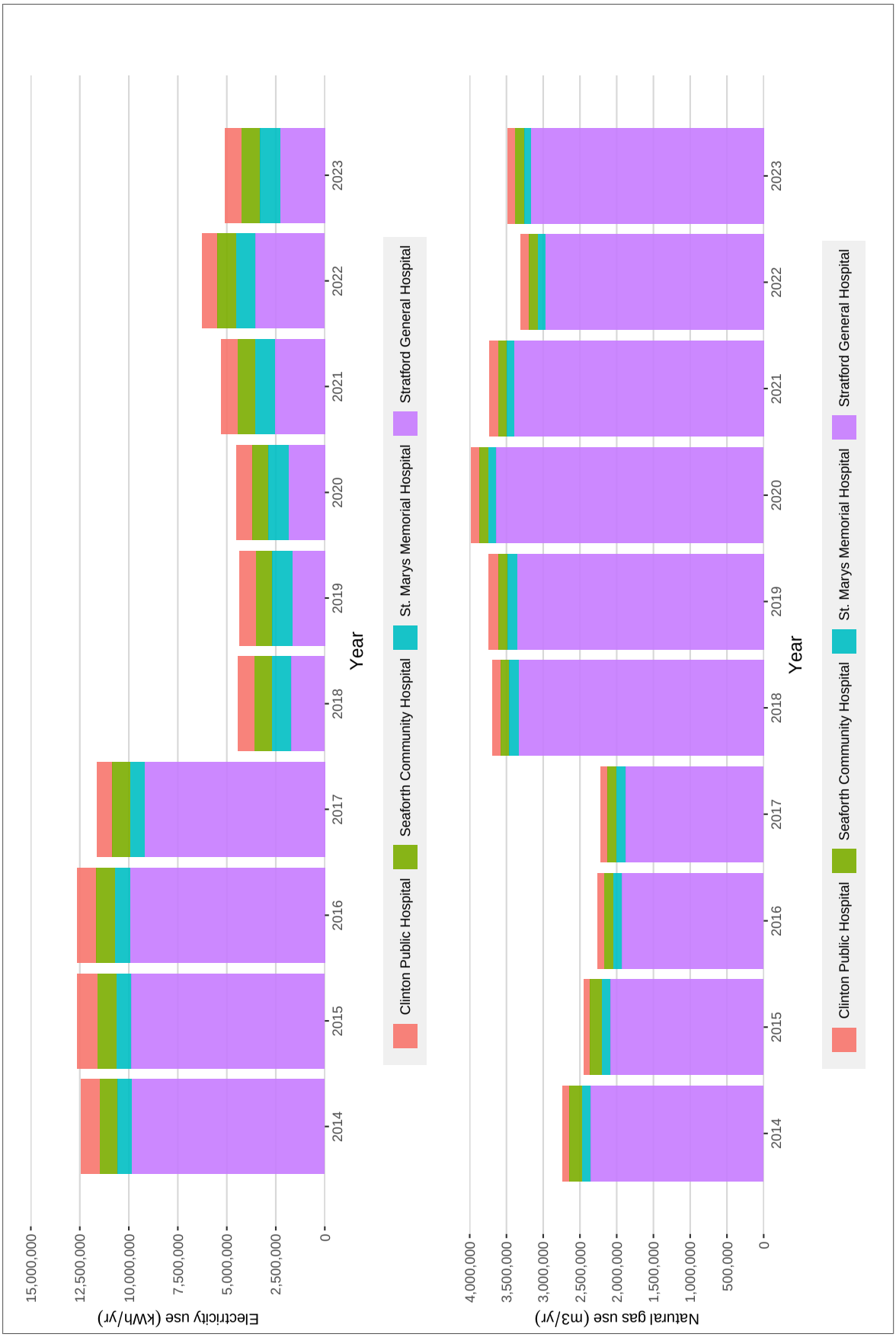


Figure 2: Annual electricity and natural gas consumption

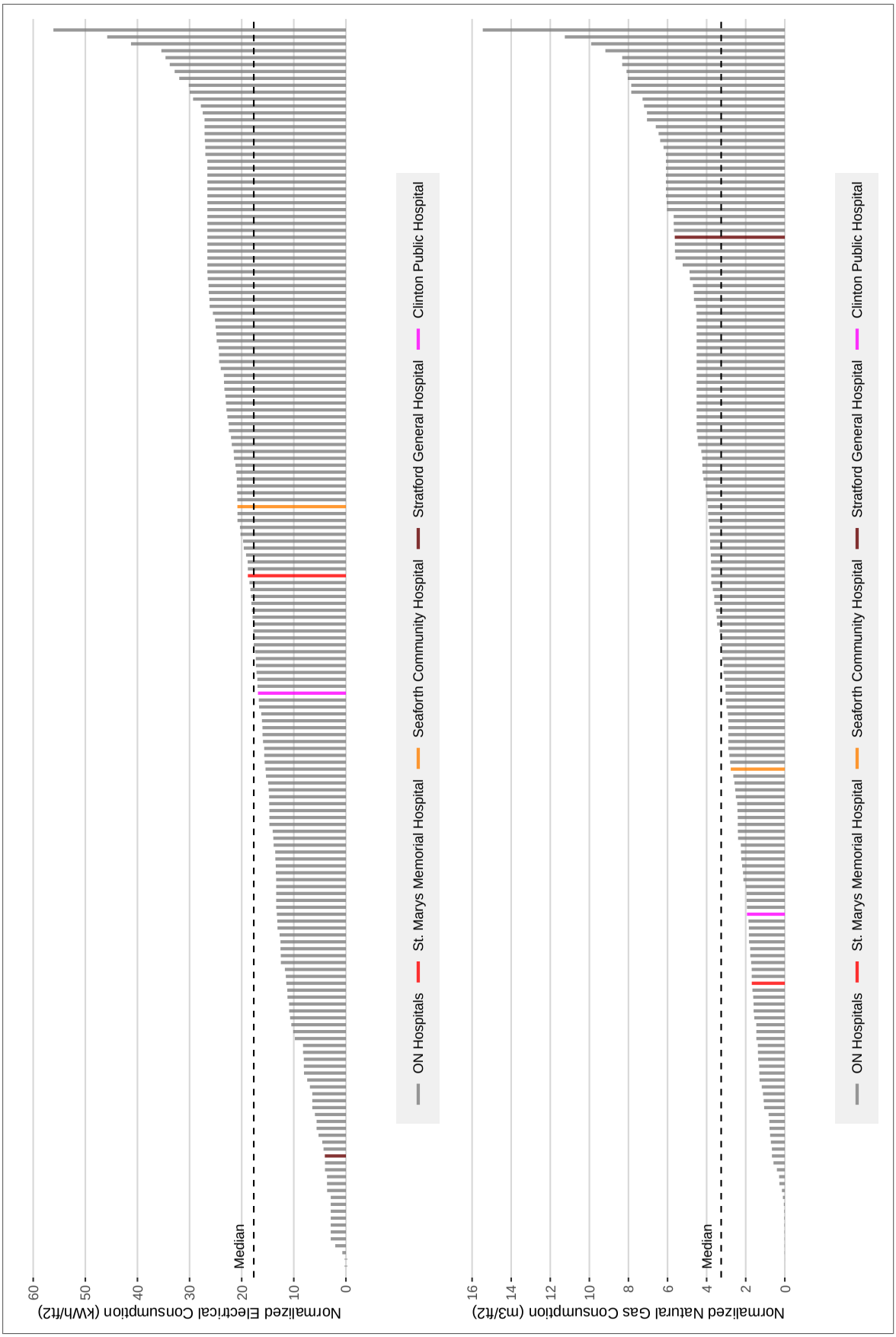


Figure 3: 2019 electricity and natural gas use intensity of Southern Ontario hospitals

2.1.2 GHG Emissions

GHG emissions are typically measured in metric tonnes of carbon dioxide (tCO2e). To illustrate, a typical passenger vehicle emits approximately 4.6 tCO2e per year. GHG emissions can be broken down into three categories - Scope 1, Scope 2, and Scope 3.

Scope 1 emissions are defined as direct emissions from sources owned or controlled by the organization. An example of this would be the emissions from the burning of natural gas or propane in on-site equipment. This is typically the second largest contributor to a facility's GHG emissions.

Scope 2 emissions are defined as indirect emissions from sources owned or controlled by the organization. An example of this would be the downstream emissions from electricity purchased from the grid for use in on-site equipment. This is typically the smallest contributor to a facility's GHG emissions.

Scope 3 emissions are defined as emissions from sources not owned or directly controlled by the organization. An example of this would be emissions from vehicles used in employee travel and commuting. Scope 3 emissions were not included in this inventory as it is difficult to quantify, and data is not readily available. However, this would typically be the largest contributor to a facility's GHG emissions.

Scope 1 and 2 GHG emission factors used for 2023 are summarized in Table 4.

Table 4: GHG emissions factor assumptions

Utility	Unit	Value
Scope 1	[gCO2e/m3]	1921
Scope 2	[gCO2e/kWh]	46

gCO2e/m3 indicates the metric grams of equivalent CO2 emissions per cubic meter of natural gas burned.
gCO2e/kWh indicates the average metric grams of equivalent CO2 emissions per kilowatthour of electricity consumed.

The GHG emissions factor associated with Ontario's electricity grid was assumed to change over time. The projected emissions factor was taken from the IESO 2022 Planning Outlook for the short term projections (until 2029), and from the Low Carbon Economy Fund (LCEF) numbers (obtained from ECCC's *2022 Reference Case GHG Emissions*) for the 2030-2050 projections. Figure 4 presents the electricity grid GHG emissions factors assumed over the evaluation period.

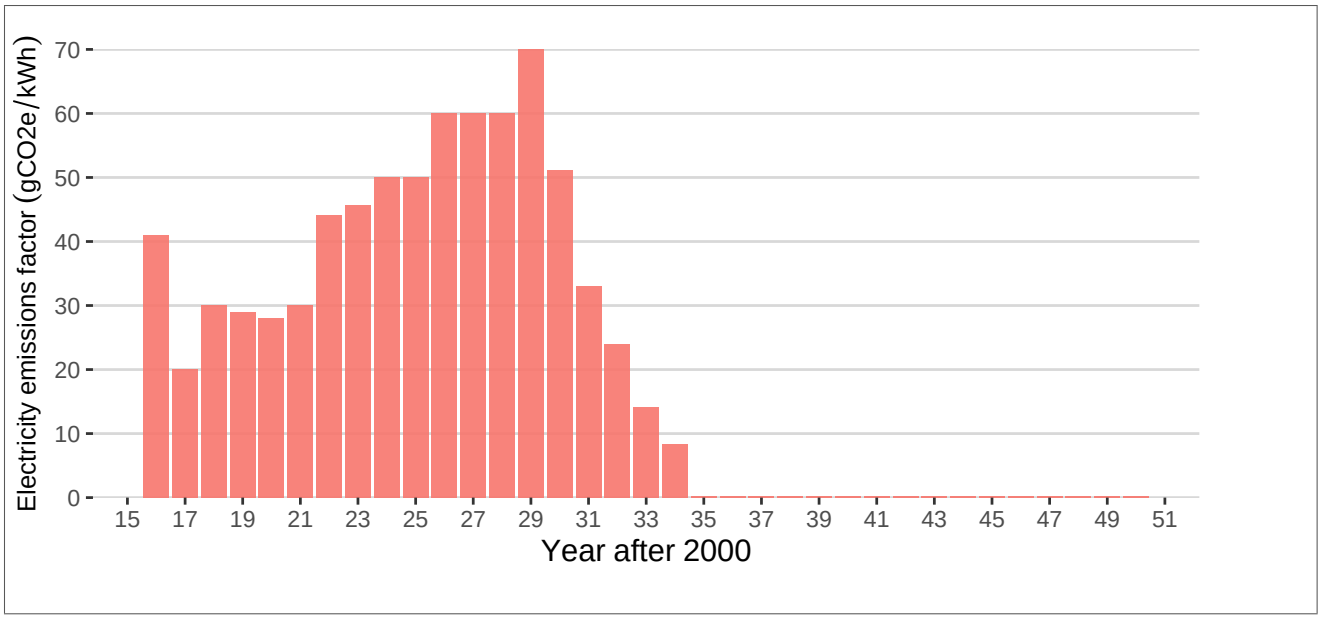


Figure 4: Electricity GHG emissions factor assumptions (from IESO's 2022 Planning Outlook (short term) and ECCC's 2022 Reference Case GHG Emissions (long term))

Figure 5 summarizes the Huron Perth Healthcare Alliance's GHG emissions from 2014 - 2023. It is separated by into Scope 1 and 2 emissions. It can be seen that Scope 1 and 2 emissions can be directly tied to a facility's electricity and natural gas consumption. As a result, the large increase in 2018 natural gas consumption is directly correlated to the increase in 2018 GHG emissions.

Since this ECDM Plan focuses on the utility metered energy performance of the facilities, Scope 3 emissions are not considered.

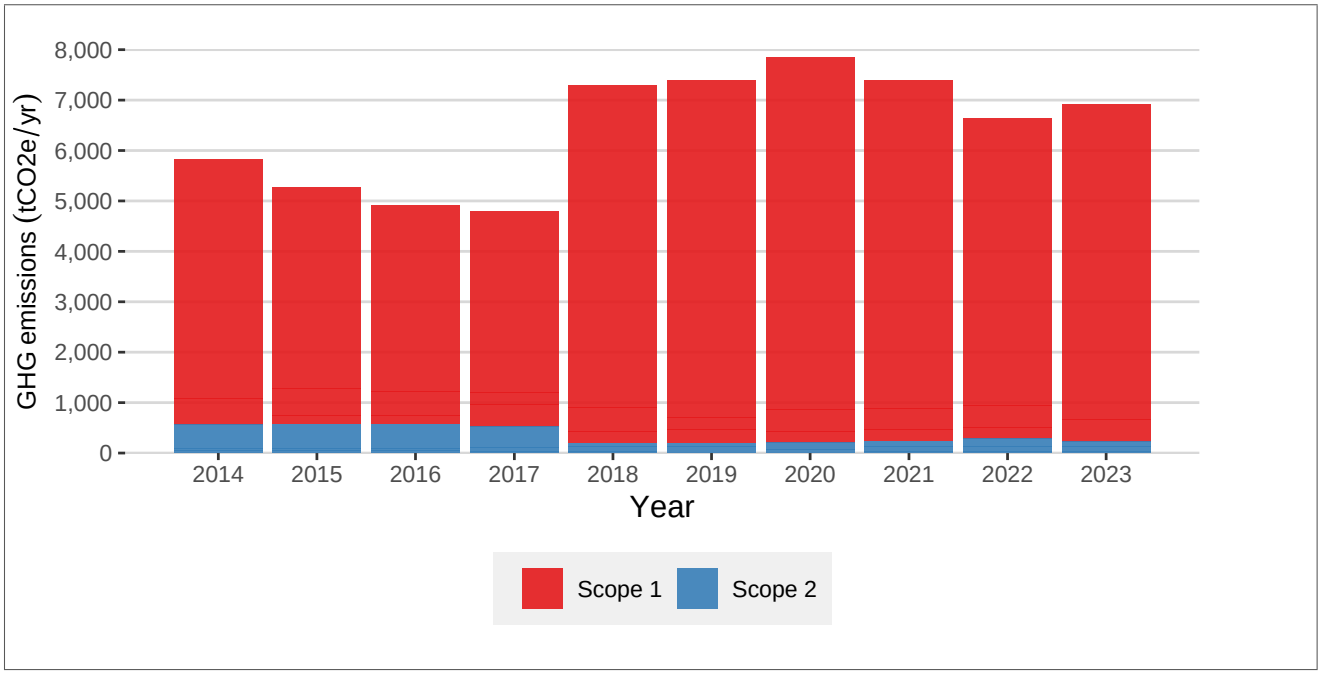


Figure 5: Annual GHG emissions

2.2 Energy Conservation Measures

2.2.1 Previous ECMs (2014-2018)

Several ECMs were implemented between 2014 and 2018 in an effort to improve energy efficiency and GHG performance. These are summarized in Table 5.

Table 5: Estimated Annual Energy Savings for Measures Implemented From 2014 to 2018

Status	Building	Measure	Completion Year	Electricity Savings	Natural Gas Savings
-	-	-	-	[kWh]	[m3]
Complete	Clinton Public Hospital	Kitchen exhaust - scheduling	2016	9,775	16,500
	Clinton Public Hospital	HVAC1 - scheduling	2016	27,200	0
	Clinton Public Hospital	Kitchen exhaust - system	2016	15,740	23,000
	Clinton Public Hospital	Interior lighting	2016	259,990	0
	Clinton Public Hospital	Outdoor lighting	2016	18,390	0
	Clinton Public Hospital	RTU replacement	2017		
	Clinton Public Hospital	SF7 RTU replacement	2017		
	Clinton Public Hospital	SF1, 2, 3 RTU replacement	2018		
	Seaforth Community Hospital	Kitchen - schedule	2016	40,733	16,250
	Seaforth Community Hospital	Interior lighting upgrades	2017	138,172	0
	Seaforth Community Hospital	Exterior lighting upgrades	2017	18,391	0
	Seaforth Community Hospital	Water heater upgrade	2017		
	Seaforth Community Hospital	Boiler upgrade	2017		
	St. Marys Memorial Hospital	Wellness centre RTUs scheduling - medical clinic	2016	8,980	6,072
	St. Marys Memorial Hospital	Wellness centre RTUs scheduling - YMCA	2016	12,750	5,290
	St. Marys Memorial Hospital	Kitchen RTU scheduling	2016	2,580	7,030
	St. Marys Memorial Hospital	Cafeteria RTU scheduling	2016	3,420	3,548
	St. Marys Memorial Hospital	Meighan Wing RTUs scheduling	2016	3,220	7,707
	St. Marys Memorial Hospital	Laboratory RTU scheduling	2016	2,160	1,619
	St. Marys Memorial Hospital	Roofing Insulation, Meighen Wing	2018	3,701	16,654
	St. Marys Memorial Hospital	HVAC 107/108 replacement	2018		
	St. Marys Memorial Hospital	Water heater upgrade	2018		
	Stratford General Hospital	HVAC ECM project	2016	976,243	63,044
	Stratford General Hospital	West Building DDC controls	2016		
	Stratford General Hospital	Roofing Insulation, West Building and College	2016	0	36,040
	Stratford General Hospital	Modifications to Flue-Ace system	2018	0	7,590
	Stratford General Hospital	Cogeneration plant	2018	8,163,216	-1,598,043
	Stratford General Hospital	Roofing Insulation, East Building and Residence	2018	2,421	49,146

Costs and energy savings provided by Huron Perth Healthcare Alliance.

2.2.2 Previous ECMs (2019-2023)

Several ECMs were implemented between 2019 and 2023 in an effort to improve energy efficiency and GHG performance. These are summarized in Table 6.

Table 6: Estimated Annual Energy Savings for Measures Implemented From 2019 to 2023

Status	Building	Measure	Completion Year	Electricity Savings	Natural Gas Savings
-	-	-	-	[kWh]	[m3]
Complete	Clinton Public Hospital	Air handling unit system replacements	2021	4,483	6,142
	Seaforth Community Hospital	Chiller replacement	2019	7,573	0
	Seaforth Community Hospital	Penthouse air handling unit replacement	2021	8,741	0
	Seaforth Community Hospital	Pneumatic controls upgrade	2021	44,183	5,582
	Seaforth Community Hospital	Cooling tower replacement	2023	4,783	0
	St. Marys Memorial Hospital	Direct digital controls upgrade	2023	14,751	1,932
	Stratford General Hospital	Heating and special services unit electrical transformation project	2021	128	8,029
	Stratford General Hospital	Chiller plant upgrades	2021	411,300	0
	Stratford General Hospital	West building brick and windows replacement	2022	32	9,096
	Stratford General Hospital	North wing water heater replacement	2023	0	28,494
	Stratford General Hospital	West building windows replacement	2023	175	7,693
	Stratford General Hospital	West building laundry renovation	2023	0	10,000
	Stratford General Hospital	Avon Crest demolition	2023	66,000	190,000

These ECMs were based on a series of whitepapers representing each measure. A sample whitepaper is presented in Appendix A.

3 STRATFORD GENERAL HOSPITAL

3.1 Baseline

3.1.1 Energy Consumption

Figure 6 summarizes the monthly electricity and natural gas consumption for SGH from 2019 - 2023. The trends it shows are typical - higher electricity consumption in the summer months due to increased cooling load and higher natural gas consumption in the winter months due to increased heating load, although there are some outliers in the electricity consumption where the consumption in some months is significantly higher than the seasonal average.

Figure 7 summarizes the annual electricity and natural gas consumption for SGH from 2014 - 2023. Annual electricity consumption from 2014 - 2017 is relatively constant, before dropping off significantly in 2018, and increasing slightly in 2021 and 2022. Annual natural gas consumption steadily decreases from 2014 - 2017 with a significant increase in 2018, and a slight decrease from 2020 to 2022.

The energy use changes in 2017 and 2020 to 2022 can be attributed to the ECM projects while the energy use changes in 2018 can be attributed to the Cogeneration Plant project.

Figure 6: SGH monthly electricity and natural gas consumption

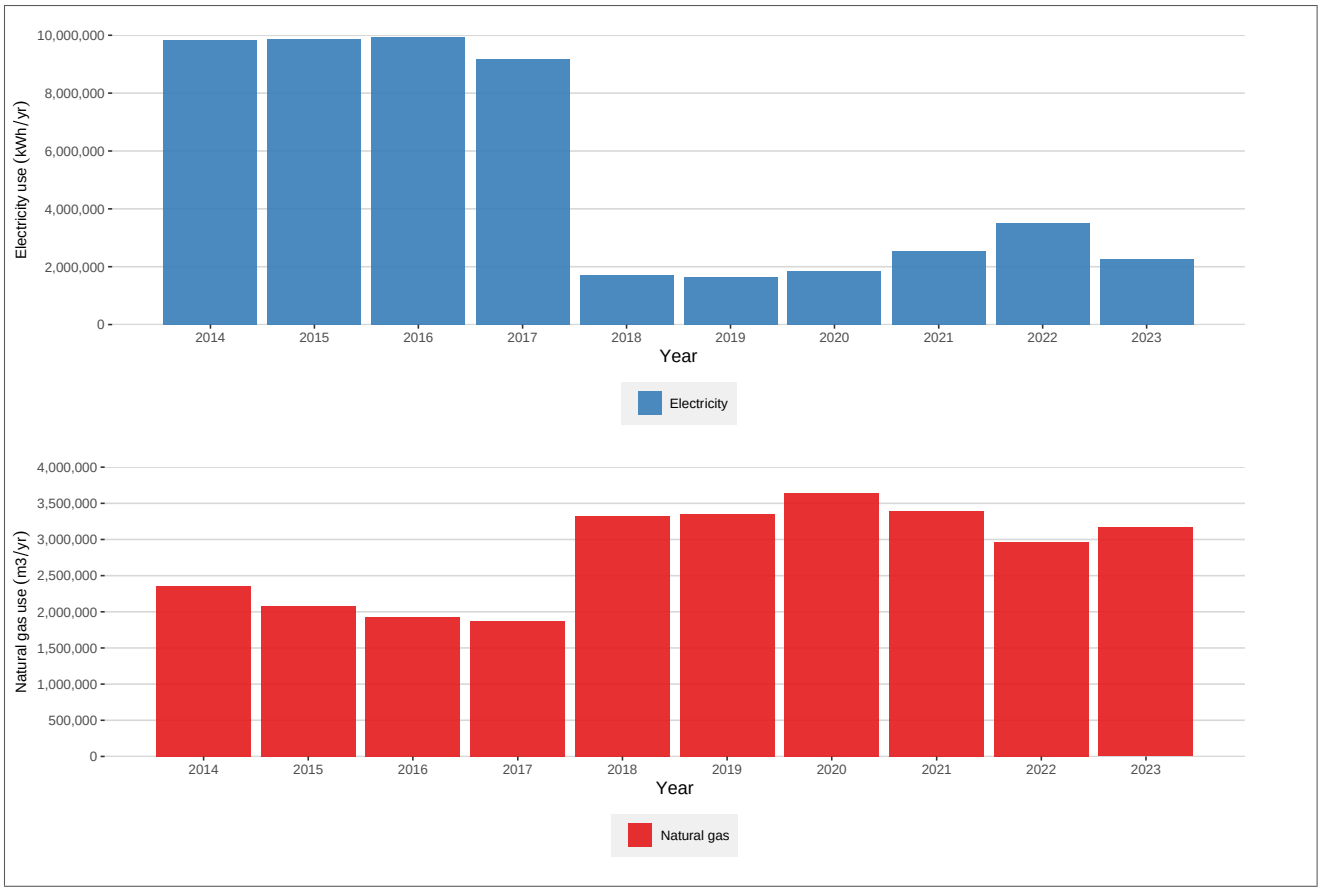


Figure 7: SGH annual electricity and natural gas consumption

3.1.2 GHG Emissions

Figure 8 summarizes SGH's GHG emissions from 2014 - 2023. It is separated by into Scope 1 and 2 emissions. Scope 1 and 2 emissions are directly tied to a facility's electricity and natural gas consumption.

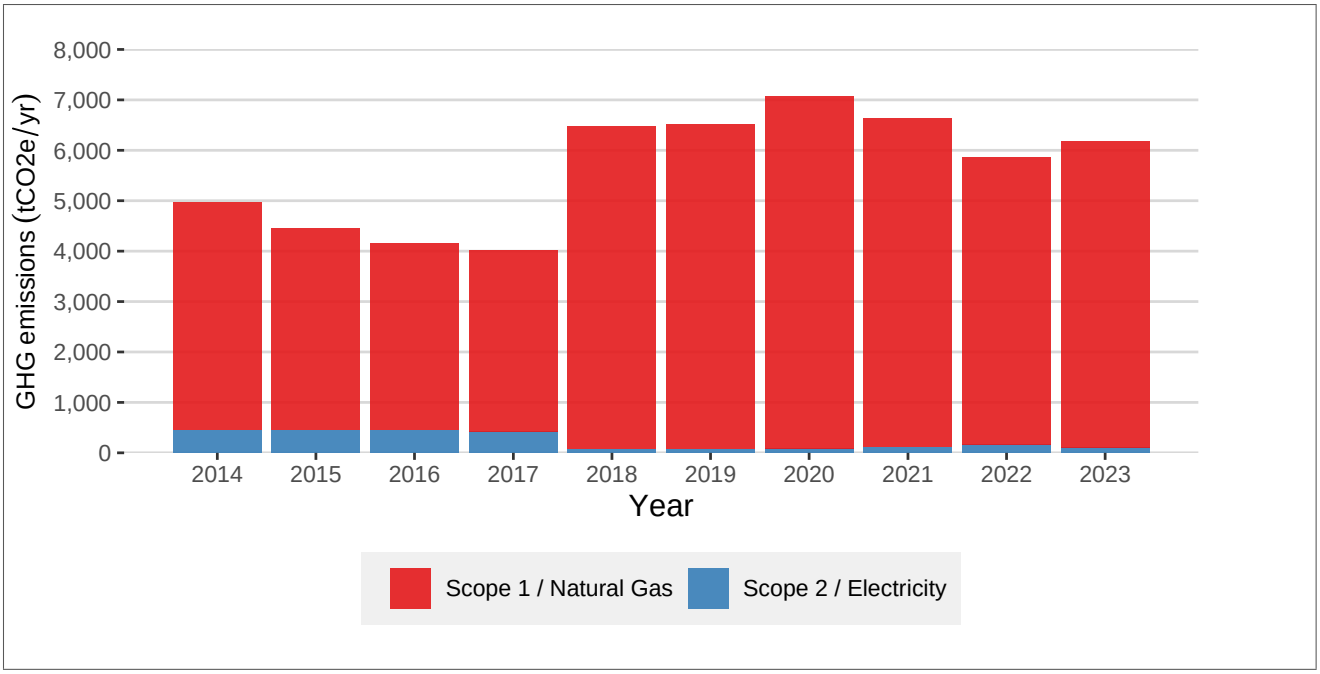


Figure 8: SGH annual GHG emissions

3.2 Energy Conservation Measures

3.2.1 Previous ECMs

A number of energy conservation measures (ECMs) have been implemented since the 2019 CDM plan was completed in an effort to achieve the goals set out in the plan. A list of the ECMs implemented to date is summarized in Table 7.

Table 7: Estimated annual energy savings for completed measures SGH

Measure	Completion Year	Electricity Savings	Natural Gas Savings
-	-	[kWh]	[m3]
Heating and special services unit electrical transformation project	2021	128	8,029
Chiller plant upgrades	2021	411,300	0
West building brick and windows replacement	2022	32	9,096
North wing water heater replacement	2023	0	28,494
West building windows replacement	2023	175	7,693
West building laundry renovation	2023	0	10,000
Avon Crest demolition	2023	66,000	190,000

3.2.2 Proposed ECMs

A number of energy audits were completed for Huron Perth Healthcare Alliance's facilities in 2023. These energy audits evaluated various ECMs and estimated their energy savings and implementation costs. Although a number of recommendations resulting from the energy audits have already been completed, there are still several opportunities which remain. The list of proposed ECMs is summarized in Table 8. The year designates the first full year following the ECM's implementation.

Table 8: ECMs to implement at SGH

Measure	Year	Capital cost	GHG reduction	Electricity reduction	Natural gas reduction	Simple payback period
-	-	[$]	[tCO2e/yr]	[kWh/yr]	[m3/yr]	[yr]
Block 300 and 400 upgrade	2024	0	23	-217,831	22,325	-
East building LED upgrades	2024	1,206,011	8	220,092	-6,132	>25
AHU schedule optimization	2025	0	12	2,877	5,964	-
Humidification SP optimization	2025	21,318	39	-4,066	20,697	3
Free cooling controls optimization	2026	27,588	7	4,077	3,646	14
Minimum OA flow review	2026	11,286	126	2,699	65,526	0
O2 trim on boilers	2026	49,500	22	0	11,355	11
CHP use for Class A peak mitigation	2027	0	1,717	-5,727,975	1,160,878	-
AHU SATSP optimization	2028	37,620	35	7,180	17,908	5
Electrical room AHU auto mode	2028	4,389	0	1,763	0	17
Heat recovery steam generator (HRSG) economizer	2028	135,000	68	0	35,488	10
Interior lighting upgrade	2028	8,151,000	13	349,939	-9,750	>25
Ground heat exchanger	2029	6,987,288	0	0	0	>25
Steam boiler plant to GSHP	2029	11,111,000	1,399	-1,841,450	814,025	>25
Wastewater heat recovery	2029	11,491,071	1,498	-1,860,599	866,788	>25
Blowdown heat recovery	2031	300,000	40	0	21,040	>25
Pneumatic to DDC	2031	94,050	13	4,402	6,532	>25
Envelope upgrade west remaining	2034	3,410,880	182	0	94,621	>25
Kitchen AHU free-cool	2034	125,400	0	2,295	0	>25
Kitchen MUA VFDs	2036	125,776	7	2,208	3,723	>25
CAV to VAV conversion	2037	219,450	73	26,478	36,924	12
W2 300 AHU upgrade	2038	150,480	9	-18,400	5,447	-
Carbon offsets	2050	0	6,285	0	0	-

Note that the "Block 300 and 400 upgrade" measure also encompasses ventilation improvements in this space, which is projected to increase the fan electricity use. However, the upgrade includes energy efficiency improvements that mitigate the increase in electricity use, ensuring it remains lower than it would be without these enhancements.
Also note that interactive effects between measures are not considered in this table, but are accounted for in the plan.
For instance, after ECM implementation, carbon offsets are projected to provide a 1891 tCO2e/yr reduction in GHG emissions in 2050.

Note that the Block 300 and 400 upgrade is currently underway as a part of the work being performed for the SGH pharmacy chemo project.

3.2.3 Decarbonization Plan

The HPHA is investigating a major decarbonization project at SGH. This project has three main phases to reduce natural gas consumption at SGH: CHP (combined heat and power) switch, geothermal heat pumps, and wastewater heat recovery.

Once the decarbonization is done, plant heating and cooling is assumed to work as below:

- **Stage 1:** Wastewater energy recovery heat pump.
- **Stage 2:** Geothermal heating and cooling, sized to bridge the gap between the wastewater energy recovery and the full building load.
- **Stage 3:** Existing infrastructure (steam boilers, chiller plant, CHP) will be used as backup and to supplement heating when outdoor temperatures are particularly low.

Wastewater Heat Recovery

Install a wastewater energy recovery system to serve as the facility's first stage of heating and cooling energy. This is represented by the "Wastewater heat recovery" measure.

Geothermal Heat Pumps

As part of the decarbonization effort, the boilers serving the steam boiler plant should be converted from being gas-fired steam boilers to being heated by geothermal heat pumps (ground source heat pumps, or GSHP). This is represented by the measures "Ground heat exchanger" (to build the infrastructure) and "Steam boiler plant to GSHP".

CHP Switch

To reduce utility costs and reduce natural gas usage, it is recommended that SGH opt into a Class A electricity billing structure and only run CHP for global adjustment peak mitigation. This is represented by the "CHP use for Class A peak mitigation" measure.

Project Implementation

To implement this project, the following stages should be undertaken:

- **2024-2025:** Detailed project study
- **2026:** Approval process
- **2027:** Design
- **2028-2029:** Construction

To offset any remaining GHG emissions, carbon offsets can be purchased in 2050.

3.3 Short Term (2024-2029) Energy and GHG Plan

3.3.1 Energy and GHG Performance Targets

Energy and GHG performance targets are determined to reflect the annual energy and GHG performance expected upon implementing the current and proposed ECMs described in Section 3.2. These targets are summarized in Table 9.

Table 9: SGH baseline energy and GHG performance and reduction targets

Category	Description	Unit	SGH
Electricity	2023 Baseline consumption	[kWh]	2,276,412
	2029 Target maximum consumption	[kWh]	9,491,371
	2029 Target consumption reduction	[kWh]	-7,214,959
	2029 Target consumption reduction	[%]	-317
Natural gas	2023 Baseline consumption	[m3]	3,165,404
	2029 Target maximum consumption	[m3]	994,408
	2029 Target consumption reduction	[m3]	2,170,996
	2029 Target consumption reduction	[%]	69
GHG emissions	2023 Baseline consumption	[tCO2e]	6,185
	2029 Target maximum consumption	[tCO2e]	2,575
	2029 Target consumption reduction	[tCO2e]	3,610
	2029 Target consumption reduction	[%]	58

To paraphrase Table 9, the 2029 energy and GHG performance targets for SGH are as follows.

- **Electricity**: To limit annual electricity consumption to 9,491,371 kWh.
- **Natural gas**: To limit annual natural gas consumption to 994,408 m^3.
- **GHG emissions**: To limit annual GHG emissions to 2,575 tCO_2e.

3.3.2 Energy and GHG Road Map

To achieve the above energy and GHG performance targets at SGH, the road map depicted in Figure 9 is developed according to the following methodology.

1. Each proposed ECM (from Table 8) with a planned in-service year between 2024 and 2029 is superimposed over the timeline in Figure 9 based on its planned in-service year, which is the first full year following the ECM's implementation.

2. Capital costs associated with each ECM are taken from Table 8. It is assumed that capital costs will be incurred during the calendar year prior to the in-service year for each ECM.
3. Changes in electricity, natural gas and GHG performance associated with each ECM are taken from Table 8 and projected according to the same implementation timeline. Results are plotted in Figure 9.

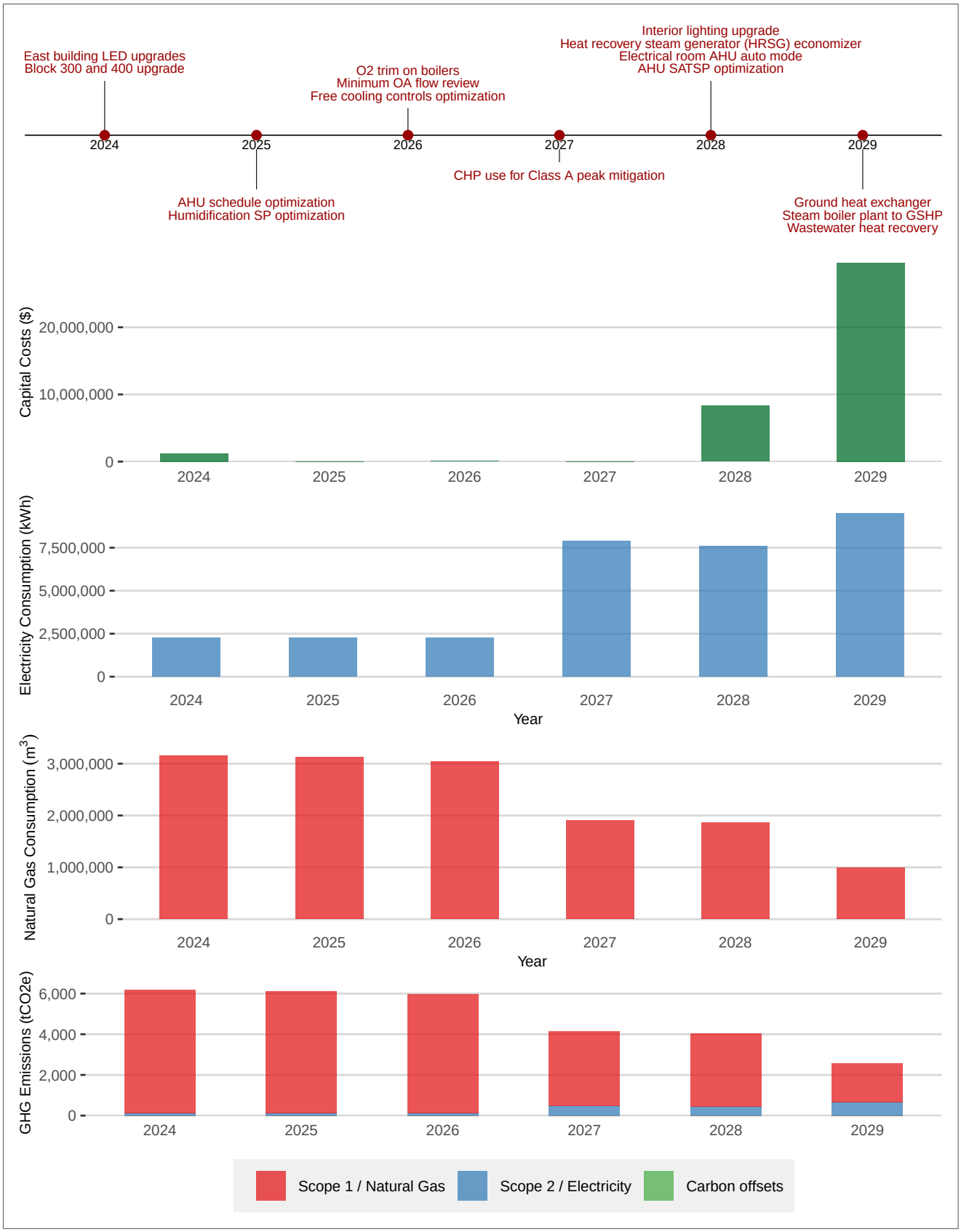


Figure 9: SGH energy and GHG road map

3.4 Long Term (2030-2050) Energy and GHG Plan

3.4.1 Energy and GHG Performance Targets

Energy and GHG performance targets are determined to reflect the annual energy and GHG performance expected upon implementing the current and proposed ECMs described in Section 3.2. These targets are summarized in Table 10.

Table 10: SGH baseline energy and long term GHG performance and reduction targets

Category	Description	Unit	SGH
Electricity	2023 Baseline consumption	[kWh]	2,276,412
	2050 Target maximum consumption	[kWh]	9,459,745
	2050 Target consumption reduction	[kWh]	-7,183,333
	2050 Target consumption reduction	[%]	-316
Natural gas	2023 Baseline consumption	[m3]	3,165,404
	2050 Target maximum consumption	[m3]	983,197
	2050 Target consumption reduction	[m3]	2,182,207
	2050 Target consumption reduction	[%]	69
GHG emissions	2023 Baseline consumption	[tCO2e]	6,185
	2050 Target maximum consumption	[tCO2e]	0
	2050 Target consumption reduction	[tCO2e]	6,185
	2050 Target consumption reduction	[%]	100

To paraphrase Table 10, the 2050 energy and GHG performance targets for SGH are as follows.

- **Electricity**: To limit annual electricity consumption to 9,459,745 kWh.
- **Natural gas**: To limit annual natural gas consumption to 983,197 m^3.
- **GHG emissions**: To limit annual GHG emissions to 0 tCO_2e.

3.4.2 Energy and GHG Road Map

To achieve the above long term energy and GHG performance targets at SGH, the road map depicted in Figure 10 is developed according to the following methodology.

1. Each proposed ECM (from Table 8) with a planned in-service year between 2030 and 2050 is superimposed over the timeline in Figure 9 based on its planned in-service year, which is the first full year following the ECM's implementation.
2. Capital costs associated with each ECM are taken from Table 8. It is assumed that capital costs will be incurred during the calendar year prior to the in-service year for each ECM.
3. Changes in electricity, natural gas and GHG performance associated with each ECM are taken from Table 8 and projected according to the same implementation timeline. Results are plotted in Figure 9.

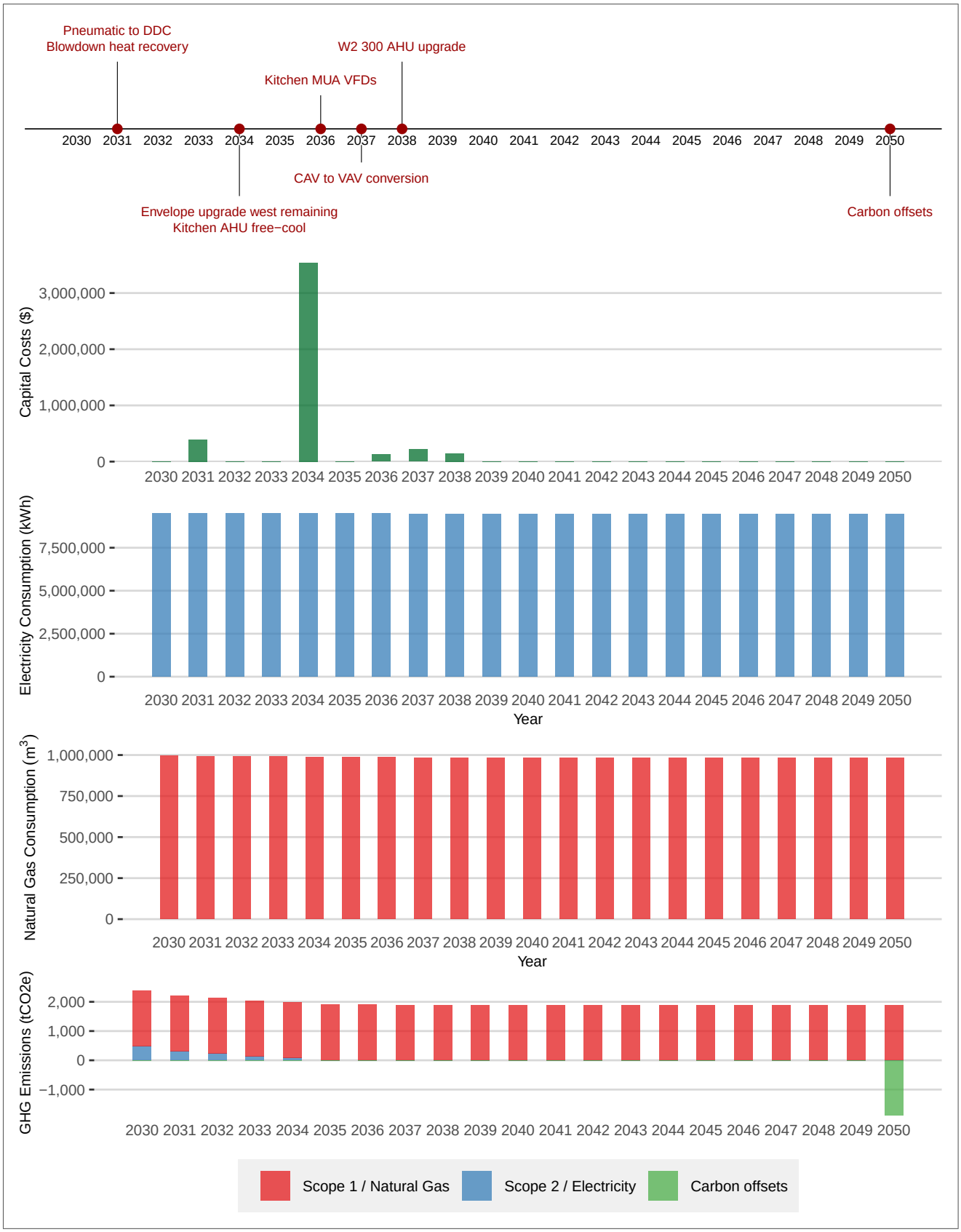


Figure 10: SGH long term energy and GHG road map

4 SEAFORTH COMMUNITY HOSPITAL

4.1 Baseline

4.1.1 Energy Consumption

Figure 11 summarizes the monthly electricity and natural gas consumption for SCH from 2019 - 2023. The trends it shows are typical - higher electricity consumption in the summer months due to increased cooling load and higher natural gas consumption in the winter months due to increased heating load. In 2022, the natural gas consumption in June and July is significantly higher than the seasonal average, which could be a result of how the natural gas is metered.

Figure 12 summarizes the annual electricity and natural gas consumption for SCH from 2014 - 2023. Annual electricity consumption remains relatively consistent from 2014 to 2023, although it decreases gradually from 2015 to 2020 and then increases from 2020 to 2023. Annual natural gas consumption decreases significantly in 2016 and remains relatively constant from 2016 to 2023.

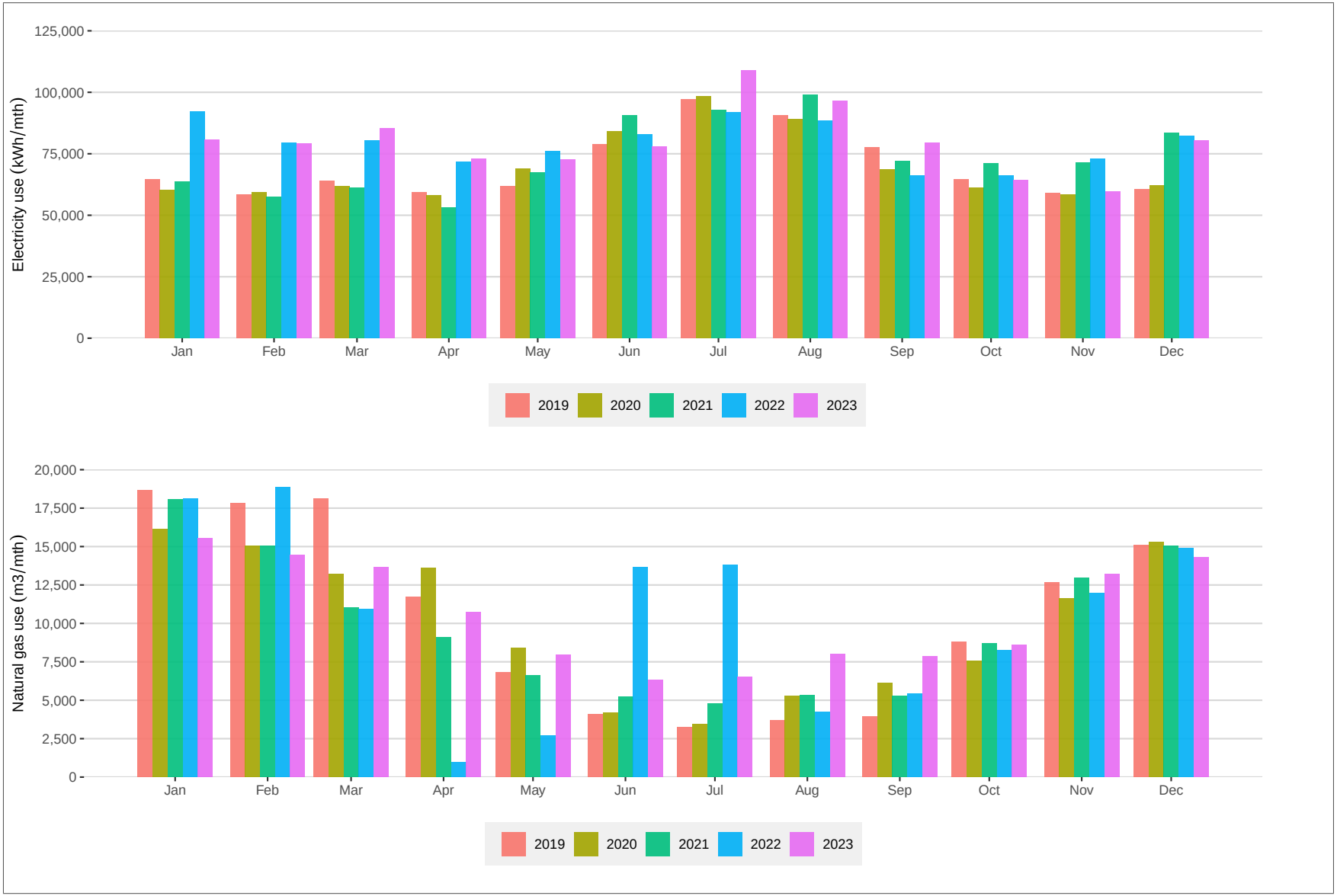


Figure 11: SCH monthly electricity and natural gas consumption

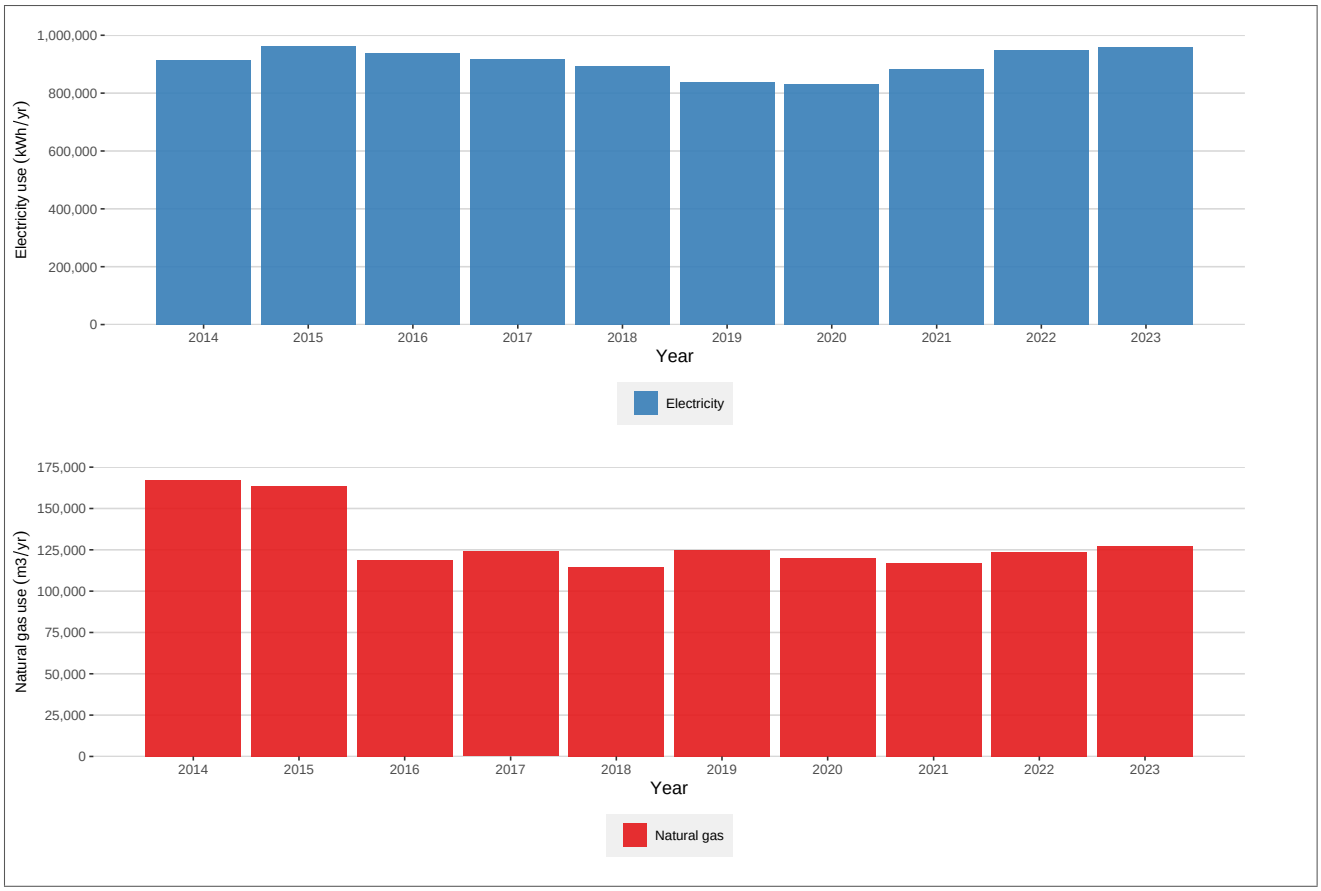


Figure 12: SCH annual electricity and natural gas consumption

4.1.2 GHG Emissions

Figure 13 summarizes SCH's GHG emissions from 2014 - 2023. It is separated by into Scope 1 and 2 emissions. Scope 1 and 2 emissions are directly tied to a facility's electricity and natural gas consumption.

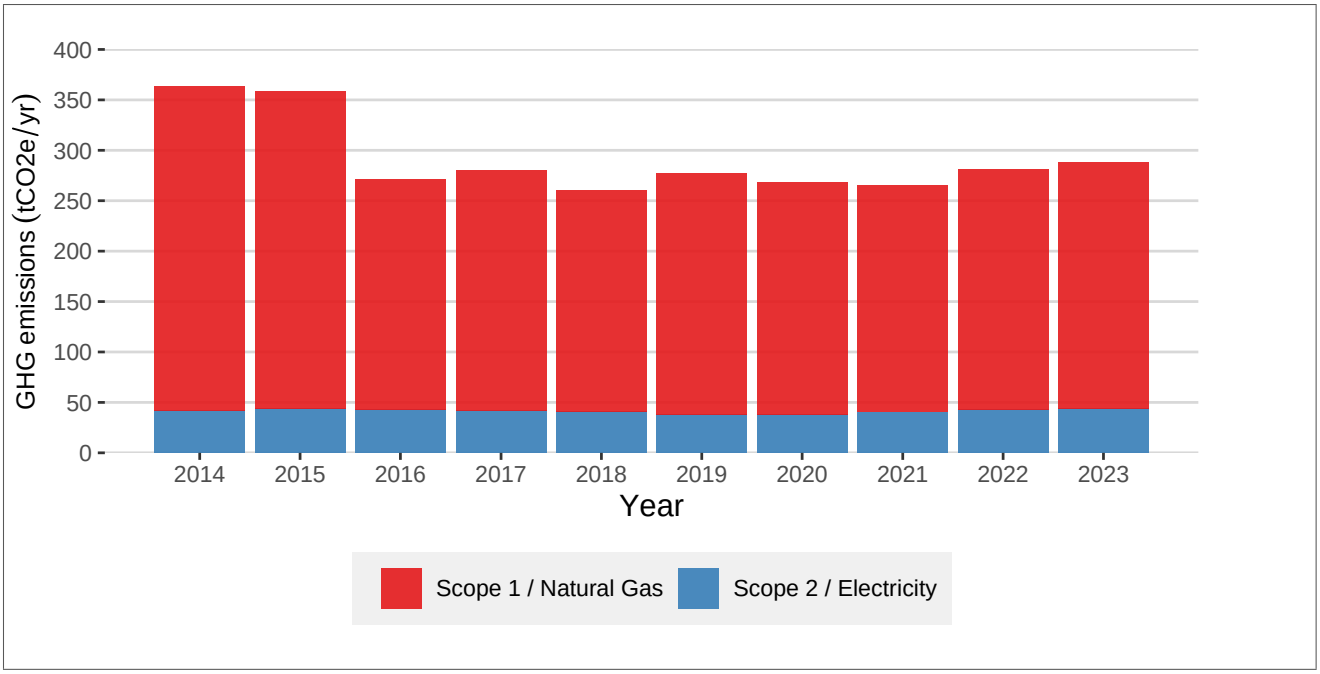


Figure 13: SCH annual GHG emissions

4.2 Energy Conservation Measures

4.2.1 Previous ECMs

A number of energy conservation measures (ECMs) have been implemented since the 2019 CDM plan was completed in an effort to achieve the goals set out in the plan. A list of the ECMs implemented to date is summarized in Table 11.

Table 11: Estimated annual energy savings for completed measures SCH

Measure	Completion Year	Electricity Savings	Natural Gas Savings
-	-	[kWh]	[m3]
Chiller replacement	2019	7,573	0
Penthouse air handling unit replacement	2021	8,741	0
Pneumatic controls upgrade	2021	44,183	5,582
Cooling tower replacement	2023	4,783	0

4.2.2 Proposed ECMs

A number of energy audits were completed for Huron Perth Healthcare Alliance's facilities in 2023. These energy audits evaluated various ECMs and estimated their energy savings and implementation costs. Although a number of recommendations resulting from the energy audits have already been completed, there are still several opportunities which remain. The list of proposed ECMs is summarized in Table 12. The year designates the first full year following the ECM's implementation.

Table 12: ECMs to implement at SCH

Measure	Year	Capital cost	GHG reduction	Electricity reduction	Natural gas reduction	Simple payback period
-	-	[$]	[tCO2e/yr]	[kWh/yr]	[m3/yr]	[yr]
Administration unit SASTP optimization	2026	12,540	18	0	9,427	3
Bedcare occupancy schecule control optimization	2026	85,272	41	73,274	18,052	5
Kitchen schedule optimization	2026	0	3	4,782	1,482	-
Schedule implementation for kitchen glycol loop	2026	0	0	1,462	0	-
Emergency entrance air leak mitigation	2028	18,434	0	128	219	>25
Patio entrance air leak mitigation	2028	0	0	64	62	-
Building envelope upgrade	2039	3,034,680	15	-1,223	7,768	>25
Decouple DHW from boiler	2040	106,590	12	0	6,292	>25
Geothermal conversion	2040	1,943,700	144	-273,486	87,666	-
Canopy Solar PV	2047	880,308	14	161,026	0	>25
Ground mount solar PV	2047	843,750	19	213,525	0	>25
Roof mount solar PV	2047	461,472	11	123,218	0	>25
Carbon offsets	2050	0	330	0	0	-

Note that interactive effects between measures are not considered in this table, but are accounted for in the plan.
For instance, after ECM implementation, carbon offsets are projected to provide a 48 tCO2e/yr reduction in GHG emissions in 2050.

4.2.3 Decarbonization Plan

To achieve net zero GHG emissions by 2050, a building decarbonization project for SCH is recommended. For this project, the existing gas-fired hot water loop (which serves space heating and domestic hot water) is recommended to be replaced by heat pumps. This is represented by the measure "Geothermal conversion".

This measure is expected to take place in the medium-to-long term (2030-2045).

To offset any remaining GHG emissions, carbon offsets can be purchased in 2050.

4.3 Short Term (2024-2029) Energy and GHG Plan

4.3.1 Energy and GHG Performance Targets

Energy and GHG performance targets are determined to reflect the annual energy and GHG performance expected upon implementing the current and proposed ECMs described in Section 4.2. These targets are summarized in Table 13.

Table 13: SCH baseline energy and GHG performance and reduction targets

Category	Description	Unit	SCH
Electricity	2023 Baseline consumption	[kWh]	957,944
	2029 Target maximum consumption	[kWh]	879,462
	2029 Target consumption reduction	[kWh]	78,482
	2029 Target consumption reduction	[%]	8
Natural gas	2023 Baseline consumption	[m3]	127,222
	2029 Target maximum consumption	[m3]	99,825
	2029 Target consumption reduction	[m3]	27,397
	2029 Target consumption reduction	[%]	22
GHG emissions	2023 Baseline consumption	[tCO2e]	288
	2029 Target maximum consumption	[tCO2e]	253
	2029 Target consumption reduction	[tCO2e]	35
	2029 Target consumption reduction	[%]	12

To paraphrase Table 13, the 2029 energy and GHG performance targets for SCH are as follows.

- **Electricity**: To limit annual electricity consumption to 879,462 kWh.
- **Natural gas**: To limit annual natural gas consumption to 99,825 m^3.
- **GHG emissions**: To limit annual GHG emissions to 253 tCO_2e.

4.3.2 Energy and GHG Road Map

To achieve the above energy and GHG performance targets at SCH, the road map depicted in Figure 14 is developed according to the following methodology.

1. Each proposed ECM (from Table 12) with a planned in-service year between 2024 and 2029 is superimposed over the timeline in Figure 14 based on its planned in-service year, which is the first full year following the ECM's implementation.
2. Capital costs associated with each ECM are taken from Table 12. It is assumed that capital costs will be incurred during the calendar year prior to the in-service year for each ECM.
3. Changes in electricity, natural gas and GHG performance associated with each ECM are taken from Table 12 and projected according to the same implementation timeline. Results are plotted in Figure 14.

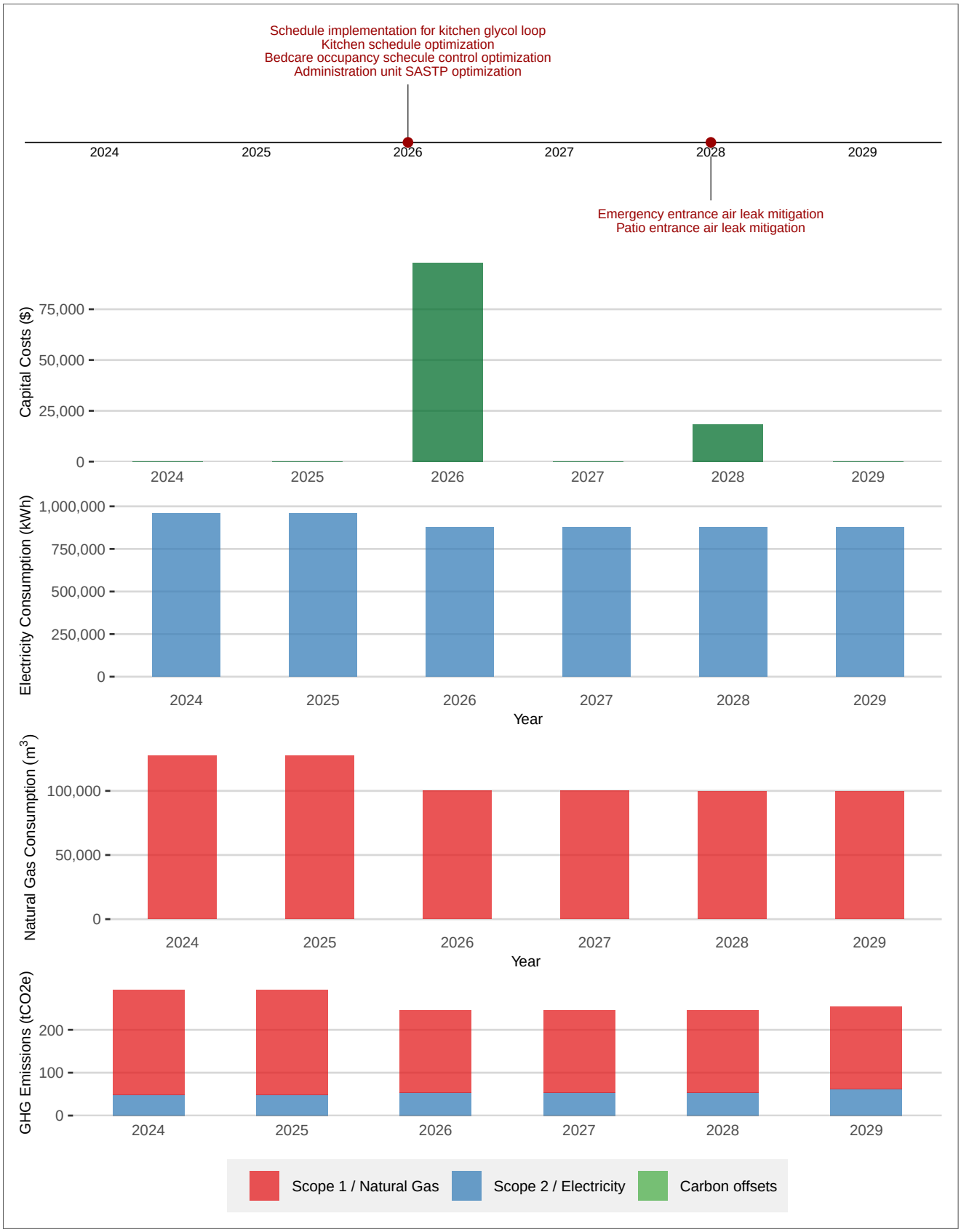


Figure 14: SCH energy and GHG road map

4.4 Long Term (2030-2050) Energy and GHG Plan

4.4.1 Energy and GHG Performance Targets

Energy and GHG performance targets are determined to reflect the annual energy and GHG performance expected upon implementing the current and proposed ECMs described in Section 4.2. These targets are summarized in Table 14.

Table 14: SCH baseline energy and long term GHG performance and reduction targets

Category	Description	Unit	SCH
Electricity	2023 Baseline consumption	[kWh]	957,944
	2050 Target maximum consumption	[kWh]	578,359
	2050 Target consumption reduction	[kWh]	379,585
	2050 Target consumption reduction	[%]	40
Natural gas	2023 Baseline consumption	[m3]	127,222
	2050 Target maximum consumption	[m3]	24,838
	2050 Target consumption reduction	[m3]	102,384
	2050 Target consumption reduction	[%]	80
GHG emissions	2023 Baseline consumption	[tCO2e]	288
	2050 Target maximum consumption	[tCO2e]	0
	2050 Target consumption reduction	[tCO2e]	288
	2050 Target consumption reduction	[%]	100

To paraphrase Table 14, the 2050 energy and GHG performance targets for SCH are as follows.

- **Electricity**: To limit annual electricity consumption to 578,359 kWh.
- **Natural gas**: To limit annual natural gas consumption to 24,838 m^3.
- **GHG emissions**: To limit annual GHG emissions to 0 tCO_2e.

4.4.2 Energy and GHG Road Map

To achieve the above long term energy and GHG performance targets at SCH, the road map depicted in Figure 15 is developed according to the following methodology.

1. Each proposed ECM (from Table 12) with a planned in-service year between 2030 and 2050 is superimposed over the timeline in Figure 14 based on its planned in-service year, which is the first full year following the ECM's implementation.
2. Capital costs associated with each ECM are taken from Table 12. It is assumed that capital costs will be incurred during the calendar year prior to the in-service year for each ECM.
3. Changes in electricity, natural gas and GHG performance associated with each ECM are taken from Table 12 and projected according to the same implementation timeline. Results are plotted in Figure 14.

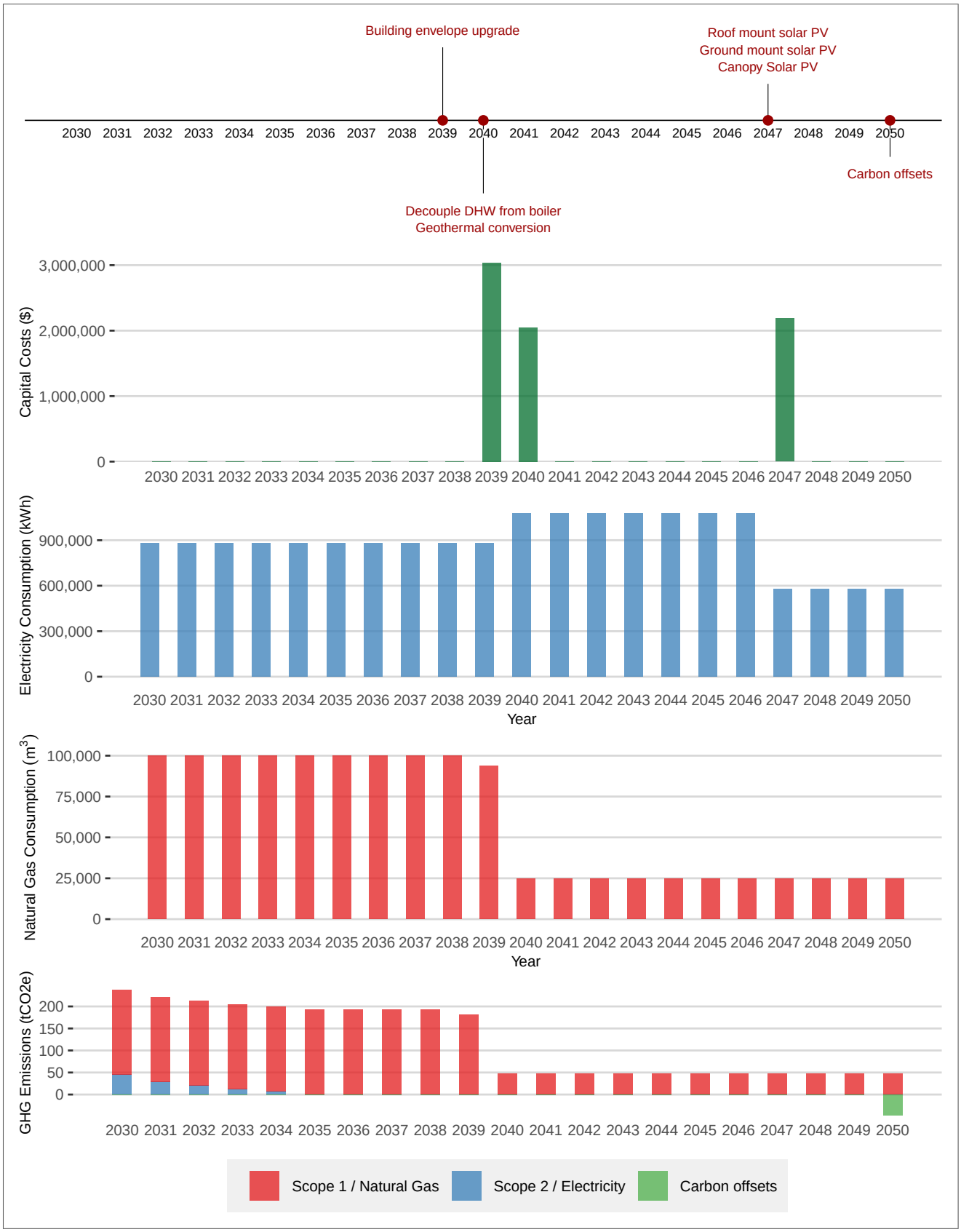


Figure 15: SCH long term energy and GHG road map

5 ST. MARYS MEMORIAL HOSPITAL

5.1 Baseline

5.1.1 Energy Consumption

Figure 16 summarizes the monthly electricity and natural gas consumption for SMMH from 2019 - 2023. The trends it shows are typical - higher electricity consumption in the summer months due to increased cooling load and higher natural gas consumption in the winter months due to increased heating load.

Figure 17 summarizes the annual electricity and natural gas consumption for SMMH from 2014 - 2023. Annual electricity consumption is relatively constant from 2014 to 2017 and increases in 2018, remaining relatively constant at the new level from 2018 to 2023. Annual natural gas consumption is relatively consistent from 2014 to 2019 and decreases from 2020 to 2023.

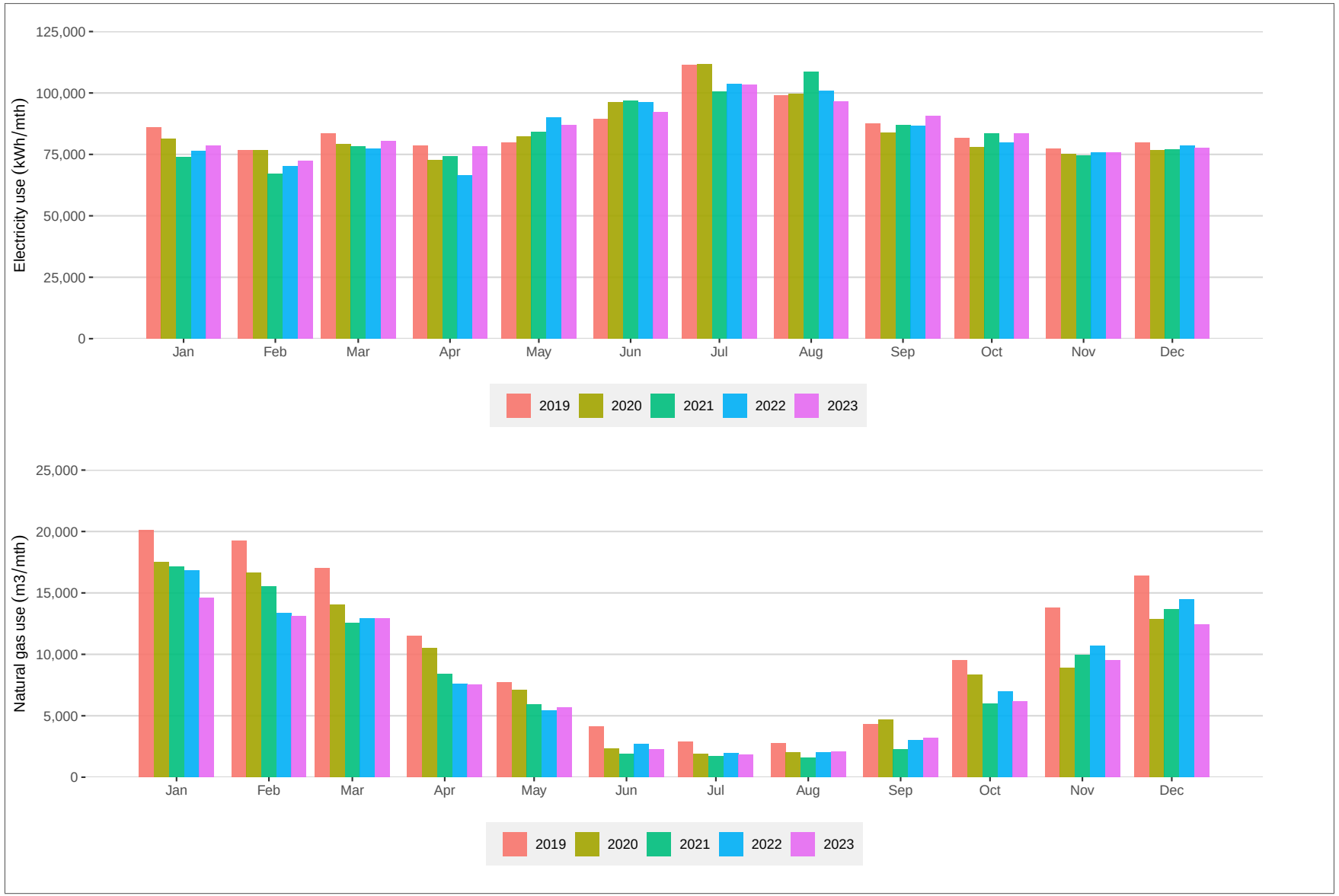


Figure 16: SMMH monthly electricity and natural gas consumption

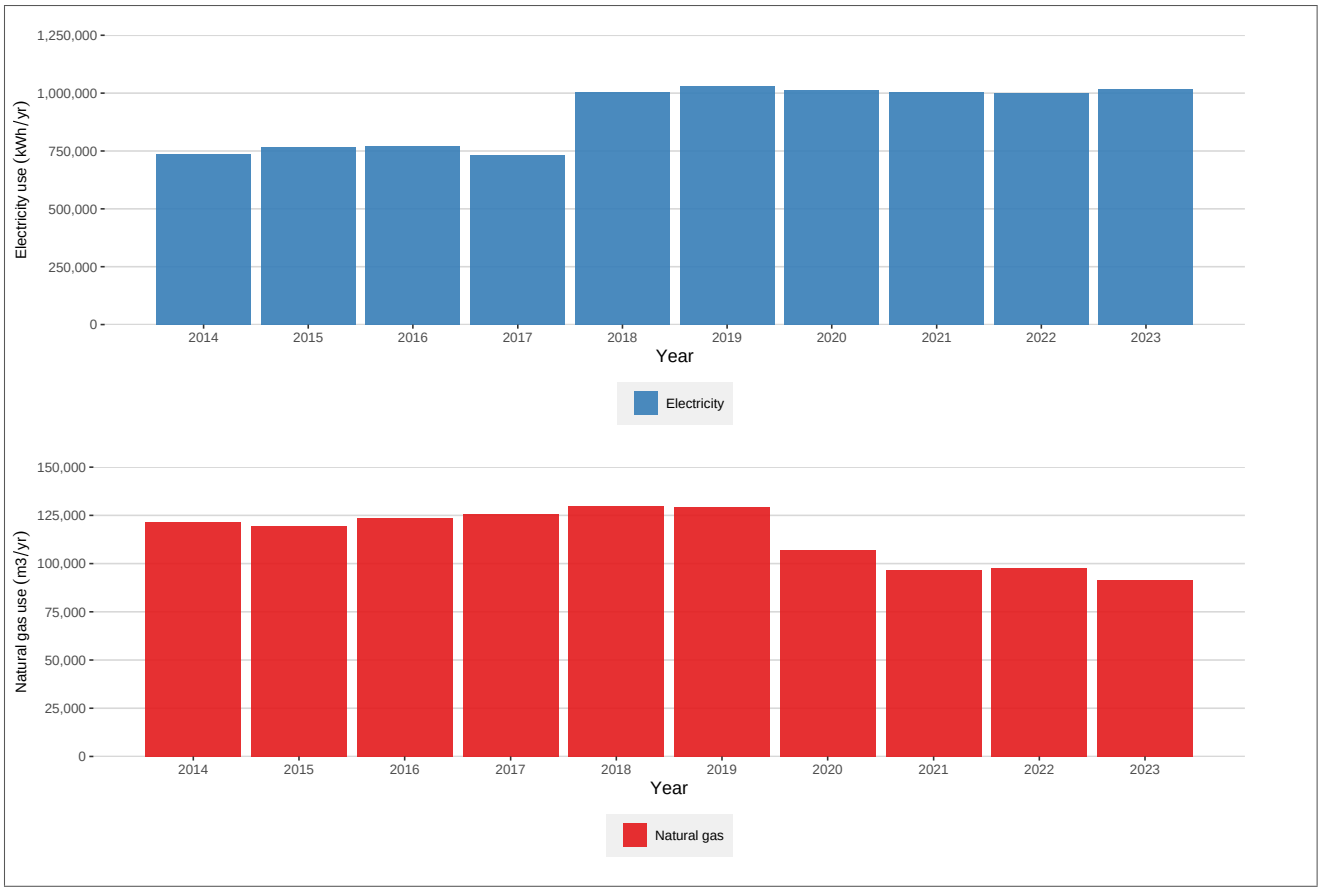


Figure 17: SMMH annual electricity and natural gas consumption

5.1.2 GHG Emissions

Figure 18 summarizes SMMH's GHG emissions from 2014 - 2023. It is separated by into Scope 1 and 2 emissions. Scope 1 and 2 emissions are directly tied to a facility's electricity and natural gas consumption.

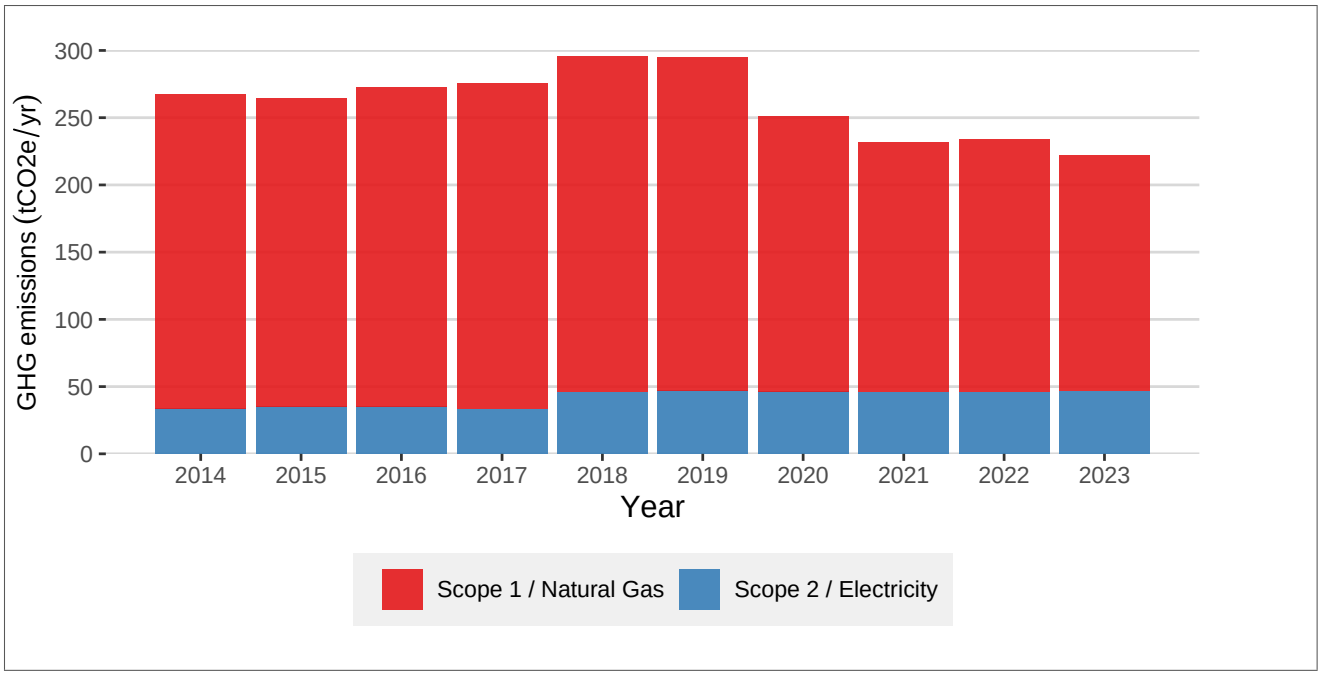


Figure 18: SMMH annual GHG emissions

5.2 Energy Conservation Measures

5.2.1 Previous ECMs

A number of energy conservation measures (ECMs) have been implemented since the 2019 CDM plan was completed in an effort to achieve the goals set out in the plan. A list of the ECMs implemented to date is summarized in Table 15.

Table 15: Estimated annual energy savings for completed measures SMMH

Measure	Completion Year	Electricity Savings	Natural Gas Savings
-	-	[kWh]	[m3]
Direct digital controls upgrade	2023	14,751	1,932

5.2.2 Proposed ECMs

A number of energy audits were completed for Huron Perth Healthcare Alliance's facilities in 2023. These energy audits evaluated various ECMs and estimated their energy savings and implementation costs. Although a number of recommendations resulting from the energy audits have already been completed, there are still several opportunities which remain. The list of proposed ECMs is summarized in Table 16. The year designates the first full year following the ECM's implementation.

Table 16: ECMs to implement at SMMH

Measure	Year	Capital cost	GHG reduction	Electricity reduction	Natural gas reduction	Simple payback period
-	-	[$]	[tCO2e/yr]	[kWh/yr]	[m3/yr]	[yr]
Laundry equipment replacement	2025	22,572	16	-5,653	8,373	9
HVAC 102 SASTP optimization	2026	3,762	1	12,263	0	2
Storage RTU schedule optimization	2026	0	2	6,970	770	-
Add exhaust fans to BAS	2027	37,620	1	12,031	0	22
Heating plant OAT optimization	2027	0	0	2,151	0	-
North Wing schedule optimization	2027	0	12	20,507	5,455	-
East and West HVAC Retrofits	2028	0	22	-19,506	12,180	-
HVAC 107 and 108 recommissioning	2028	0	9	9,755	4,077	-
Pneumatic to DDC	2029	225,720	1	14,903	0	>25
Fuel conversion for the business unit	2034	31,350	1	-2,594	442	-
HVAC 101 replacement	2035	351,120	7	35,045	1,980	>25
Building envelope upgrade	2039	3,978,190	15	0	7,668	>25
Geothermal HVAC conversion	2040	3,735,666	83	-141,122	49,738	-
Domestic hot water boiler to heat pump	2042	1,175,000	23	-48,606	14,388	-
Canopy Solar PV	2048	645,810	11	118,094	0	>25
Roof mount solar PV	2048	669,636	16	179,247	0	>25
Carbon offsets	2050	0	266	0	0	-

Note that interactive effects between measures are not considered in this table, but are accounted for in the plan.
For instance, after ECM implementation, carbon offsets are projected to provide a 28 tCO2e/yr reduction in GHG emissions in 2050.

5.2.3 Decarbonization Plan

To achieve net zero GHG emissions by 2050, a building decarbonization project for SMMH is recommended. For this project, the existing gas-fired hot water plant and domestic hot water boiler are recommended to be replaced by heat pumps. This is represented by the measures "Geothermal conversion" and "Domestic hot water boiler to heat pump".

This measure is expected to take place in the medium-to-long term (2030-2045).

To offset any remaining GHG emissions, carbon offsets can be purchased in 2050.

5.3 Short Term (2024-2029) Energy and GHG Plan

5.3.1 Energy and GHG Performance Targets

Energy and GHG performance targets are determined to reflect the annual energy and GHG performance expected upon implementing the current and proposed ECMs described in Section 5.2. These targets are summarized in Table 17.

Table 17: SMMH baseline energy and GHG performance and reduction targets

Category	Description	Unit	SMMH
Electricity	2023 Baseline consumption	[kWh]	1,016,104
	2029 Target maximum consumption	[kWh]	960,104
	2029 Target consumption reduction	[kWh]	56,000
	2029 Target consumption reduction	[%]	6
Natural gas	2023 Baseline consumption	[m3]	91,312
	2029 Target maximum consumption	[m3]	64,130
	2029 Target consumption reduction	[m3]	27,182
	2029 Target consumption reduction	[%]	30
GHG emissions	2023 Baseline consumption	[tCO2e]	222
	2029 Target maximum consumption	[tCO2e]	190
	2029 Target consumption reduction	[tCO2e]	31
	2029 Target consumption reduction	[%]	14

To paraphrase Table 17, the 2029 energy and GHG performance targets for SMMH are as follows.

- **Electricity**: To limit annual electricity consumption to 960,104 kWh.
- **Natural gas**: To limit annual natural gas consumption to 64,130 m^3.
- **GHG emissions**: To limit annual GHG emissions to 190 tCO_2e.

5.3.2 Energy and GHG Road Map

To achieve the above energy and GHG performance targets at SMMH, the road map depicted in Figure 19 is developed according to the following methodology.

1. Each proposed ECM (from Table 16) with a planned in-service year between 2024 and 2029 is superimposed over the timeline in Figure 19 based on its planned in-service year, which is the first full year following the ECM's implementation.
2. Capital costs associated with each ECM are taken from Table 16. It is assumed that capital costs will be incurred during the calendar year prior to the in-service year for each ECM.
3. Changes in electricity, natural gas and GHG performance associated with each ECM are taken from Table 16 and projected according to the same implementation timeline. Results are plotted in Figure 19.

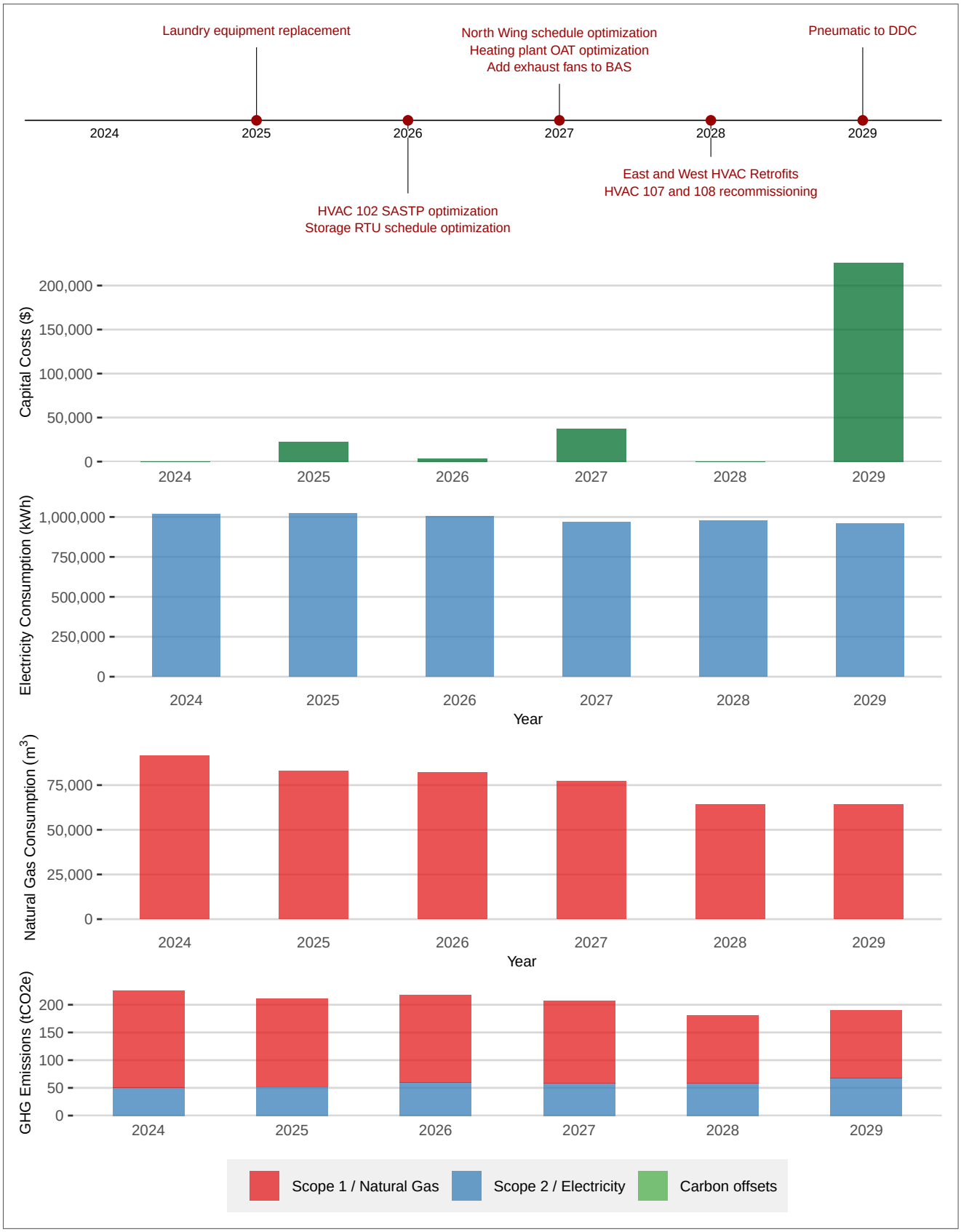


Figure 19: SMMH energy and GHG road map

5.4 Long Term (2030-2050) Energy and GHG Plan

5.4.1 Energy and GHG Performance Targets

Energy and GHG performance targets are determined to reflect the annual energy and GHG performance expected upon implementing the current and proposed ECMs described in Section 5.2. These targets are summarized in Table 18.

Table 18: SMMH baseline energy and long term GHG performance and reduction targets

Category	Description	Unit	SMMH
Electricity	2023 Baseline consumption	[kWh]	1,016,104
	2050 Target maximum consumption	[kWh]	764,010
	2050 Target consumption reduction	[kWh]	252,094
	2050 Target consumption reduction	[%]	25
Natural gas	2023 Baseline consumption	[m3]	91,312
	2050 Target maximum consumption	[m3]	14,482
	2050 Target consumption reduction	[m3]	76,830
	2050 Target consumption reduction	[%]	84
GHG emissions	2023 Baseline consumption	[tCO2e]	222
	2050 Target maximum consumption	[tCO2e]	0
	2050 Target consumption reduction	[tCO2e]	222
	2050 Target consumption reduction	[%]	100

To paraphrase Table 18, the 2050 energy and GHG performance targets for SMMH are as follows.

- **Electricity**: To limit annual electricity consumption to 764,010 kWh.
- **Natural gas**: To limit annual natural gas consumption to 14,482 m^3.
- **GHG emissions**: To limit annual GHG emissions to 0 tCO_2e.

5.4.2 Energy and GHG Road Map

To achieve the above long term energy and GHG performance targets at SMMH, the road map depicted in Figure 20 is developed according to the following methodology.

1. Each proposed ECM (from Table 16) with a planned in-service year between 2030 and 2050 is superimposed over the timeline in Figure 19 based on its planned in-service year, which is the first full year following the ECM's implementation.
2. Capital costs associated with each ECM are taken from Table 16. It is assumed that capital costs will be incurred during the calendar year prior to the in-service year for each ECM.
3. Changes in electricity, natural gas and GHG performance associated with each ECM are taken from Table 16 and projected according to the same implementation timeline. Results are plotted in Figure 19.

Figure 20: SMMH long term energy and GHG road map

6 CLINTON PUBLIC HOSPITAL

6.1 Baseline

6.1.1 Energy Consumption

Figure 21 summarizes the monthly electricity and natural gas consumption for CPH from 2019 - 2023. The trends it shows are typical - higher electricity consumption in the summer months due to increased cooling load and higher natural gas consumption in the winter months due to increased heating load.

Figure 22 summarizes the annual electricity and natural gas consumption for CPH from 2014 - 2023. Annual electricity consumption decreases in 2017 and remains relatively consistent from 2017 to 2023. Annual natural gas consumption increases from 2015 to 2019 and decreases from 2020 to 2023.

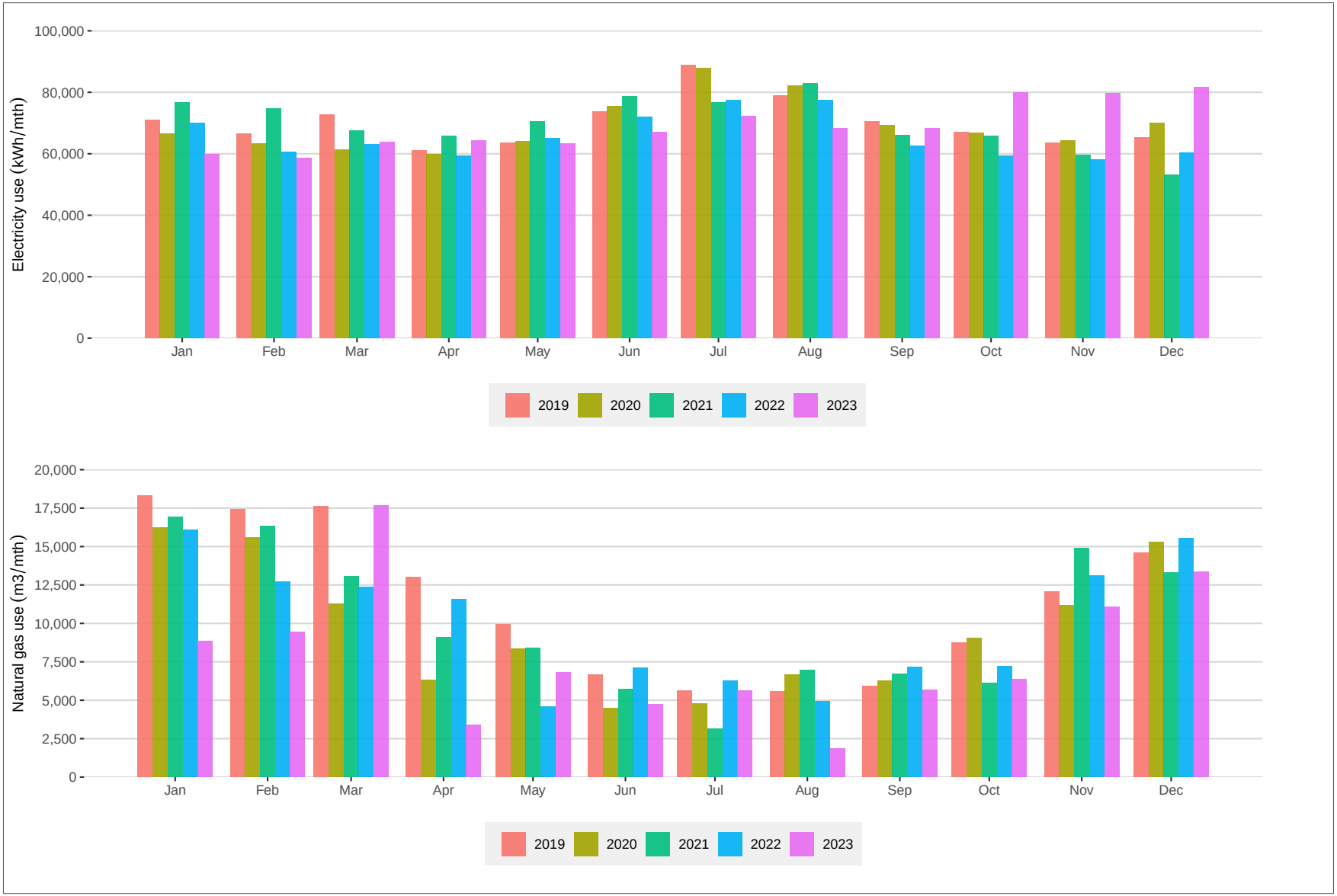


Figure 21: CPH monthly electricity and natural gas consumption

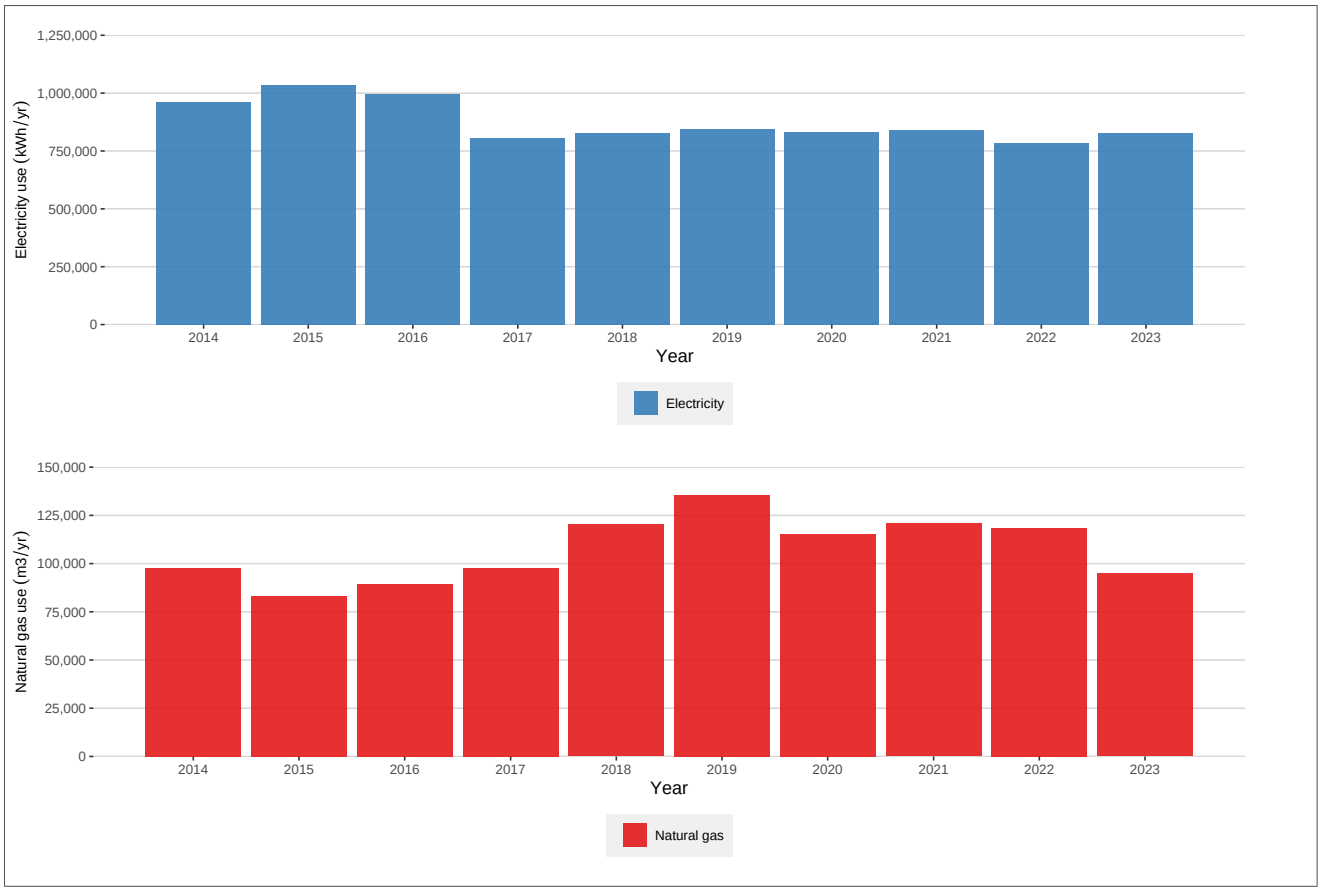


Figure 22: CPH annual electricity and natural gas consumption

6.1.2 GHG Emissions

Figure 23 summarizes CPH's GHG emissions from 2014 - 2023. It is separated by into Scope 1 and 2 emissions. Scope 1 and 2 emissions are directly tied to a facility's electricity and natural gas consumption.

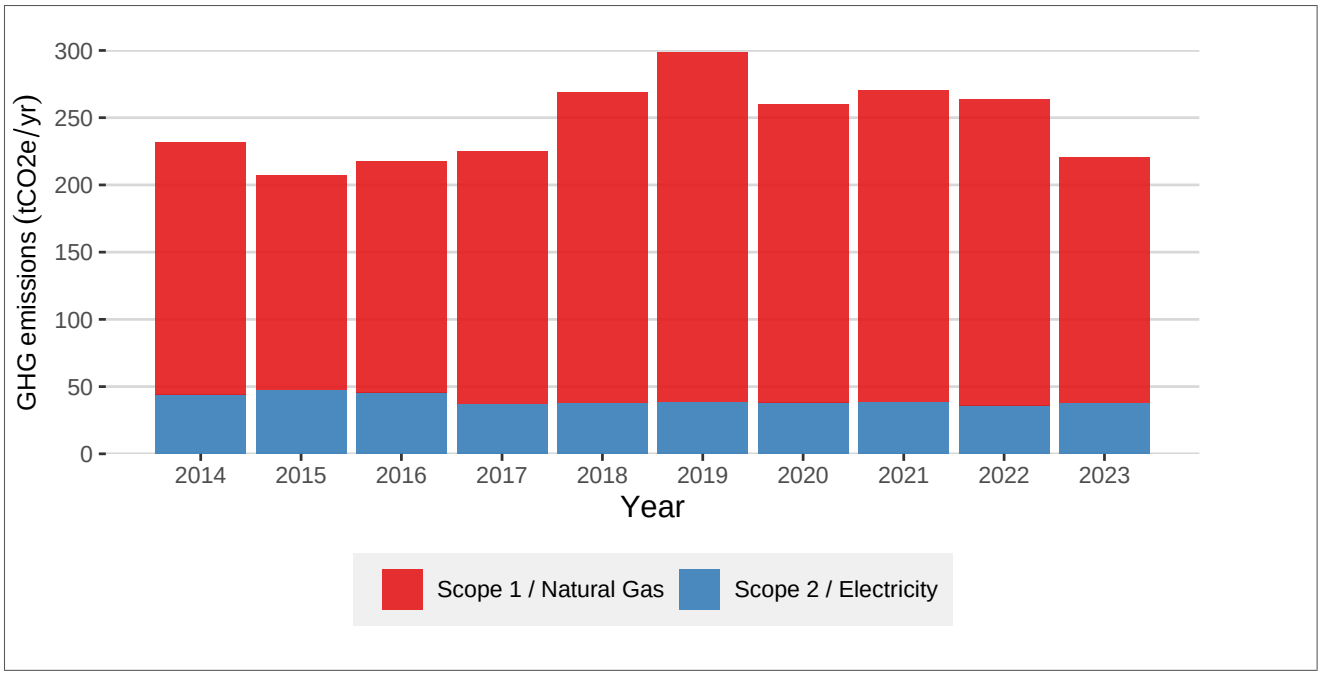


Figure 23: CPH annual GHG emissions

6.2 Energy Conservation Measures

6.2.1 Previous ECMs

A number of energy conservation measures (ECMs) have been implemented since the 2019 CDM plan was completed in an effort to achieve the goals set out in the plan. A list of the ECMs implemented to date is summarized in Table 19.

Table 19: Estimated annual energy savings for completed measures CPH

Measure	Completion Year	Electricity Savings	Natural Gas Savings
-	-	[kWh]	[m3]
Air handling unit system replacements	2021	4,483	6,142

6.2.2 Proposed ECMs

A number of energy audits were completed for Huron Perth Healthcare Alliance's facilities in 2023. These energy audits evaluated various ECMs and estimated their energy savings and implementation costs. Although a number of recommendations resulting from the energy audits have already been completed, there are still several opportunities which remain. The list of proposed ECMs is summarized in Table 20. The year designates the first full year following the ECM's implementation.

Table 20: ECMs to implement at CPH

Measure	Year	Capital cost	GHG reduction	Electricity reduction	Natural gas reduction	Simple payback period
-	-	[$]	[tCO2e/yr]	[kWh/yr]	[m3/yr]	[yr]
SF06 temperature scheduling and OA optimization	2025	0	9	24,310	3,705	-
SF07 OA optimization	2025	0	14	15,858	6,774	-
SF08 OA optimization	2025	0	11	701	5,710	-
HVAC1 FC1 FC2 temperature scheduling and OA optimization	2026	0	4	2,170	2,127	-
Delivery chute air leak mitigation	2027	0	1	566	290	-
DHW to air source heat pump	2034	94,050	15	-32,071	9,494	-
HVAC1 FC1 FC2 replacements	2034	351,120	11	-33,772	7,411	-
Hybrid boiler to air source heat pump	2035	940,500	59	-76,626	34,213	>25
Building envelope upgrade	2038	4,879,314	18	0	9,166	>25
Carbon offsets	2050	0	256	0	0	-

Note that interactive effects between measures are not considered in this table, but are accounted for in the plan.
For instance, after ECM implementation, carbon offsets are projected to provide a 65 tCO2e/yr reduction in GHG emissions in 2050.

6.2.3 Decarbonization Plan

To achieve net zero GHG emissions by 2050, a building decarbonization project for CPH is recommended. For this project, the existing gas-fired hot water plant and domestic hot water boilers are recommended to be replaced by heat pumps. This is represented by the measures "Hybrid boiler to air source heat pump" and "DHW to air source heat pump".

This measure is expected to take place in the medium-to-long term (2030-2045).

To offset any remaining GHG emissions, carbon offsets can be purchased in 2050.

6.3 Short Term (2024-2029) Energy and GHG Plan

6.3.1 Energy and GHG Performance Targets

Energy and GHG performance targets are determined to reflect the annual energy and GHG performance expected upon implementing the current and proposed ECMs described in Section 6.2. These targets are summarized in Table 21.

Table 21: CPH baseline energy and GHG performance and reduction targets

Category	Description	Unit	CPH
Electricity	2023 Baseline consumption	[kWh]	826,969
	2029 Target maximum consumption	[kWh]	785,155
	2029 Target consumption reduction	[kWh]	41,814
	2029 Target consumption reduction	[%]	5
Natural gas	2023 Baseline consumption	[m3]	94,874
	2029 Target maximum consumption	[m3]	77,743
	2029 Target consumption reduction	[m3]	17,131
	2029 Target consumption reduction	[%]	18
GHG emissions	2023 Baseline consumption	[tCO2e]	220
	2029 Target maximum consumption	[tCO2e]	204
	2029 Target consumption reduction	[tCO2e]	16
	2029 Target consumption reduction	[%]	7

To paraphrase Table 21, the 2029 energy and GHG performance targets for CPH are as follows.

- **Electricity**: To limit annual electricity consumption to 785,155 kWh.

- **Natural gas**: To limit annual natural gas consumption to 77,743 m^3.
- **GHG emissions**: To limit annual GHG emissions to 204 tCO_2e.

6.3.2 Energy and GHG Road Map

To achieve the above energy and GHG performance targets at CPH, the road map depicted in Figure 24 is developed according to the following methodology.

1. Each proposed ECM (from Table 20) with a planned in-service year between 2024 and 2029 is superimposed over the timeline in Figure 24 based on its planned in-service year, which is the first full year following the ECM's implementation.
2. Capital costs associated with each ECM are taken from Table 20. It is assumed that capital costs will be incurred during the calendar year prior to the in-service year for each ECM.
3. Changes in electricity, natural gas and GHG performance associated with each ECM are taken from Table 20 and projected according to the same implementation timeline. Results are plotted in Figure 24.

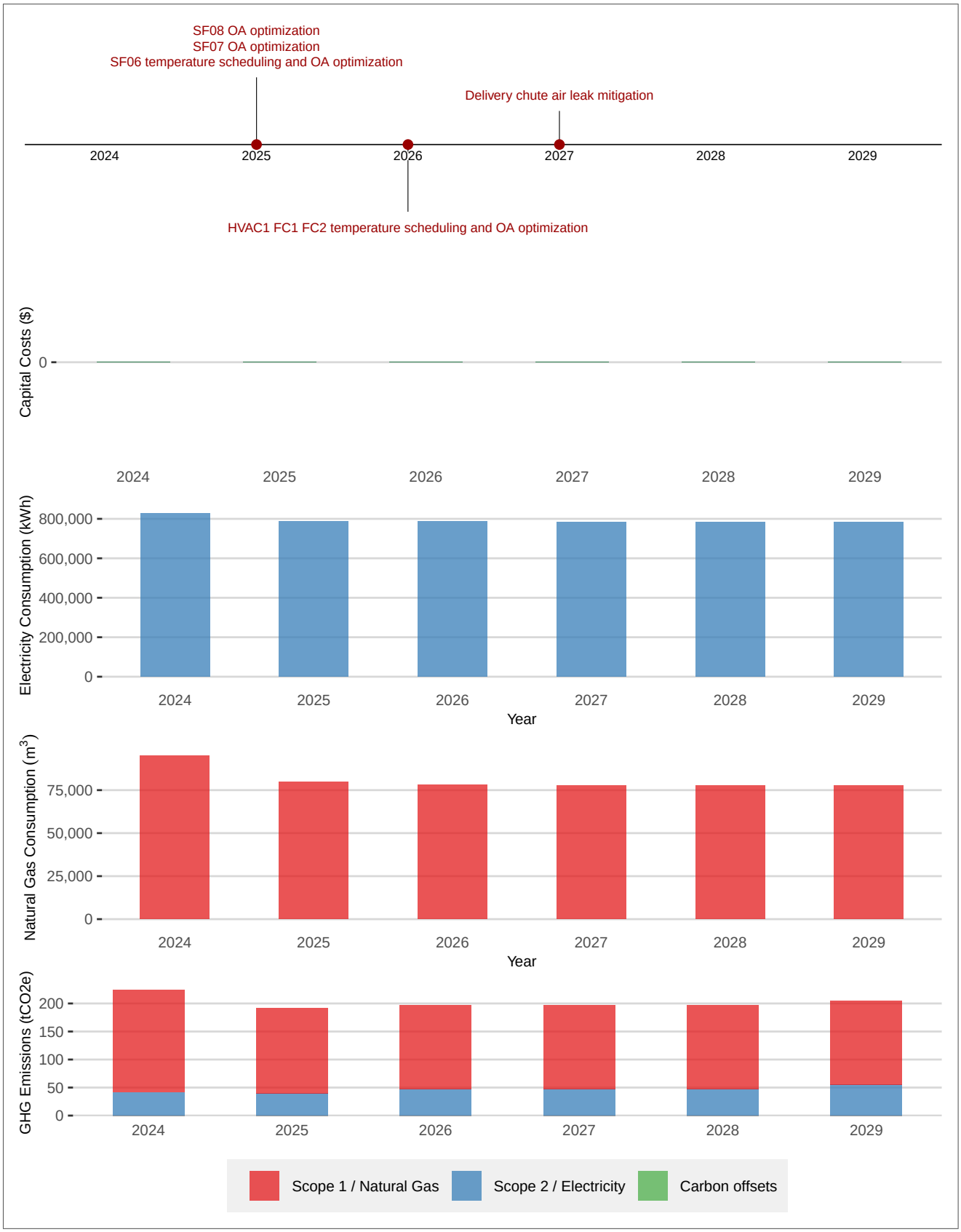


Figure 24: CPH energy and GHG road map

6.4 Long Term (2030-2050) Energy and GHG Plan

6.4.1 Energy and GHG Performance Targets

Energy and GHG performance targets are determined to reflect the annual energy and GHG performance expected upon implementing the current and proposed ECMs described in Section 6.2. These targets are summarized in Table 22.

Table 22: CPH baseline energy and long term GHG performance and reduction targets

Category	Description	Unit	CPH
Electricity	2023 Baseline consumption	[kWh]	826,969
	2050 Target maximum consumption	[kWh]	898,979
	2050 Target consumption reduction	[kWh]	-72,010
	2050 Target consumption reduction	[%]	-9
Natural gas	2023 Baseline consumption	[m3]	94,874
	2050 Target maximum consumption	[m3]	33,979
	2050 Target consumption reduction	[m3]	60,895
	2050 Target consumption reduction	[%]	64
GHG emissions	2023 Baseline consumption	[tCO2e]	220
	2050 Target maximum consumption	[tCO2e]	0
	2050 Target consumption reduction	[tCO2e]	220
	2050 Target consumption reduction	[%]	100

To paraphrase Table 22, the 2050 energy and GHG performance targets for CPH are as follows.

- **Electricity**: To limit annual electricity consumption to 898,979 kWh.
- **Natural gas**: To limit annual natural gas consumption to 33,979 m^3.
- **GHG emissions**: To limit annual GHG emissions to 0 tCO_2e.

6.4.2 Energy and GHG Road Map

To achieve the above long term energy and GHG performance targets at CPH, the road map depicted in Figure 25 is developed according to the following methodology.

1. Each proposed ECM (from Table 20) with a planned in-service year between 2030 and 2050 is superimposed over the timeline in Figure 24 based on its planned in-service year, which is the first full year following the ECM's implementation.
2. Capital costs associated with each ECM are taken from Table 20. It is assumed that capital costs will be incurred during the calendar year prior to the in-service year for each ECM.
3. Changes in electricity, natural gas and GHG performance associated with each ECM are taken from Table 20 and projected according to the same implementation timeline. Results are plotted in Figure 24.

Figure 25: CPH long term energy and GHG road map

7 RENEWABLE GENERATION

There is currently no renewable generation installed at Huron Perth Healthcare Alliance's facilities and there are no plans to install renewable generation in the near future.

Based on the energy audits, there are a few proposed solar PV systems for Seaforth Community Hospital and at St. Marys Memorial Hospital, presented in Table 23.

Table 23: Proposed solar arrays to implement at SCH and SMMH

Facility	Measure	Year	Capital cost	Solar array capacity	Solar generation
-	-	-	[$]	[kW]	[kWh/yr]
Seaforth Community Hospital	Canopy Solar PV	2047	880,308	141	161,026
Seaforth Community Hospital	Ground mount solar PV	2047	843,750	188	213,525
Seaforth Community Hospital	Roof mount solar PV	2047	461,472	108	123,218
St. Marys Memorial Hospital	Canopy Solar PV	2048	645,810	104	118,094
St. Marys Memorial Hospital	Roof mount solar PV	2048	669,636	157	179,247

8 GOALS SUMMARY

This section will summarize Huron Perth Healthcare Alliance's previous goals from the 2014 ECDM plan, current goals for the 2019 ECDM plan, an action plan on how to achieve the current goals, and some additional energy management strategies to consider.

8.1 Previous

The 2019 ECDM Plan aimed to cap annual electricity consumption at 3.5 million kWh, natural gas consumption at 3.6 million m^3, and GHG emissions at 7,100 tCO_2e. Based on Table 24, although the electricity consumption was higher than this goal, the natural gas consumption and GHG emissions were lower than the target.

Figure 26 shows the total energy consumption from 2014 - 2023.

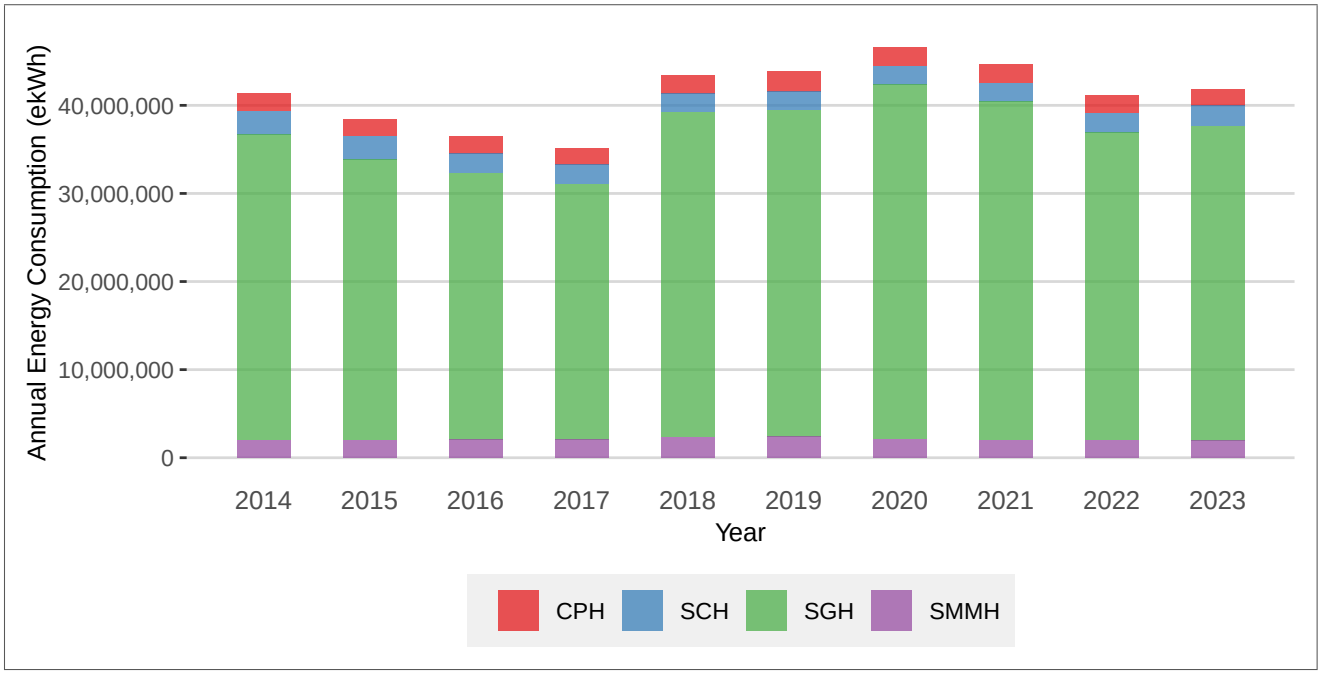


Figure 26: Total energy consumption from 2018 - 2023

8.2 Current

Table 24 summarizes the energy consumption and GHG emissions for Huron Perth Healthcare Alliance facilities for 2018. This is the baseline which the current goal will be based on.

Table 24: Huron Perth Healthcare Alliance 2023 energy consumption and GHG emissions summary

Utility	Unit	CPH	SCH	SMMH	SGH	Total
Electricity Consumption	[kWh]	826,969	957,944	1,016,104	2,276,412	5,077,429
Natural Gas Consumption	[m3]	94,874	127,222	91,312	3,165,404	3,478,812
GHG Emissions	[tCO2e]	220	288	222	6,185	6,915

The energy consumption and GHG emissions reduction goals Huron Perth Healthcare Alliance will achieve by 2029 are summarized in Table 25. Figure 27 summarizes the results of achieving the goals set in this plan. It compares the estimated 2029 energy consumption to the 2023 energy consumption.

Table 25: Huron Perth Healthcare Alliance 2029 goals summary

Utility	Unit	CPH	SCH	SMMH	SGH	Total
Electricity Consumption Reduction	[kWh]	41,814	78,482	56,000	-7,214,959	-7,038,663
Electricity Consumption Reduction	[%]	5	8	6	-317	-139
Natural Gas Consumption Reduction	[m3]	17,131	27,397	27,182	2,170,996	2,242,706
Natural Gas Consumption Reduction	[%]	18	22	30	69	64
GHG Emissions Reduction	[tCO2e]	16	35	31	3,610	3,692
GHG Emissions Reduction	[%]	7	12	14	58	53

The energy consumption and GHG emissions reduction goals Huron Perth Healthcare Alliance will achieve by 2050 are summarized in Table 26. Figure 28 summarizes the results of achieving the goals set in this plan. It compares the estimated 2050 energy consumption to the 2023 energy consumption.

Table 26: Huron Perth Healthcare Alliance 2050 goals summary

Utility	Unit	CPH	SCH	SMMH	SGH	Total
Electricity Consumption Reduction	[kWh]	-72,010	379,585	252,094	-7,183,333	-6,623,664
Electricity Consumption Reduction	[%]	-9	40	25	-316	-130
Natural Gas Consumption Reduction	[m3]	60,895	102,384	76,830	2,182,207	2,422,316
Natural Gas Consumption Reduction	[%]	64	80	84	69	70
GHG Emissions Reduction	[tCO2e]	220	288	222	6,185	6,915
GHG Emissions Reduction	[%]	100	100	100	100	100

To paraphrase Tables 24 and 25, Huron Perth Healthcare Alliance's 2029 energy and GHG performance targets are as follows.

- **Electricity**: To limit total annual electricity consumption of all its facilities to 12,116,092 kWh.
- **Natural gas**: To limit total annual natural gas consumption of all its facilities to 1,236,106 m^3.
- **GHG emissions**: To limit total annual GHG emissions of all its facilities to 3,223 tCO_2e.

To paraphrase Table 26, Huron Perth Healthcare Alliance's 2050 energy and GHG performance targets are as follows.

- **Electricity**: To limit total annual electricity consumption of all its facilities to 11,701,093 kWh.
- **Natural gas**: To limit total annual natural gas consumption of all its facilities to 1,056,496 m^3.
- **GHG emissions**: To limit total annual GHG emissions of all its facilities to 0 tCO_2e.

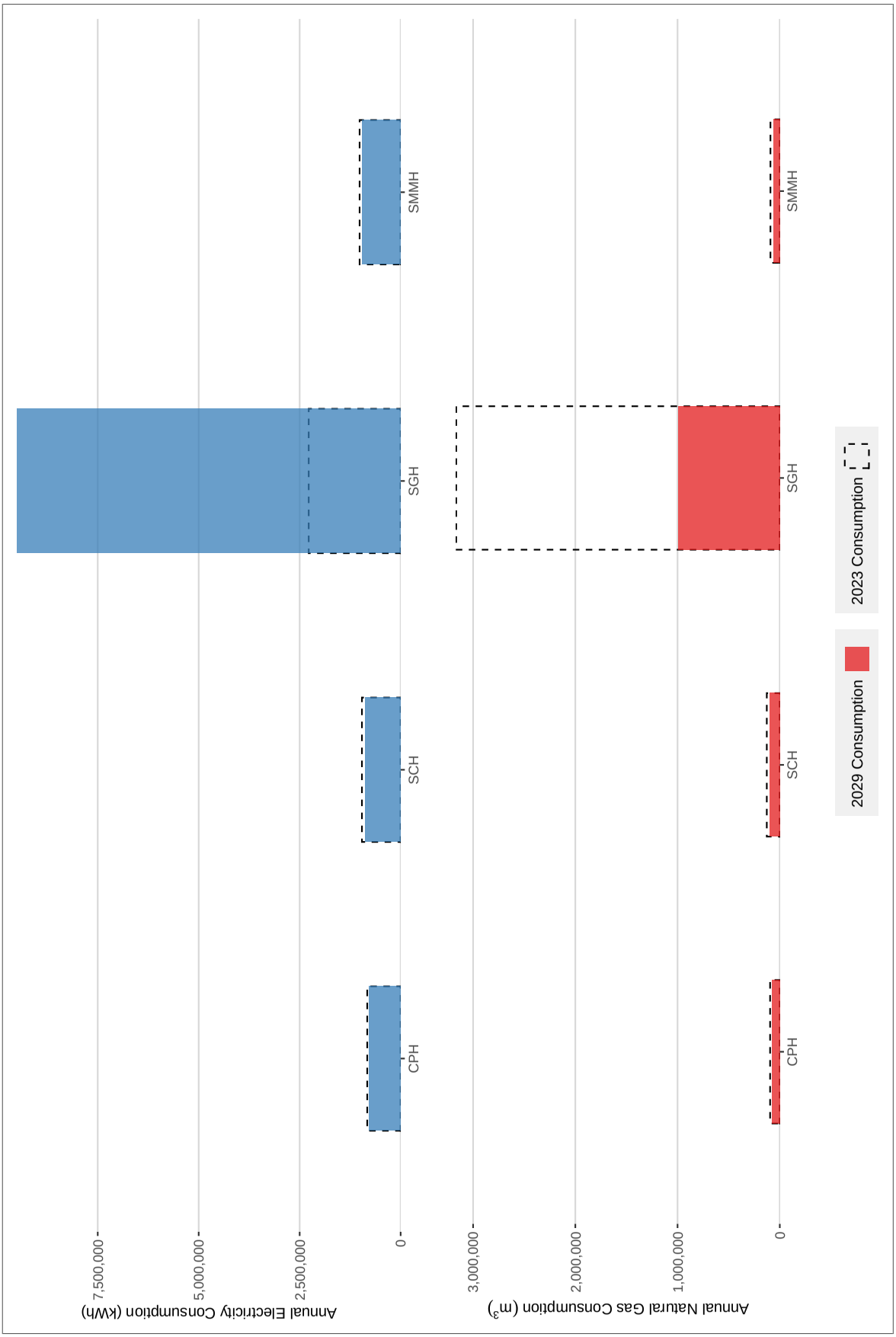


Figure 27: Annual electricity and natural gas consumption in 2023 and 2029

Figure 28: Annual electricity and natural gas consumption in 2023 and 2050

8.3 Action Plan

A summary on how these goals are planned be achieved is described as follows:

- **Stratford General Hospital**
  1. Review list of proposed ECMs and plan to implement as many as possible. Prioritize ECMs with largest potential electricity and natural gas savings.
  2. Investigate projects which can lower natural gas consumption and GHG emissions to offset effects of operating CHP.
  3. Continue to investigate the SGH decarbonization strategy and aim to decarbonize SGH by 2030.
- **Seaforth Community Hospital**
  1. Review list of proposed ECMs and plan to implement as many as possible. Prioritize ECMs with largest potential electricity and natural gas savings.
  2. Investigate decarbonization strategies for the long term (2030-2045).
- **St. Marys Community Hospital**
  1. Review list of proposed ECMs and plan to implement as many as possible. Prioritize ECMs with largest potential electricity and natural gas savings.
  2. Investigate decarbonization strategies for the long term (2030-2045).
- **Clinton Public Hospital**
  1. Review list of proposed ECMs and plan to implement as many as possible. Prioritize ECMs with largest potential electricity and natural gas savings.
  2. Investigate decarbonization strategies for the long term (2030-2045).

8.4 Additional Strategies

8.4.1 Energy Management

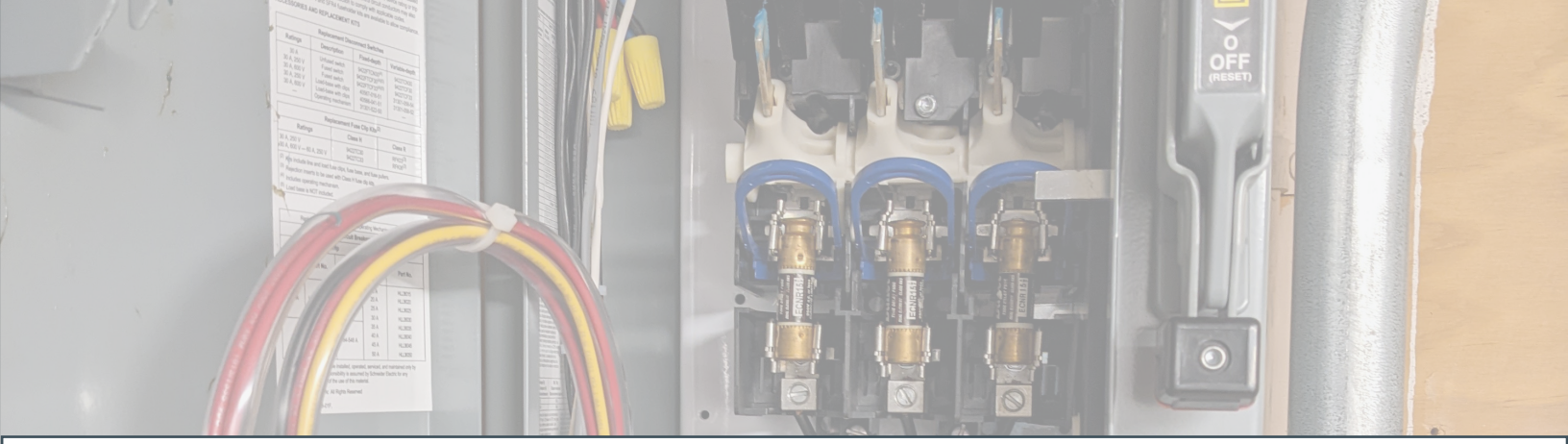
The following strategies should be considered from a strategic energy management perspective:

- Obtain organizational approval of ECDM plan and commitment of resources
  - Executive approval and commitment to required financial and human resources.
  - Support from other key staff (finance, material management, facilities management, and corporate planning departments).
  - Clarification and communication of staff roles and responsibilities, statement of performance goals, and energy management and reporting.
- Implement energy-conscious financial practices and decision making processes
  - Money spent achieving energy efficiency is often overlooked in the decision making process.
  - Make use of life cycle cost analysis on all new construction, major renovations and equipment over $50,000 rather than simply evaluating first costs.
  - Capital investments demonstrating a simple payback of two years or less qualifies as pre-approved.
  - Train energy management staff on financial practices/requirements and the decision making process.
  - Decisions regarding energy management investments will become part of Huron Perth Healthcare Alliance's long-term capital budgeting process.
  - Establish funding resources dedicated to energy efficiencies with expectations that money be invested wisely in appropriate projects and equipment annually.
- Establish purchasing specifications of energy efficiency equipment and services

  - Develop engineering tender documents that favour energy efficient equipment rather than lowest capital cost.
  - Establish efficiency specifications for standard equipment routinely replaced (e.g. lights, motors, HVAC equipment).
  - Develop efficiency guidelines that apply life cycle costing analysis for custom equipment purchases such as chillers.
  - Establish efficiency standards for design and construction, building operations, and maintenance services.
- Implement enhanced design and construction practices
  - Implement improved new construction practices in all construction projects over $500,000 that require an early team collaboration and integrated design.
  - Establish clear energy performance targets for new buildings, major renovations or retrofits of major equipment.
  - Measure energy performance and improve building performance over time using Kaizen-like processes or re-commissioning regularly using an approved commissioning agent.
  - Specify commissioning as standard procedure in all new construction and major renovations.
  - All building systems will be designed, installed, and calibrated to operate as designed and building operators will be trained in their proper operation.
  - Design team, commissioning agent, and building operators will work closely throughout the design and hand over process to ensure a smooth transition.
- Improve building operating performance
  - All building equipment will be properly maintained to achieve energy efficient results while supporting patient care, facility comfort, and safety.
  - Building operators will achieve a balance of energy efficiency, accepted building operating practices, and patient care/facility comfort while maintaining buildings to accepted CSA standards.
  - Building operators will be encouraged to improve their abilities and knowledge through continuing education. Training in new technologies and knowledge of new equipment/processes are essential in the proper operation of an energy efficient building.
- Implement cost effective facility upgrades
  - Implement equipment and system upgrades where justified by life cycle cost analysis.
  - Develop standard RFP documents and engineering standards.
  - Expand the use of qualified building systems professionals to ensure a functional relationship between building equipment and how it operates, and the ability of the physical building to support efficiency expectations.
- Monitor, track, and reward progress
  - Perform continuous monitoring and verification of metrics (electricity consumption savings, natural gas consumption savings, capital costs, etc.) for all major ECM projects implemented.
  - Establish a reward/recognition program for successes to encourage participation.

A Appendix A: Sample Whitepaper

A sample whitepaper prepared for the Huron Perth Healthcare Alliance is presented on the next page.



HURON PERTH HEALTHCARE ALLIANCE
SEAFORTH COMMUNITY HOSPITAL

CONSTRUCTION YEAR

2021

HIGHLIGHTS

Annual Electricity Reduction = 44,182.55 kWh/yr

Annual Natural Gas Reduction = 5,582.20 m3/yr

Annual Energy Reduction = 103,112 ekWh/yr

Annual GHG Reduction = 12.367900 tons/yr

EQUIVALENCY RESULTS

CO_2 Emissions From

3.7845773
Passenger Vehicles

2.8945773
Homes' Energy Use for One Year

8.274125
Homes' Electricity for One Year

PNEUMATIC CONTROLS UPGRADE

Seaforth Community Hospital (SCH) undertook a project, replacing pneumatic heating and ventilation controls. This initiative encompassed the replacement of existing perimeter and reheat pneumatic control valves and completes the hospitals initiative to eliminate pneumatic controls entirely and remove the air compressor. Additionally, building automation system (BAS) control was provided for control and monitoring of the operating room exhaust fans and dampers and for vestibule force-flow heaters. The endeavor aimed to enhance hospital infrastructure, providing efficient control and monitoring of temperature and ventilation.

ENERGY & CARBON SAVINGS

The project introduced innovations focusing on energy conservation and carbon reduction. Removal of the pneumatic control system eliminates energy consumption required by the air compressor. Circuit balancing valves were added and modern control sequences in accordance with ASHRAE Guideline 36 "Best in Class HVAC Control Sequences" were utilized for the digital control of the reheat and perimeter radiation control valves bolstering operational precision and optimizing resource usage. These features collectively support sustainable practices within the emergency department, fostering energy savings and a notable reduction in carbon footprint, aligning with a commitment to environmentally conscious healthcare infrastructure.