
2019 5-YEAR ENERGY CONSERVATION AND DEMAND MANAGEMENT PLAN

HURON PERTH HEALTHCARE ALLIANCE

July 1, 2019



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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 507/18 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.

Table 1 summarizes the annual energy and GHG performance for the baseline year of 2018.

Table 1: Huron Perth Healthcare Alliance 2018 energy consumption and GHG emissions summary

		SGH	SCH	SMMH	CPH	Total
Electricity Consumption	[kWh]	1,699,307	893,591	761,111	829,213	4,183,222
Natural Gas Consumption	[m ³]	3,356,109	110,718	125,734	117,006	3,709,567
GHG Emissions	[mtCO ₂ e]	6,409	247	270	257	7,184

Table 2 summarizes the goals that Huron Perth Healthcare Alliance plans to meet by 2023.

Table 2: Huron Perth Healthcare Alliance 2023 goals summary

		SGH	SCH	SMMH	CPH	Total
Electricity Consumption Reduction	[kWh]	293,030	112,000	207,930	44,220	657,180
Electricity Consumption Reduction	[%]	17	13	27	5.3	16
Natural Gas Consumption Reduction	[m ³]	12,143	38,726	0	-22,501	28,368
Natural Gas Consumption Reduction	[%]	0.36	35	0	-19	0.76
GHG Emissions Reduction	[mtCO ₂ e]	36	78	8.9	-41	82
GHG Emissions Reduction	[%]	0.55	31	3.3	-16	1.1

*Reductions based on 2018 energy consumption and GHG emissions.

To paraphrase Tables 1 and 2, Huron Perth Healthcare Alliance's 2023 energy and GHG performance targets are as follows.

- **Electricity:** To limit total annual electricity consumption of all its facilities to 3,526,042 kWh.
- **Natural gas:** To limit total annual natural gas consumption of all its facilities to 3,681,199 m³.
- **GHG emissions:** To limit total annual GHG emissions of all its facilities to 7,102 mt,CO₂,e.

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 507/18 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.



Figure 1: Huron Perth Healthcare Alliance sites

1.2 Objectives

In alignment with Ontario Regulation 507/18, 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.

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 - 2018.

Annual electricity consumption from 2014 - 2016 is relatively constant, but decreases slightly in 2017 before dropping off significantly in 2018. Annual natural gas consumption steadily decreases from 2014 - 2017 with a significant increase in 2018. 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 2016 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

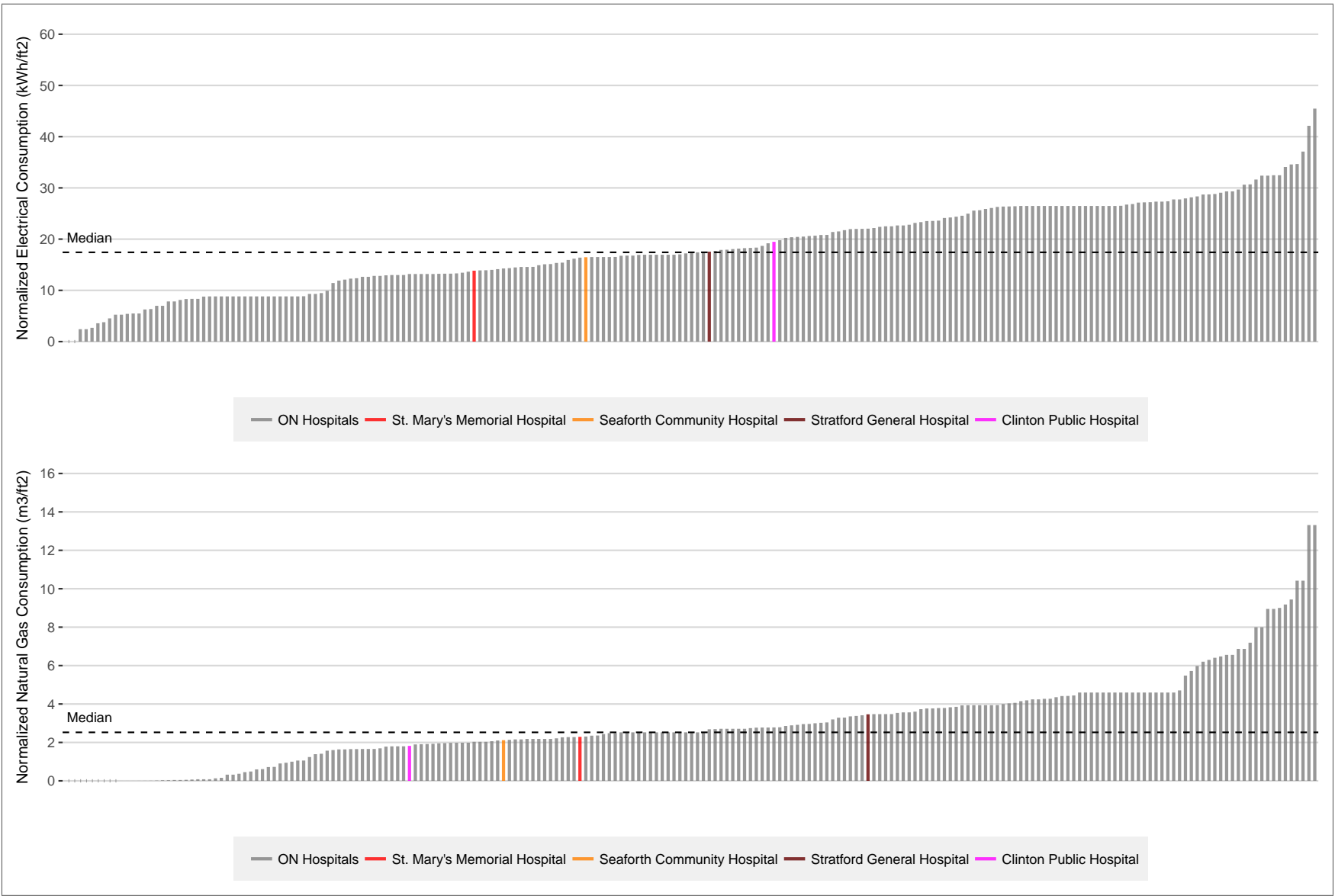


Figure 3: 2016 electricity and natural gas use intensity of Southern Ontario hospitals

2.1.2 GHG Emissions

GHG emissions is typically measured in metric tonnes of carbon dioxide (mtCO₂e). To illustrate, a typical passenger vehicle emits approximately 4.6 mtCO₂e 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 throughout this ECDM Plan are summarized in Table 3.

Table 3: GHG emission factors

Description	Unit	Value
Electricity (Scope 2) GHG emission factor	[g.CO ₂ e ₂ /kWh]	43
Natural gas (Scope 1) GHG emission factor	[g.CO ₂ e ₂ /m ³]	1,888

Figure 4 summarizes the Huron Perth Healthcare Alliance's GHG emissions from 2014 - 2018. 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.

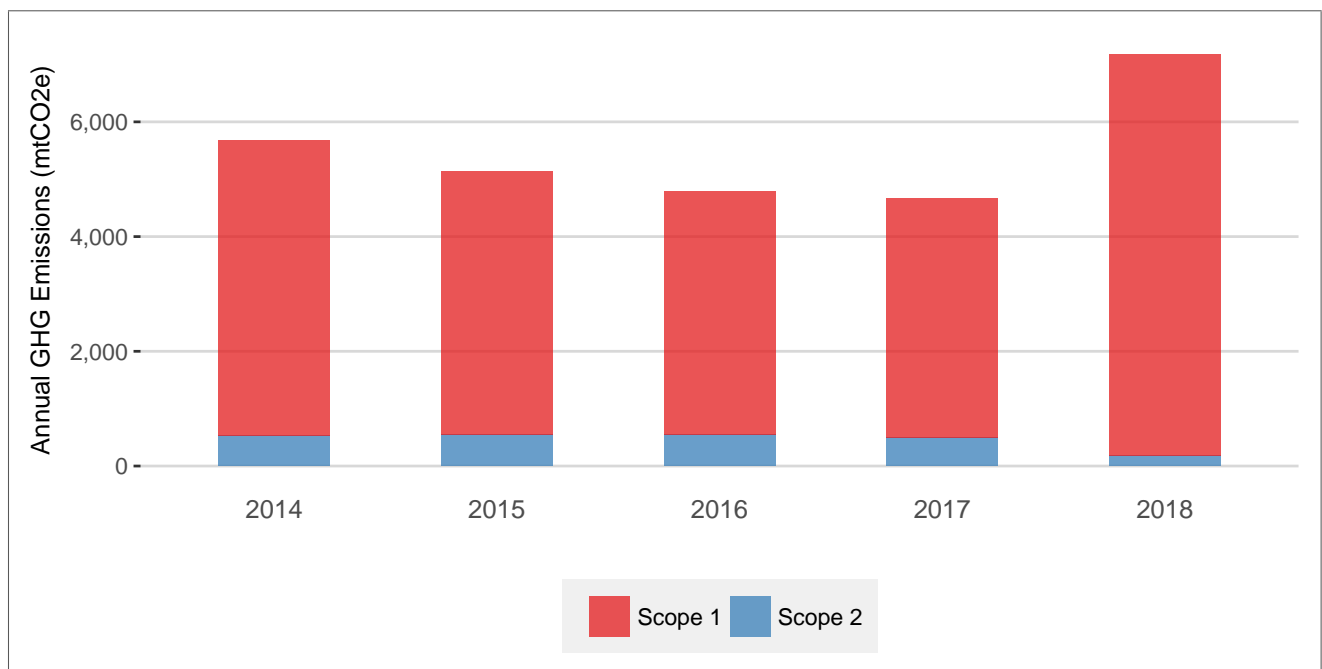


Figure 4: Annual GHG emissions

2.1.3 Water Consumption

Figure 5 summarizes the annual water consumption for all Huron Perth Healthcare Alliance facilities. The annual water consumption has been increasing from 2016 - 2018.

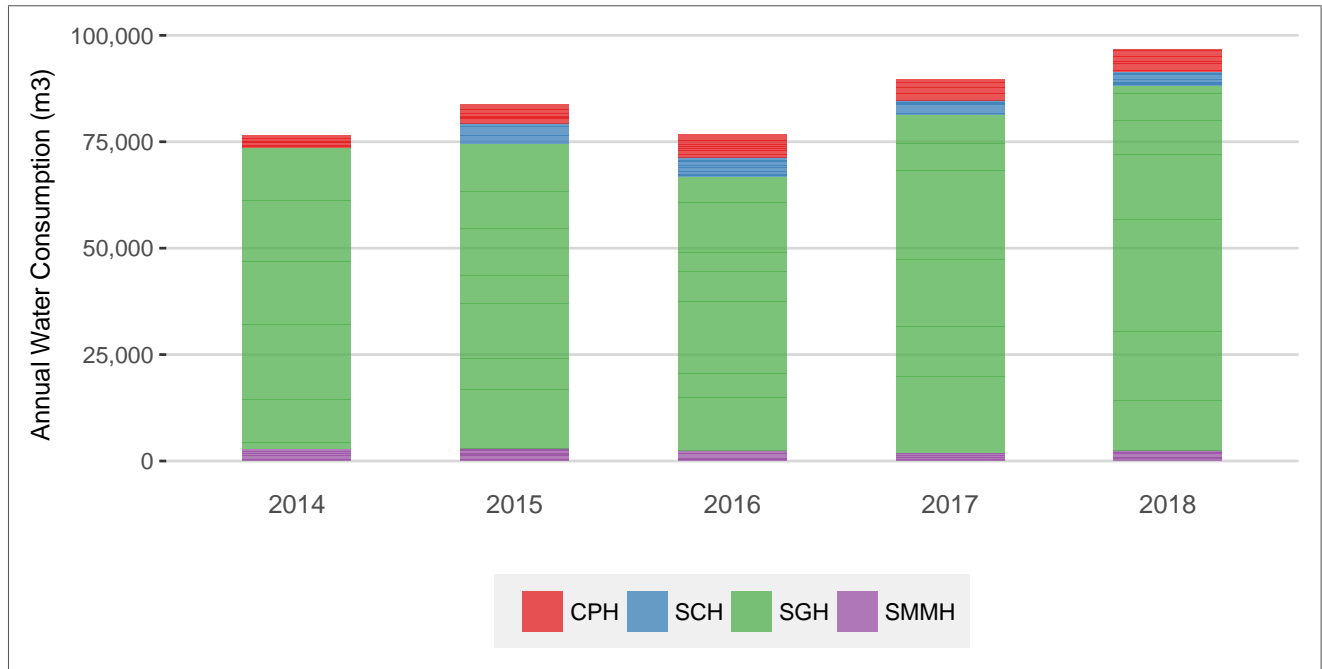


Figure 5: Annual water consumption

2.2 Energy Conservation Measures

2.2.1 Previous ECMs

Several ECMs were implemented between 2014 and 2018 in an effort to improve energy efficiency and GHG performance. These are summarized in Table 4.

Table 4: Previous ECMs summary table

Building	ECM	Year Completed	Electricity Savings [kWh]	Natural Gas Savings [m ³]	Capital Cost [\$]
SGH	HVAC ECM project	2016	976,243	63,044	240,756
SGH	Modifications to Flue-Ace system	2018	0	7,590	5,000
SGH	Cogeneration plant	2018	8,163,216	-1,598,043	2,466,600
SGH	West Building DDC controls	2016			
SGH	Roofing Insulation, West Building & College	2016	0	36,040	
SGH	Roofing Insulation, East Building & Residence	2018	2,421	49,146	
CPH	Kitchen exhaust - scheduling	2016	9,775	16,500	500
CPH	HVAC#1 - scheduling	2016	27,200	0	500
CPH	Kitchen exhaust - system	2016	15,740	23,000	27,225
CPH	Interior lighting	2016	259,990	0	155,640
CPH	Outdoor lighting	2016	18,390	0	13,540
CPH	RTU replacement	2017			
CPH	SF7 RTU replacement	2017			
CPH	SF1, 2, 3 RTU replacement	2018			
SCH	Kitchen - schedule	2016	40,733	16,250	
SCH	Interior lighting upgrades	2017	138,172	0	105,000
SCH	Exterior lighting upgrades	2017	18,391	0	16,700
SCH	Water heater upgrade	2017			
SCH	Boiler upgrade	2017			
SMMH	Wellness centre RTUs scheduling - medical clinic	2016	8,980	6,072	
SMMH	Wellness centre RTUs scheduling - YMCA	2016	12,750	5,290	
SMMH	Kitchen RTU scheduling	2016	2,580	7,030	500
SMMH	Cafeteria RTU scheduling	2016	3,420	3,548	500
SMMH	Meighan Wing RTUs scheduling	2016	3,220	7,707	1,000
SMMH	Laboratory RTU scheduling	2016	2,160	1,619	500
SMMH	Roofing Insulation, Meighan Wing	2018	3,701	16,654	
SMMH	HVAC 107/108 replacement	2018			
SMMH	Water heater upgrade	2018			

Note: Costs and energy savings provided by Huron Perth Healthcare Alliance.

2.2.2 Current ECMs

In addition to the ECMs already implemented, there are a number of ECMs which have already been planned for the remainder of 2019 and onwards. A list of the ECMs planned for implementation is summarized in Table 5. The planned in-service year is defined as the first full year following the ECM's implementation.

Table 5: Current ECMs summary table

Building	ECM	Planned In-Service Year	Electricity Savings [kWh]	Natural Gas Savings [m ³]	Capital Cost [\$]
SGH	Chiller replacement	2020	180,000	0	800,000
SMMH	Interior lighting upgrades	2021	87,785	0	81,000
SMMH	Exterior lighting upgrades	2020	36,062	0	32,949
SMMH	Interior lighting upgrades - Wellness Centre	2021	84,083	0	76,660

Note: Costs and energy savings provided by Huron Perth Healthcare Alliance.

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 2014 - 2018. 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 7 summarizes the annual electricity and natural gas consumption for SGH from 2014 - 2018. Annual electricity consumption from 2014 - 2016 is relatively constant, but decreases slightly in 2017 before dropping off significantly in 2018. Annual natural gas consumption steadily decreases from 2014 - 2017 with a significant increase in 2018.

The energy use changes in 2017 can be attributed to the HVAC ECM project while the energy use changes in 2018 can be attributed to the Cogeneration Plant project. Details on these projects are provided in Table 6.

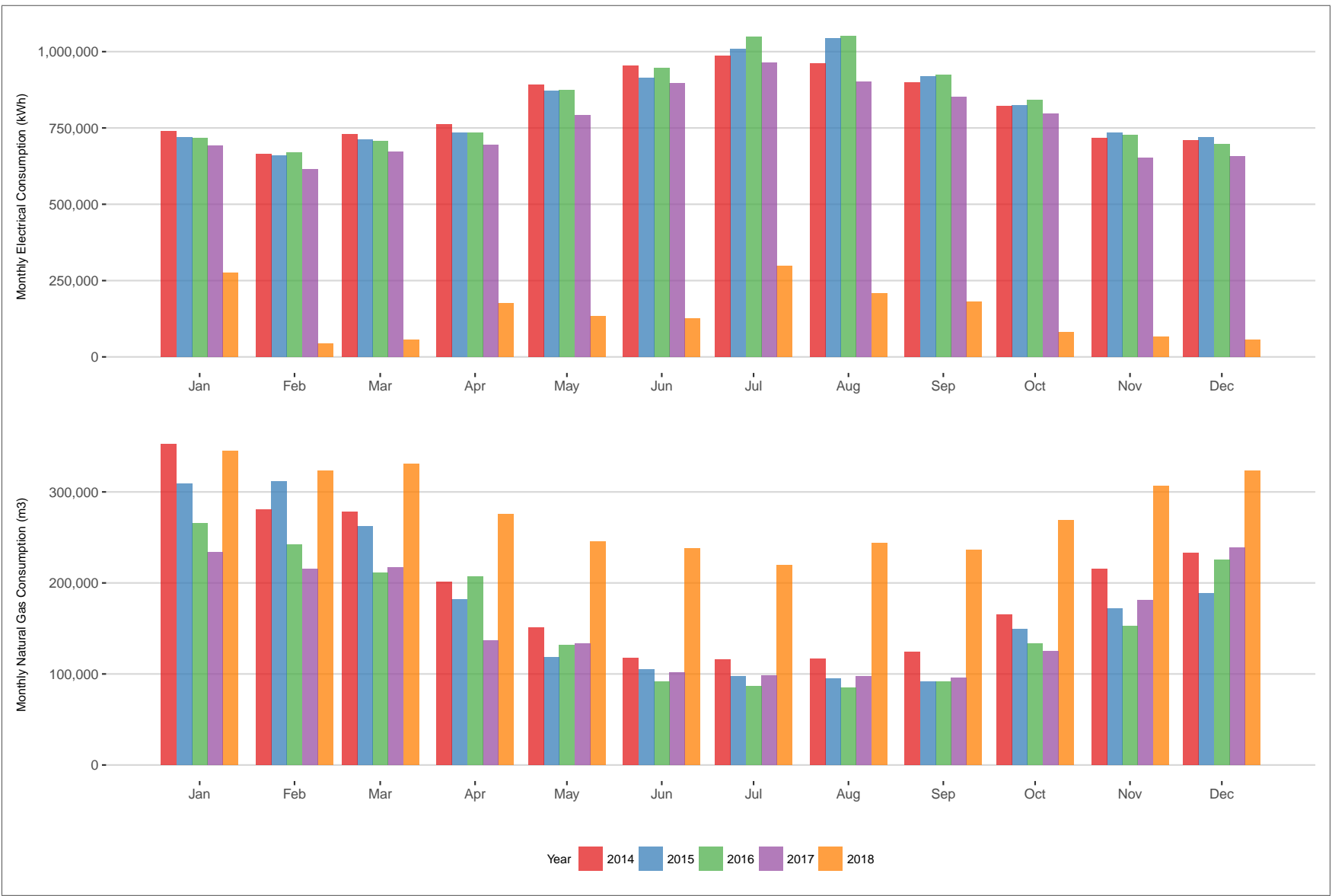


Figure 6: SGH monthly electricity and natural gas consumption



Figure 7: SGH annual electricity and natural gas consumption

3.1.2 GHG Emissions

Figure 8 summarizes SGH's GHG emissions from 2014 - 2018. 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.

3.1.3 Water Consumption

Figure 9 and Figure 10 summarize the monthly and annual water consumption from 2014 - 2018 respectively. Water consumption is slightly higher in the summer months likely due to increased cooling tower operation. Annual water consumption has been increasing from 2017 - 2018.

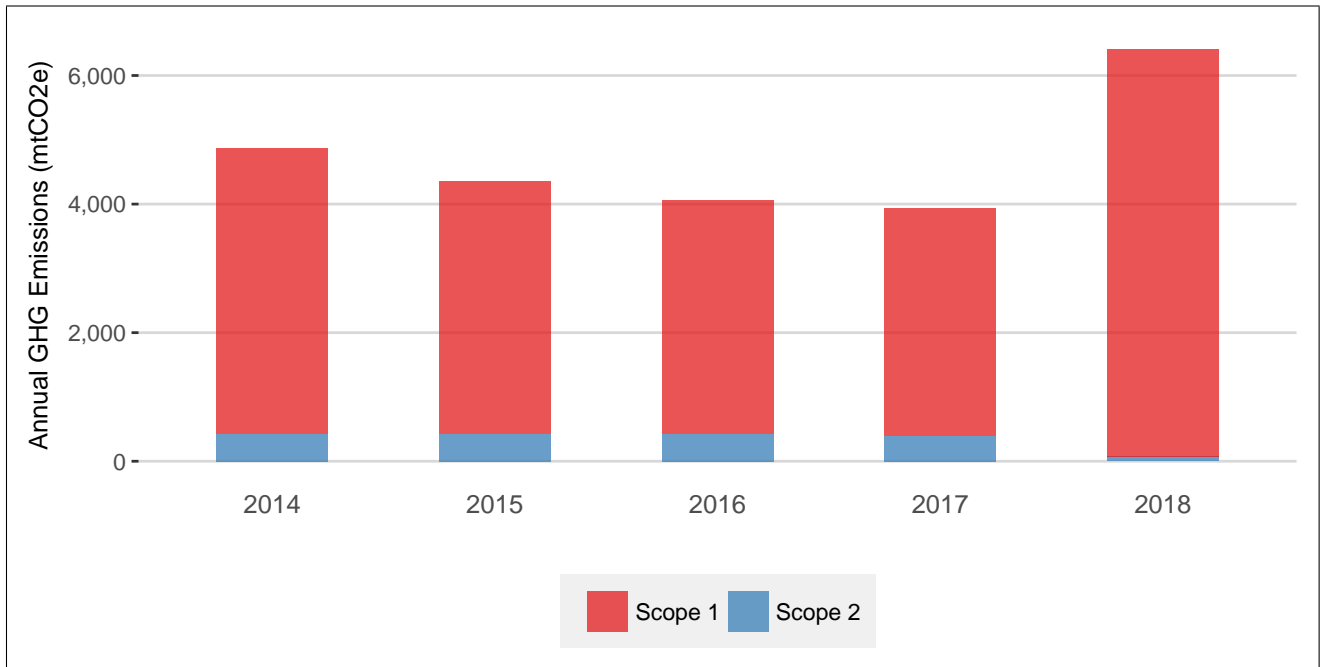


Figure 8: SGH annual GHG emissions

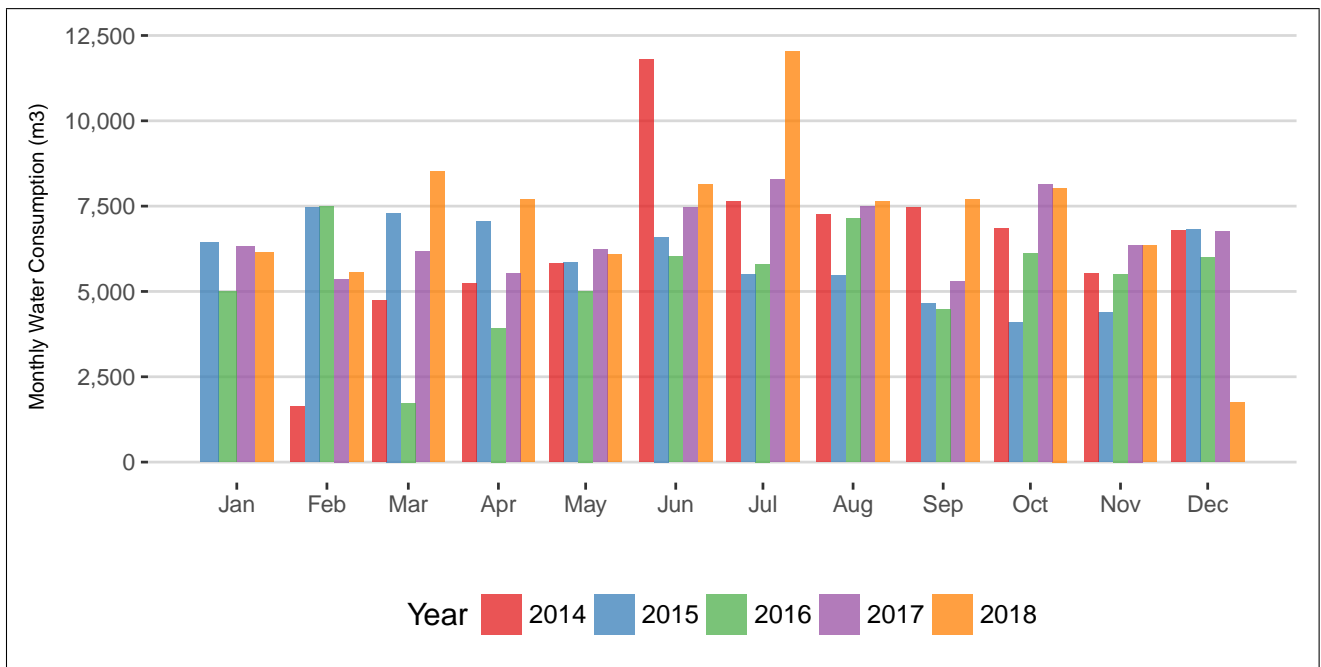


Figure 9: SGH monthly water consumption

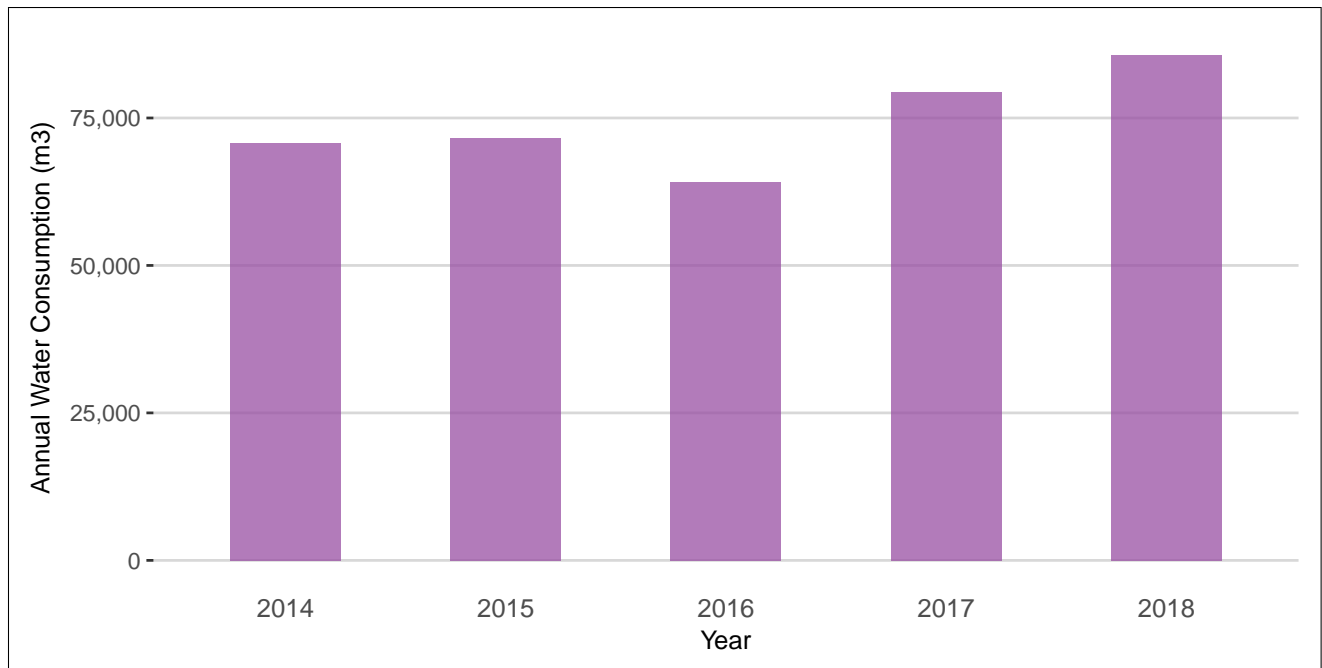


Figure 10: SGH annual water consumption

3.2 Energy Conservation Measures

3.2.1 Previous ECMs

A number of energy conservation measures (ECMs) have been implemented since the 2014 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 6.

Table 6: SGH previous ECMs summary table

Building	ECM	Year Completed	Electricity Savings [kWh]	Natural Gas Savings [m ³]	Capital Cost [\$]
SGH	HVAC ECM project	2016	976,243	63,044	240,756
SGH	Modifications to Flue-Ace system	2018	0	7,590	5,000
SGH	Cogeneration plant	2018	8,163,216	-1,598,043	2,466,600
SGH	West Building DDC controls	2016			
SGH	Roofing Insulation, West Building & College	2016	0	36,040	
SGH	Roofing Insulation, East Building & Residence	2018	2,421	49,146	

Note: Costs and energy savings provided by Huron Perth Healthcare Alliance.

3.2.2 Current ECMs

In addition to the ECMs already implemented, there are a number of ECMs which have already been planned for the remainder of 2019. A list of the ECMs planned for implementation is summarized in Table 7. The planned in-service year designates the first full year following the ECM's implementation.

Table 7: SGH current ECMs summary table

Building	ECM	Planned In-Service Year	Electricity Savings [kWh]	Natural Gas Savings [m ³]	Capital Cost [\$]
SGH	Chiller replacement	2020	180,000	0	800,000

Note: Costs and energy savings provided by Huron Perth Healthcare Alliance.

3.2.3 Proposed ECMs

A number of energy audits were completed for Huron Perth Healthcare Alliance's facilities in 2014. 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 planned in-service year designates the first full year following the ECM's implementation.

Table 8: SGH proposed ECMs summary table

Building	ECM	Planned In-Service Year	Electricity Savings [kWh]	Natural Gas Savings [m ³]	Capital Cost [\$]	Simple Payback [Years]
SGH	Scavenging pump scheduling	2020	14,700	0	0	0.0
SGH	Perimeter control (Block 200/400)	2021	0	12,143	10,000	2.9
SGH	SPD unit LED lighting upgrades	2021	59,217	0	30,000	4.3
SGH	Parking lot LED lighting upgrades	2022	39,113	0	60,000	6.3

3.3 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	2018 Baseline consumption	[kWh]	1,699,307
	2023 Target maximum consumption	[kWh]	1,406,277
	2023 Target consumption reduction	[kWh]	293,030
	2023 Target consumption reduction	[%]	17
Natural gas	2018 Baseline consumption	[m ³]	3,356,109
	2023 Target maximum consumption	[m ³]	3,343,966
	2023 Target consumption reduction	[m ³]	12,143
	2023 Target consumption reduction	[%]	0.36
GHG emissions	2018 Baseline emissions	[ton,CO ₂ ,e]	6,409
	2018 target maximum emissions	[ton,CO ₂ ,e]	6,374
	2023 Target emission reduction	[ton,CO ₂ ,e]	36
	2023 Target emission reduction	[%]	0.55

To paraphrase Table 9, the 2023 energy and GHG performance targets for SGH are as follows.

- **Electricity:** To limit annual electricity consumption to 1,406,277 kWh.

- **Natural gas:** To limit annual natural gas consumption to 3,343,966 m³.
- **GHG emissions:** To limit annual GHG emissions to 6,374 mt,CO₂,e.

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 11 is developed according to the following methodology.

1. Each current and proposed ECM (from Tables 7 and 8, respectively) with a planned in-service year between 2019 and 2023 is superimposed over the timeline in Figure 11 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 Tables 7 and 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 Tables 7 and 8 and projected according to the same implementation timeline. Results are plotted in Figure 11.



Figure 11: SGH energy and GHG road map

4 SEAFORTH COMMUNITY HOSPITAL

4.1 Baseline

4.1.1 Energy Consumption

Figure 12 summarizes the monthly electricity and natural gas consumption for SGH from 2014 - 2018. 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 13 summarizes the annual electricity and natural gas consumption for SGH from 2014 - 2018. Annual electricity consumption is relatively constant. Annual natural gas consumption decreases significantly in 2016 and remains at that level afterwards.

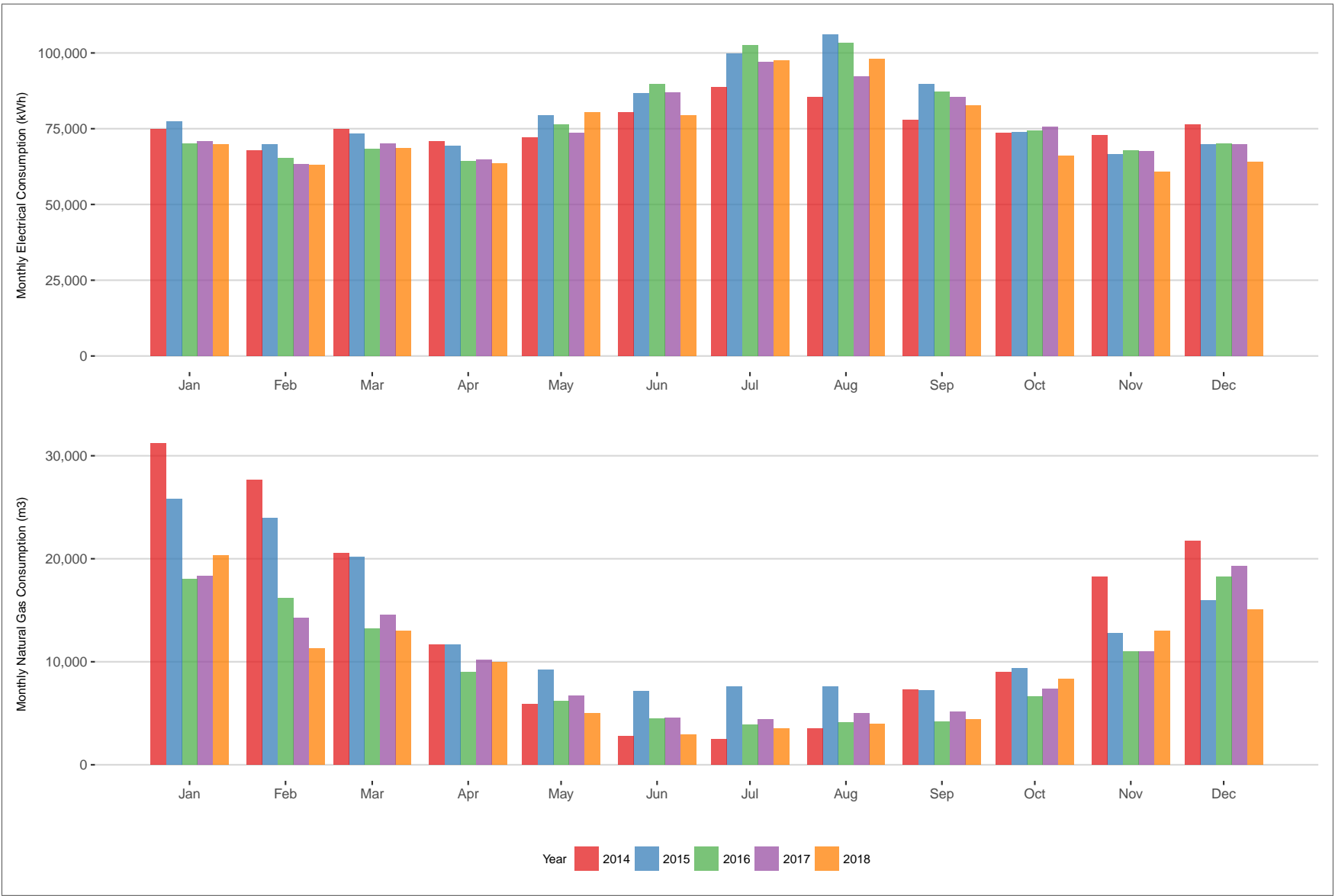


Figure 12: SCH monthly electricity and natural gas consumption

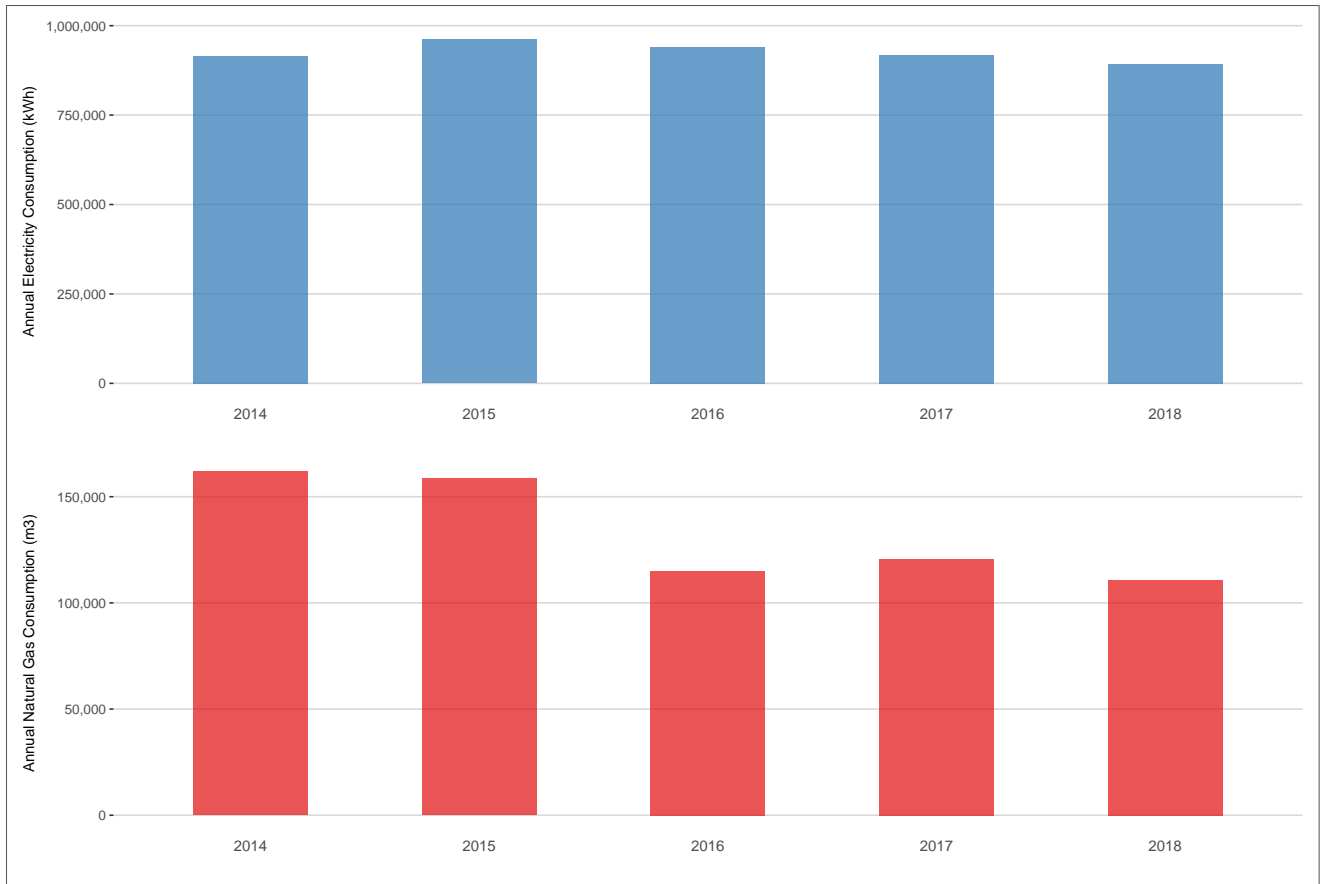


Figure 13: SCH annual electricity and natural gas consumption

4.1.2 GHG Emissions

Figure 14 summarizes SCH's GHG emissions from 2014 - 2018. 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.

4.1.3 Water Consumption

Figure 15 and Figure 16 summarize the monthly and annual water consumption from 2014 - 2018 respectively. Water consumption is slightly higher in the summer months likely due to increased cooling tower operation. Annual water consumption has decreased significantly from 2015 - 2018.

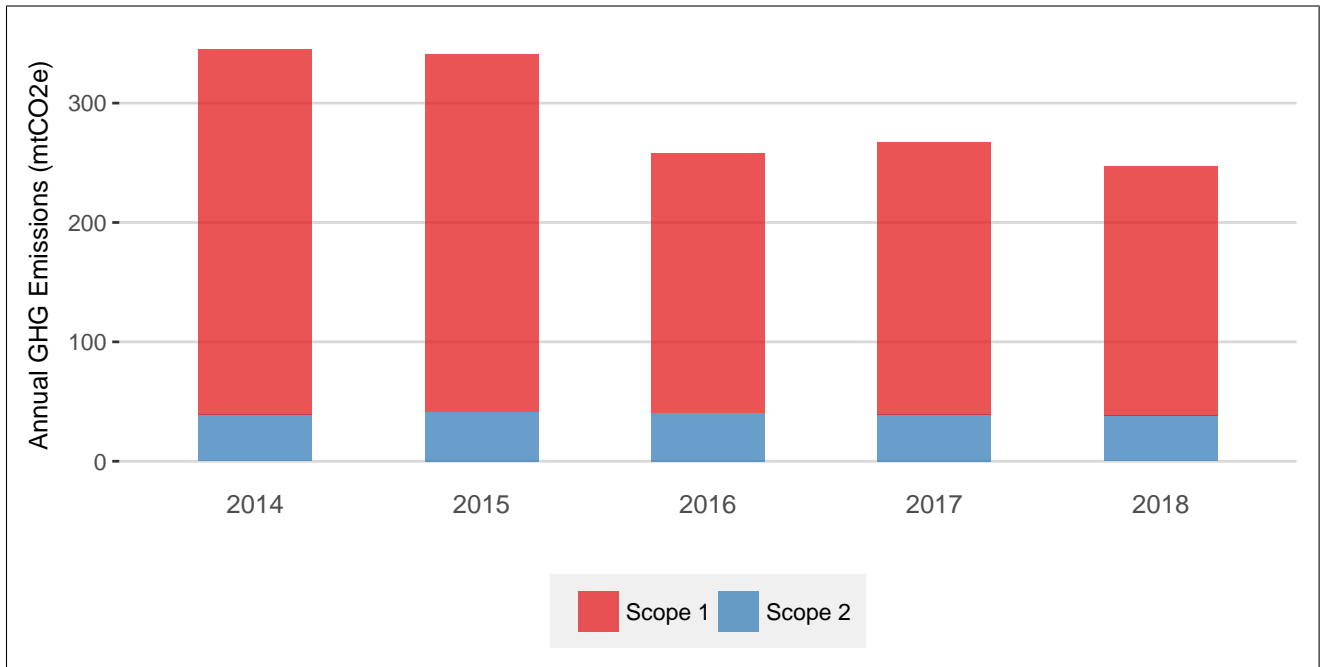


Figure 14: SCH annual GHG emissions

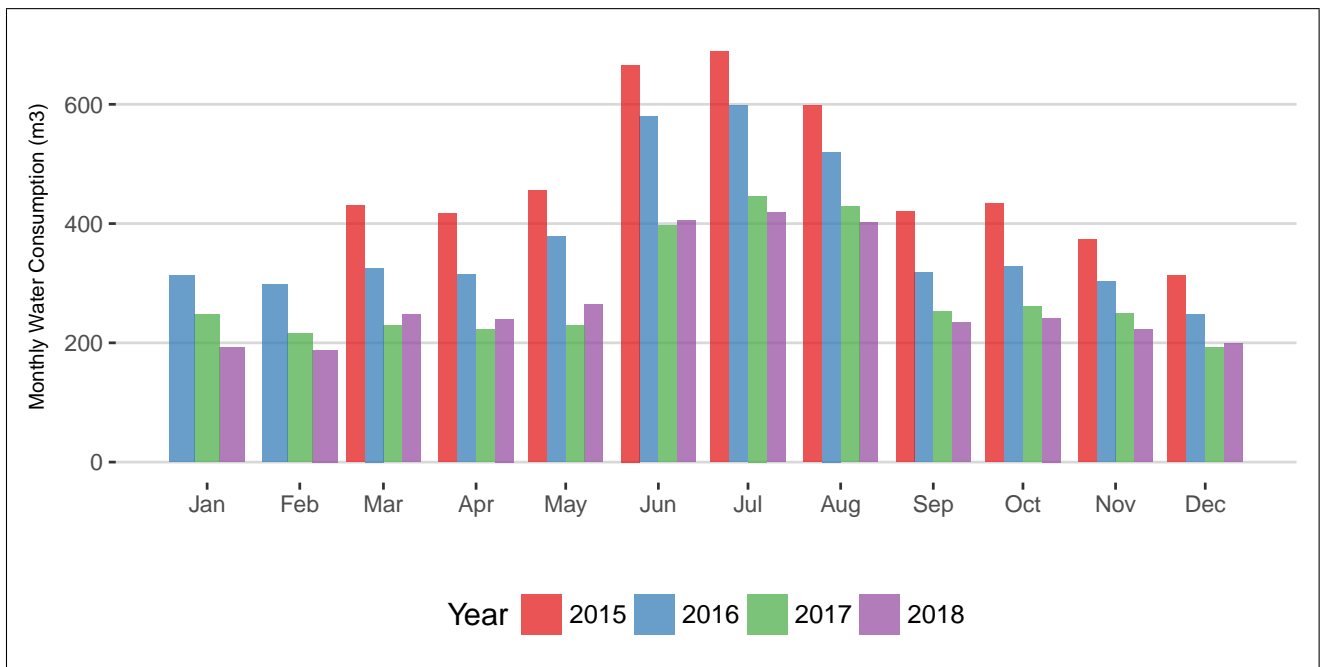


Figure 15: SCH monthly water consumption

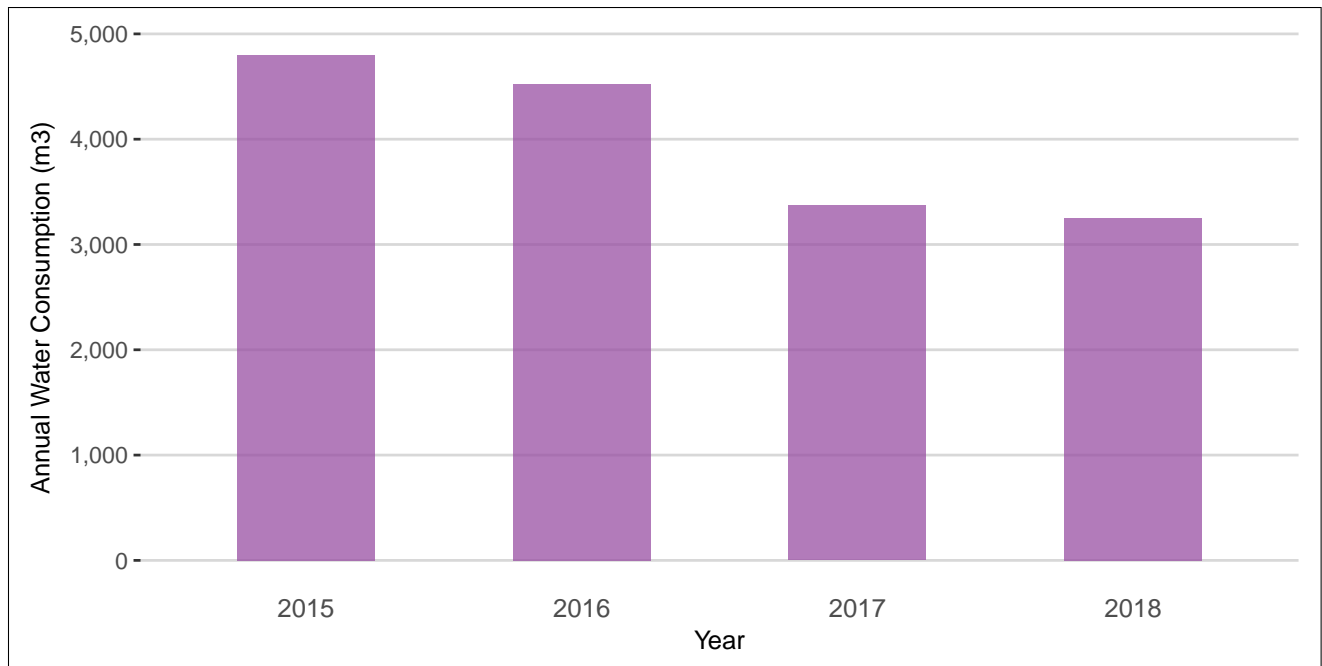


Figure 16: SCH annual water consumption

4.2 Energy Conservation Measures

4.2.1 Previous ECMs

A number of ECMs have been implemented since the 2014 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 10.

Table 10: SCH previous ECMs summary table

Building	ECM	Year Completed	Electricity Savings [kWh]	Natural Gas Savings [m ³]	Capital Cost [\$]
SCH	Kitchen - schedule	2016	40,733	16,250	
SCH	Interior lighting upgrades	2017	138,172	0	105,000
SCH	Exterior lighting upgrades	2017	18,391	0	16,700
SCH	Water heater upgrade	2017			
SCH	Boiler upgrade	2017			

Note: Costs and energy savings provided by Huron Perth Healthcare Alliance.

4.2.2 Current ECMs

There are no ECMs currently planned for this facility.

4.2.3 Proposed ECMs

A number of energy audits were completed for Huron Perth Healthcare Alliance's facilities in 2014. 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 11. The planned in-service year designates the first full year following the ECM's implementation.

Table 11: SCH proposed ECMs summary table

Building	ECM	Planned In-Service Year	Electricity Savings [kWh]	Natural Gas Savings [m ³]	Capital Cost [\$]	Simple Payback [Years]
SCH	Operating suite - schedule/modifications	2021	29,000	25,000	13,600	1.2
SCH	Administration - schedule/modifications	2022	83,000	13,726	31,600	2.5

4.3 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 12.

Table 12: SCH baseline energy and GHG performance and reduction targets

Category	Description	Unit	SCH
Electricity	2018 Baseline consumption	[kWh]	893,591
	2023 Target maximum consumption	[kWh]	781,591
	2023 Target consumption reduction	[kWh]	112,000
	2023 Target consumption reduction	[%]	13
Natural gas	2018 Baseline consumption	[m ³]	110,718
	2023 Target maximum consumption	[m ³]	71,992
	2023 Target consumption reduction	[m ³]	38,726
	2023 Target consumption reduction	[%]	35
GHG emissions	2018 Baseline emissions	[ton,CO ₂ ,e]	247
	2018 target maximum emissions	[ton,CO ₂ ,e]	170
	2023 Target emission reduction	[ton,CO ₂ ,e]	78
	2023 Target emission reduction	[%]	31

To paraphrase Table 12, the 2023 energy and GHG performance targets for SCH are as follows.

- **Electricity:** To limit annual electricity consumption to 781,591 kWh.
- **Natural gas:** To limit annual natural gas consumption to 71,992 m³.
- **GHG emissions:** To limit annual GHG emissions to 170 mt,CO₂,e.

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 17 is developed according to the following methodology.

1. Each proposed ECM (from Table 11) with a planned in-service year between 2019 and 2023 is superimposed over the timeline in Figure 17 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 11. 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 11 and projected according to the same implementation timeline. Results are plotted in Figure 17.

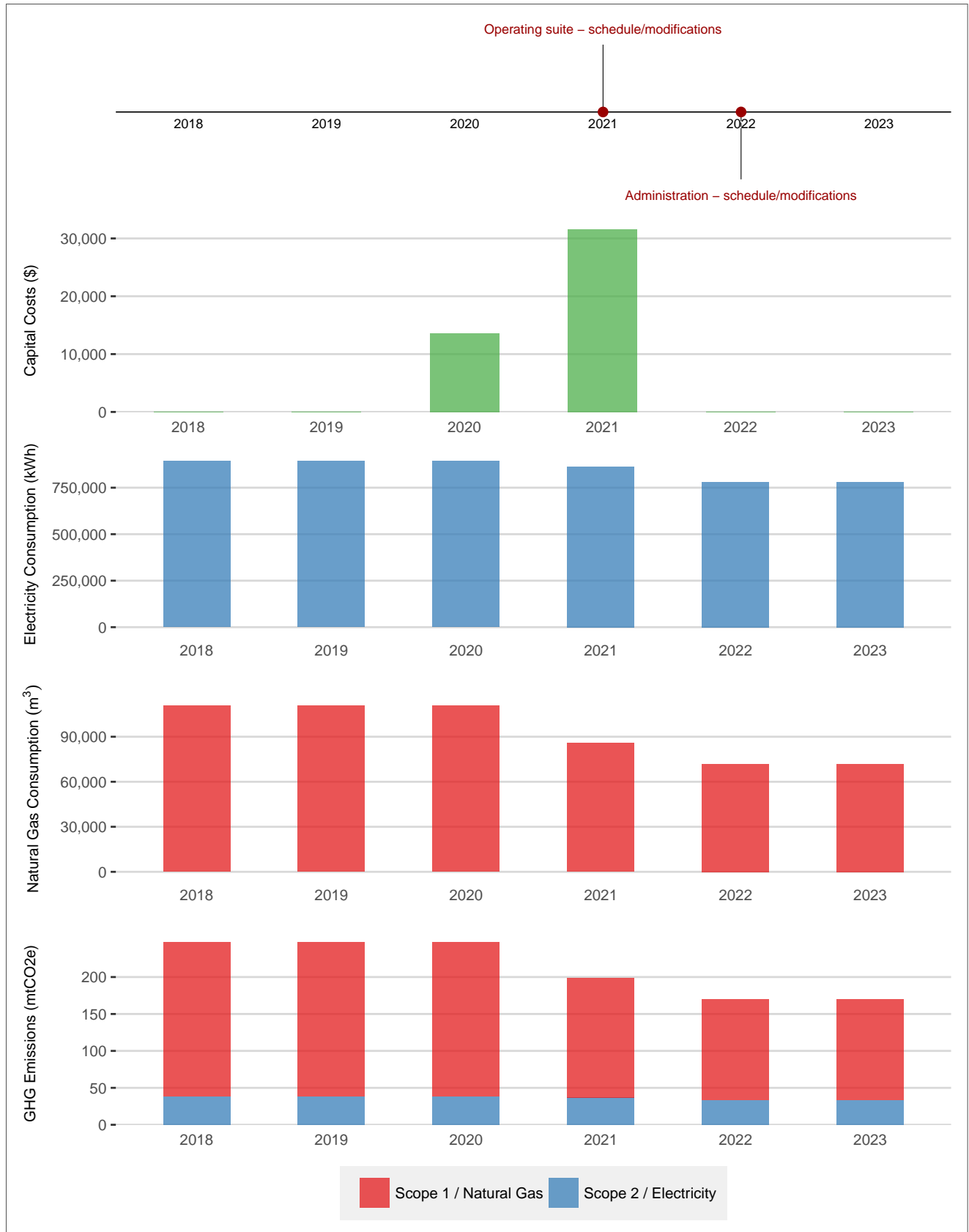


Figure 17: SCH energy and GHG road map

5 ST. MARY'S MEMORIAL HOSPITAL

5.1 Baseline

5.1.1 Energy Consumption

Figure 18 summarizes the monthly electricity and natural gas consumption for SGH from 2014 - 2018. 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 19 summarizes the annual electricity and natural gas consumption for SGH from 2014 - 2018. Annual electricity and natural gas consumption remain relatively constant throughout.

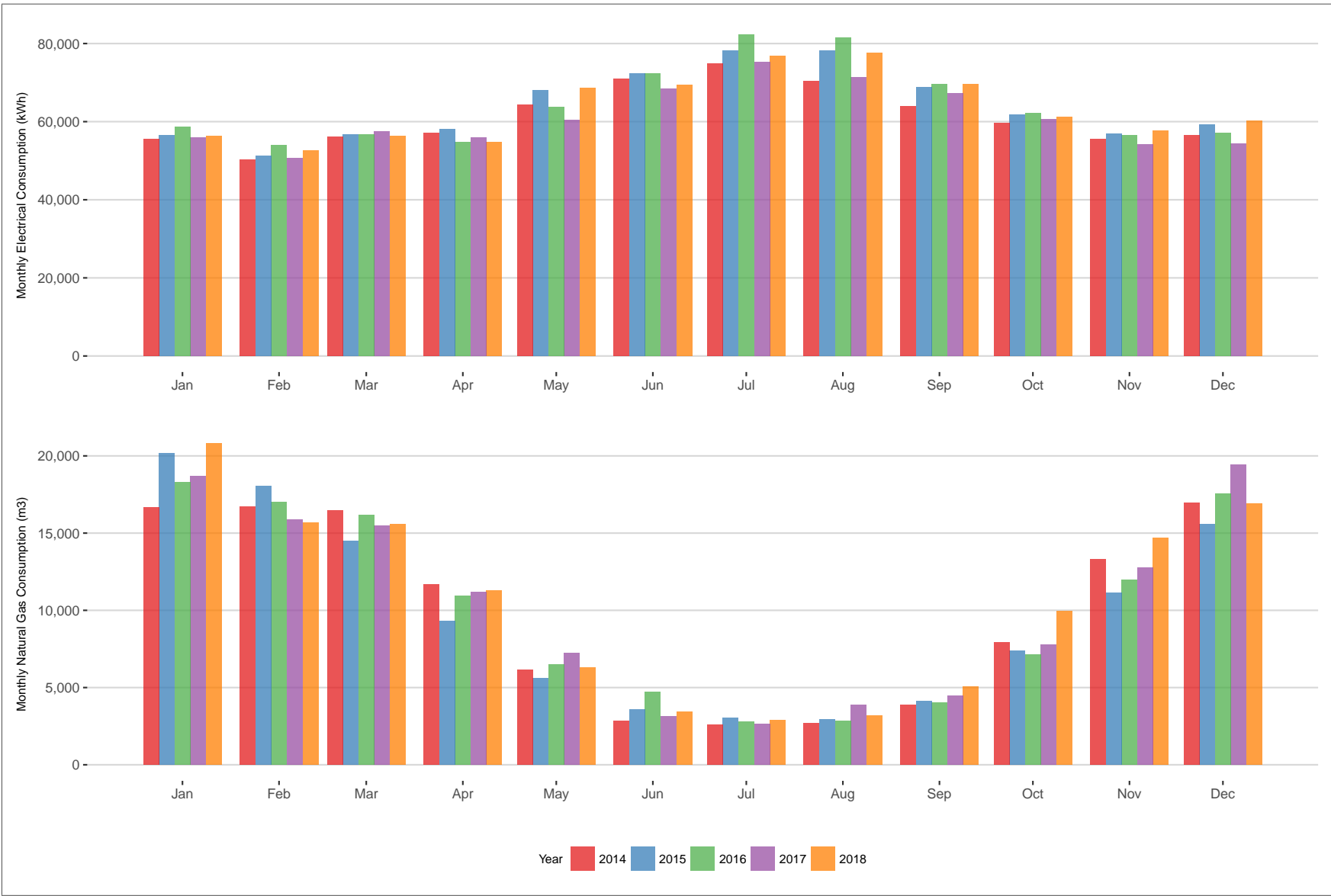


Figure 18: SMMH monthly electricity and natural gas consumption

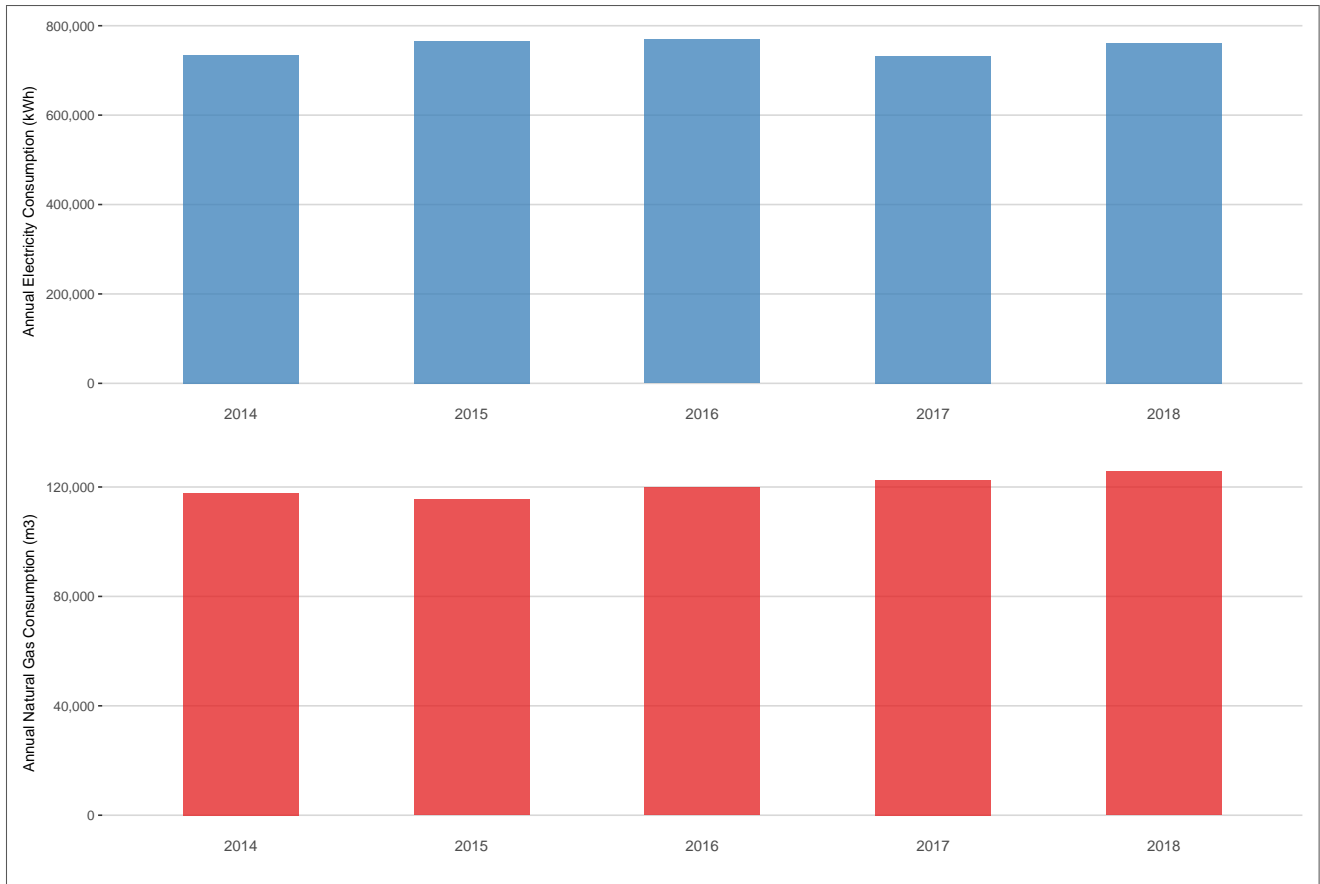


Figure 19: SMMH annual electricity and natural gas consumption

5.1.2 GHG Emissions

Figure 20 summarizes SMMH's GHG emissions from 2014 - 2018. 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.

5.1.3 Water Consumption

Figure 21 and Figure 22 summarize the monthly and annual water consumption from 2014 - 2018 respectively. There is no discernible pattern in water consumption from month to month or year to year.

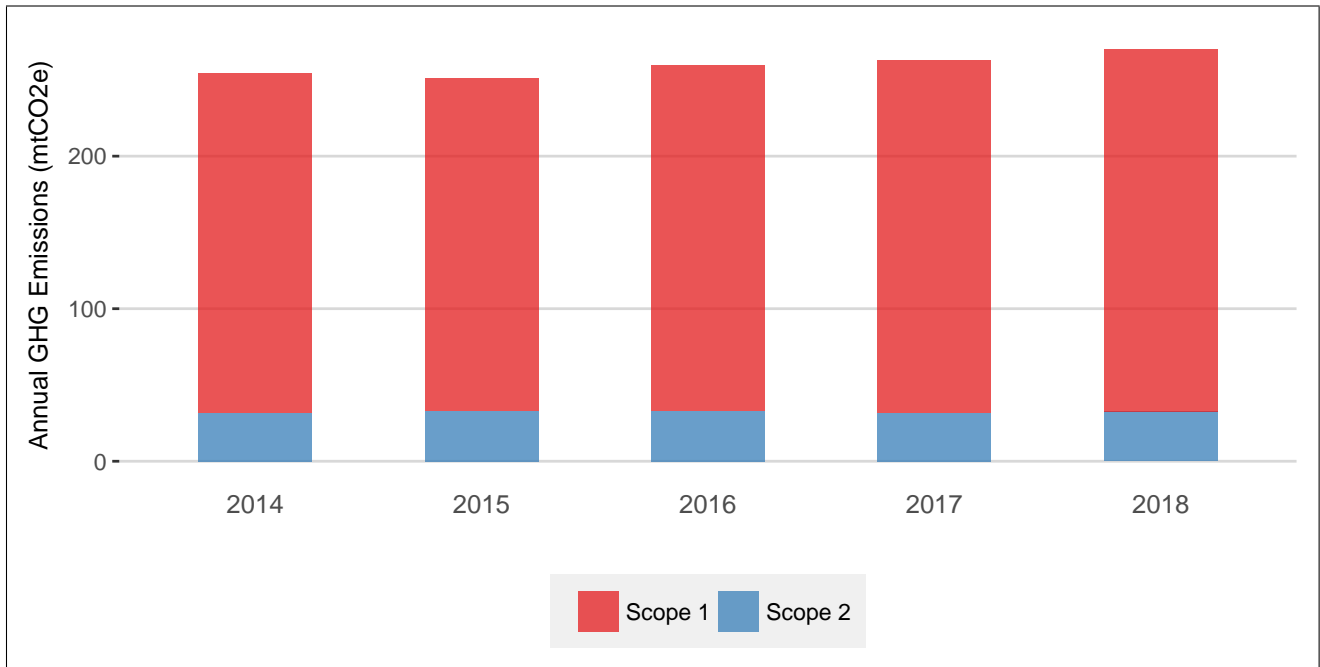


Figure 20: SMMH annual GHG emissions

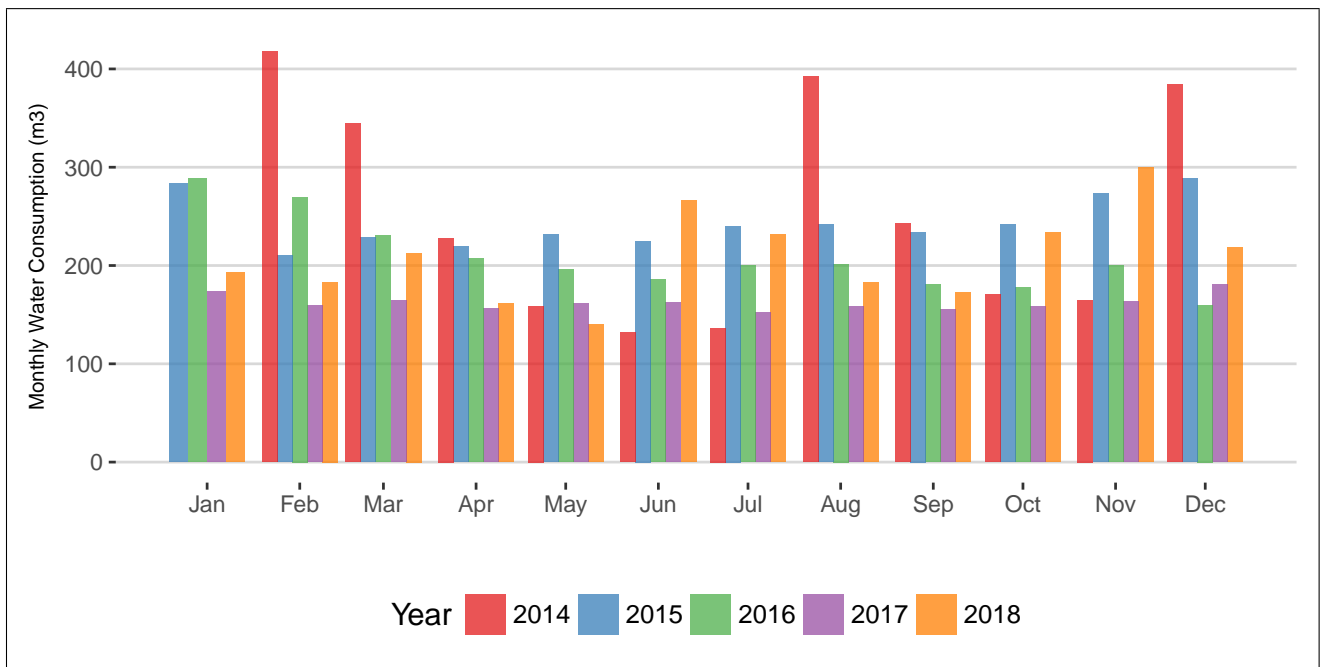


Figure 21: SMMH monthly water consumption

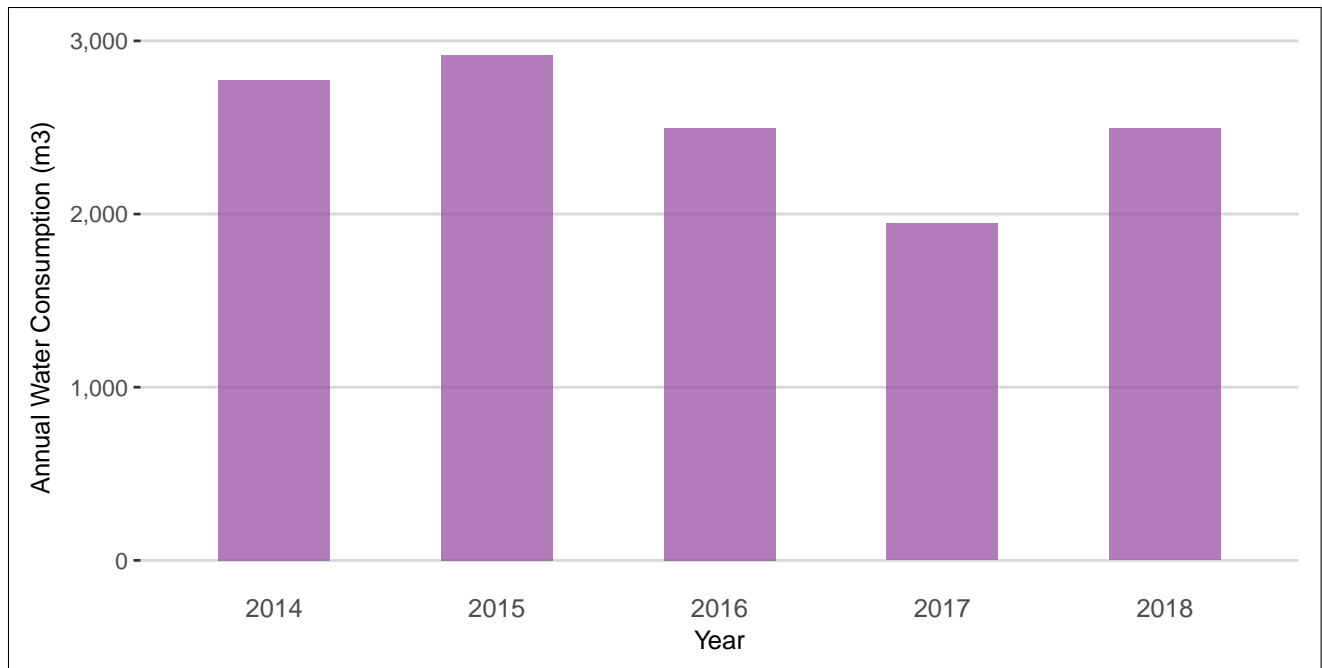


Figure 22: SMMH annual water consumption

5.2 Energy Conservation Measures

5.2.1 Previous ECMs

A number of ECMs have been implemented since the 2014 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 13.

Table 13: SMMH previous ECMs summary table

Building	ECM	Year Completed	Electricity Savings [kWh]	Natural Gas Savings [m ³]	Capital Cost [\$]
SMMH	Wellness centre RTUs scheduling - medical clinic	2016	8,980	6,072	
SMMH	Wellness centre RTUs scheduling - YMCA	2016	12,750	5,290	
SMMH	Kitchen RTU scheduling	2016	2,580	7,030	500
SMMH	Cafeteria RTU scheduling	2016	3,420	3,548	500
SMMH	Meighan Wing RTUs scheduling	2016	3,220	7,707	1,000
SMMH	Laboratory RTU scheduling	2016	2,160	1,619	500
SMMH	Roofing Insulation, Meighen Wing	2018	3,701	16,654	
SMMH	HVAC 107/108 replacement	2018			
SMMH	Water heater upgrade	2018			

Note: Costs and energy savings provided by Huron Perth Healthcare Alliance.

5.2.2 Current ECMs

In addition to the ECMs already implemented, there are a number of ECMs which have already been planned for the remainder of 2019. A list of the ECMs planned for implementation is summarized in Table 14. The planned in-service year designates the first full year following the ECM's implementation.

Table 14: SMMH current ECMs summary table

Building	ECM	Planned In-Service Year	Electricity Savings [kWh]	Natural Gas Savings [m ³]	Capital Cost [\$]
SMMH	Interior lighting upgrades	2021	87,785	0	81,000
SMMH	Exterior lighting upgrades	2020	36,062	0	32,949
SMMH	Interior lighting upgrades - Wellness Centre	2021	84,083	0	76,660

Note: Costs and energy savings provided by Huron Perth Healthcare Alliance.

5.2.3 Proposed ECMs

There are no ECMs remaining from the energy audits.

5.3 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 15.

Table 15: SMMH baseline energy and GHG performance and reduction targets

Category	Description	Unit	SMMH
Electricity	2018 Baseline consumption	[kWh]	761,111
	2023 Target maximum consumption	[kWh]	553,181
	2023 Target consumption reduction	[kWh]	207,930
	2023 Target consumption reduction	[%]	27
Natural gas	2018 Baseline consumption	[m ³]	125,734
	2023 Target maximum consumption	[m ³]	125,734
	2023 Target consumption reduction	[m ³]	0
	2023 Target consumption reduction	[%]	0
GHG emissions	2018 Baseline emissions	[ton,CO ₂ ,e]	270
	2018 target maximum emissions	[ton,CO ₂ ,e]	261
	2023 Target emission reduction	[ton,CO ₂ ,e]	8.9
	2023 Target emission reduction	[%]	3.3

To paraphrase Table 15, the 2023 energy and GHG performance targets for SMMH are as follows.

- **Electricity:** To limit annual electricity consumption to 553,181 kWh.
- **Natural gas:** To limit annual natural gas consumption to 125,734 m³.
- **GHG emissions:** To limit annual GHG emissions to 261 mt,CO₂,e.

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 23 is developed according to the following methodology.

1. Each current ECM (from Table 14) with a planned in-service year between 2019 and 2023 is superimposed over the timeline in Figure 23 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 14. 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 14 and projected according to the same implementation timeline. Results are plotted in Figure 23.

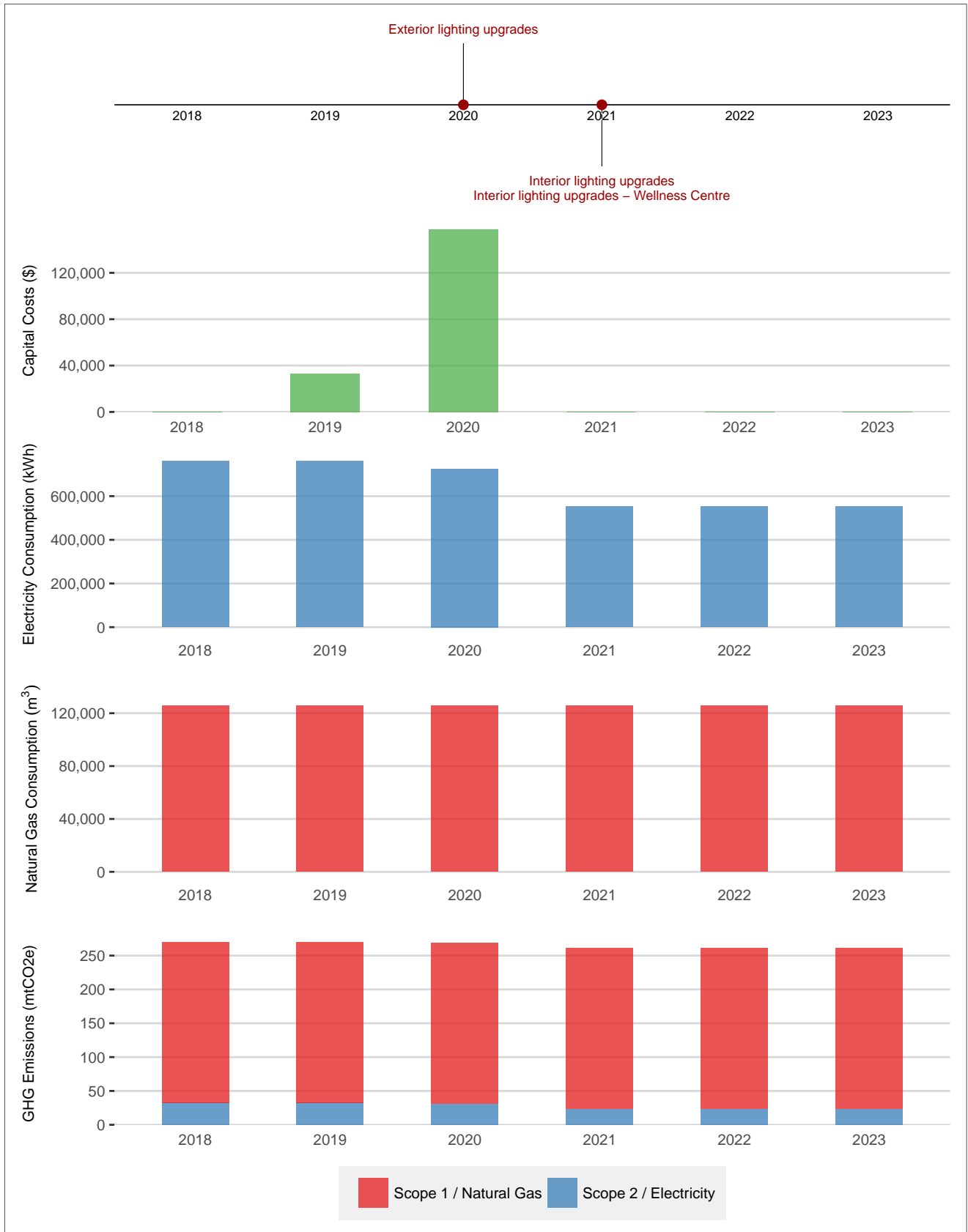


Figure 23: SMMH energy and GHG road map

6 CLINTON PUBLIC HOSPITAL

6.1 Baseline

6.1.1 Energy Consumption

Figure 24 summarizes the monthly electricity and natural gas consumption for SGH from 2014 - 2018. 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 addition to the seasonal changes noted, during the past 5 years a number of significant changes have occurred at CPH. Air-handling systems have been upgraded to ensure compliance to current CSA standards. While space conditions (temperature and humidity) have improved through these upgrades, they do come at the expense of additional energy requirements. In addition, in 2015 an increase in patient occupancy occurred at CPH. This increase in occupancy is indicated in Figure 28.

Figure 25 summarizes the annual electricity and natural gas consumption for SGH from 2014 - 2018. Annual electricity and natural gas consumption remain relatively constant throughout.

There is a decrease in annual electricity consumption from 2017 onwards and an increase in annual natural gas consumption in 2018.

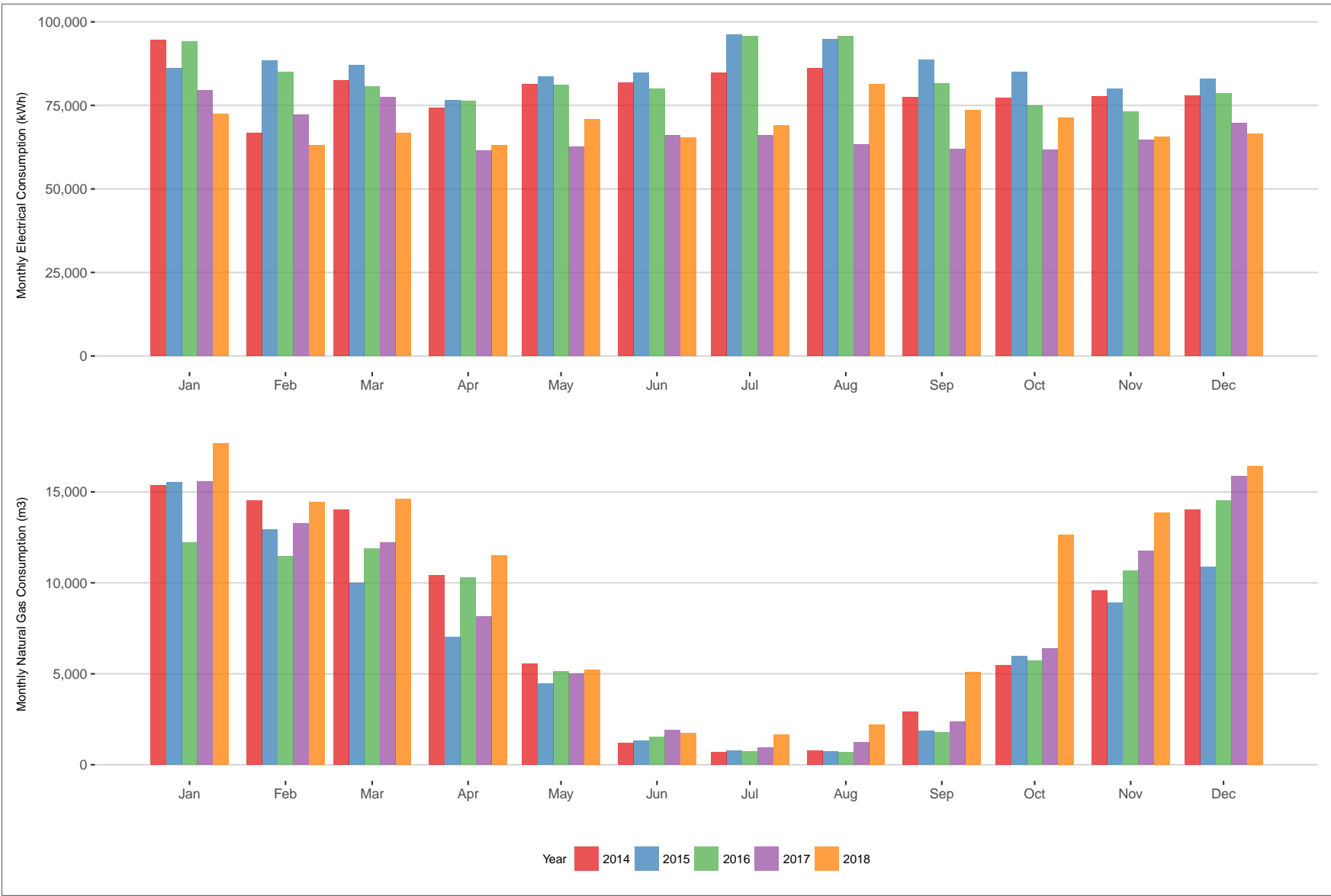


Figure 24: CPH monthly electricity and natural gas consumption



Figure 25: CPH annual Electricity and Natural Gas Consumption

6.1.2 GHG Emissions

Figure 26 summarizes CPH's GHG emissions from 2014 - 2018. 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.

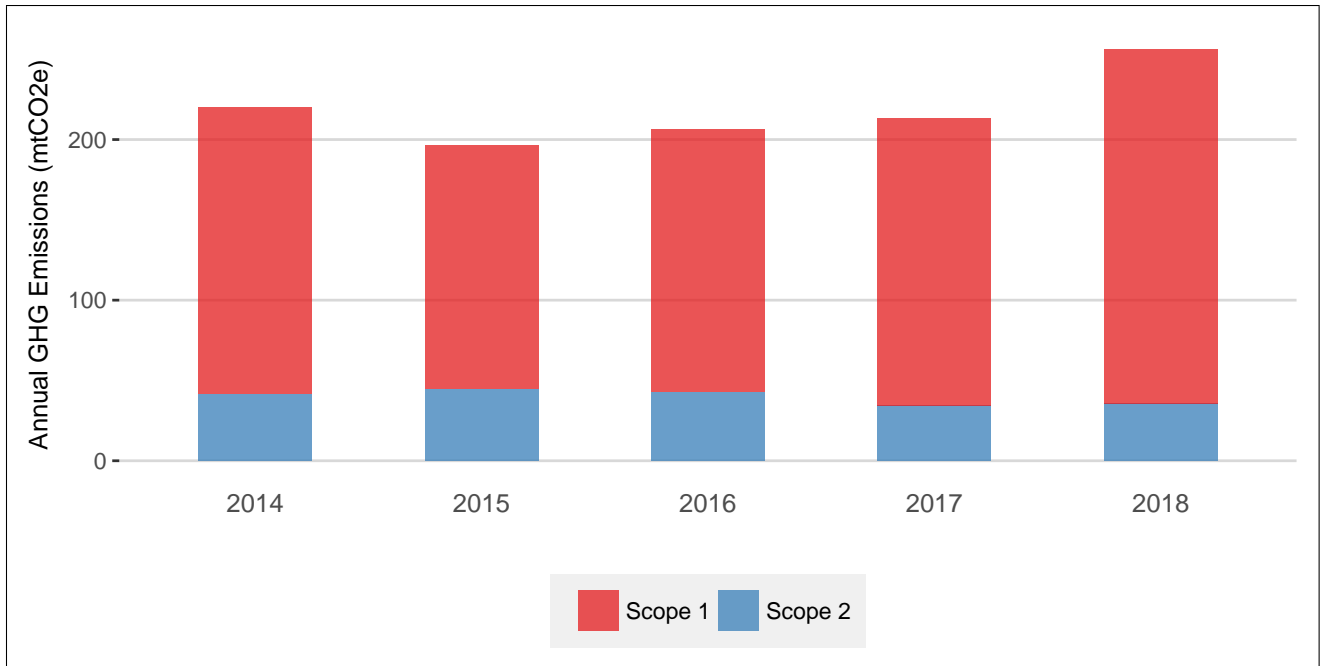


Figure 26: CPH annual GHG emissions

6.1.3 Water Consumption

Figure 27 and Figure 28 summarize the monthly and annual water consumption from 2014 - 2018 respectively. Water consumption is slightly higher in the summer months likely due to increased cooling tower operation. Annual water consumption has increased from 2014 - 2018.

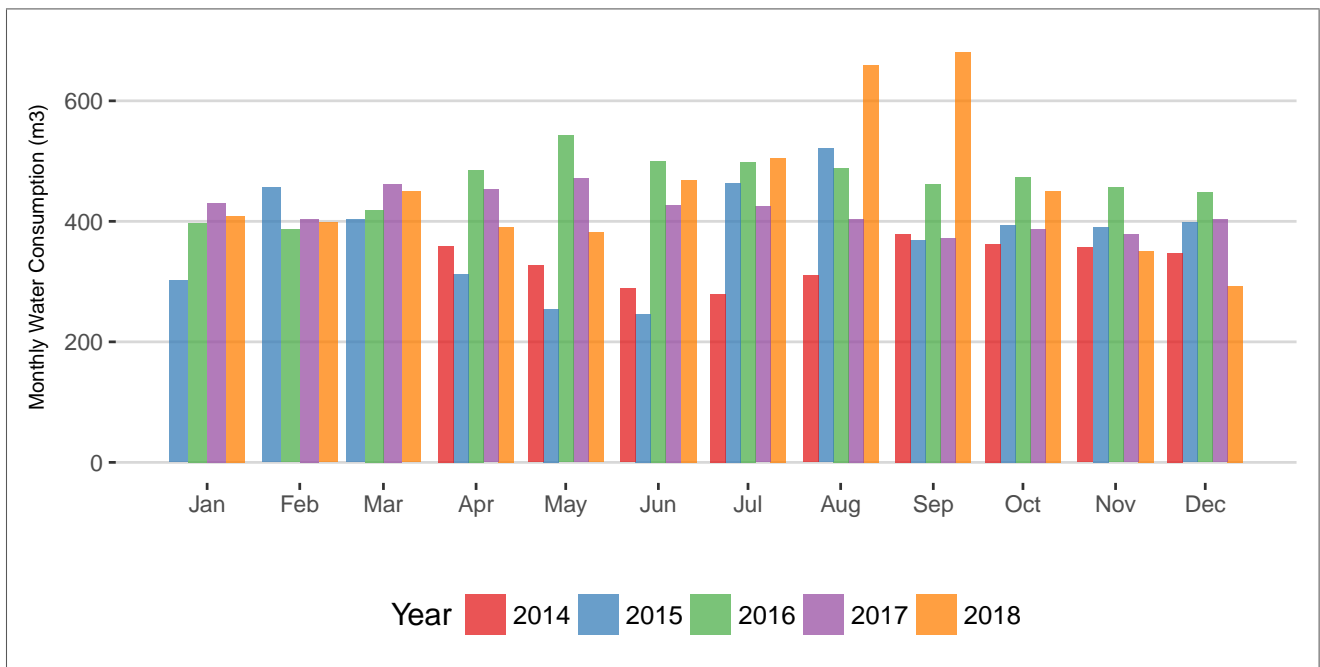


Figure 27: CPH monthly water consumption

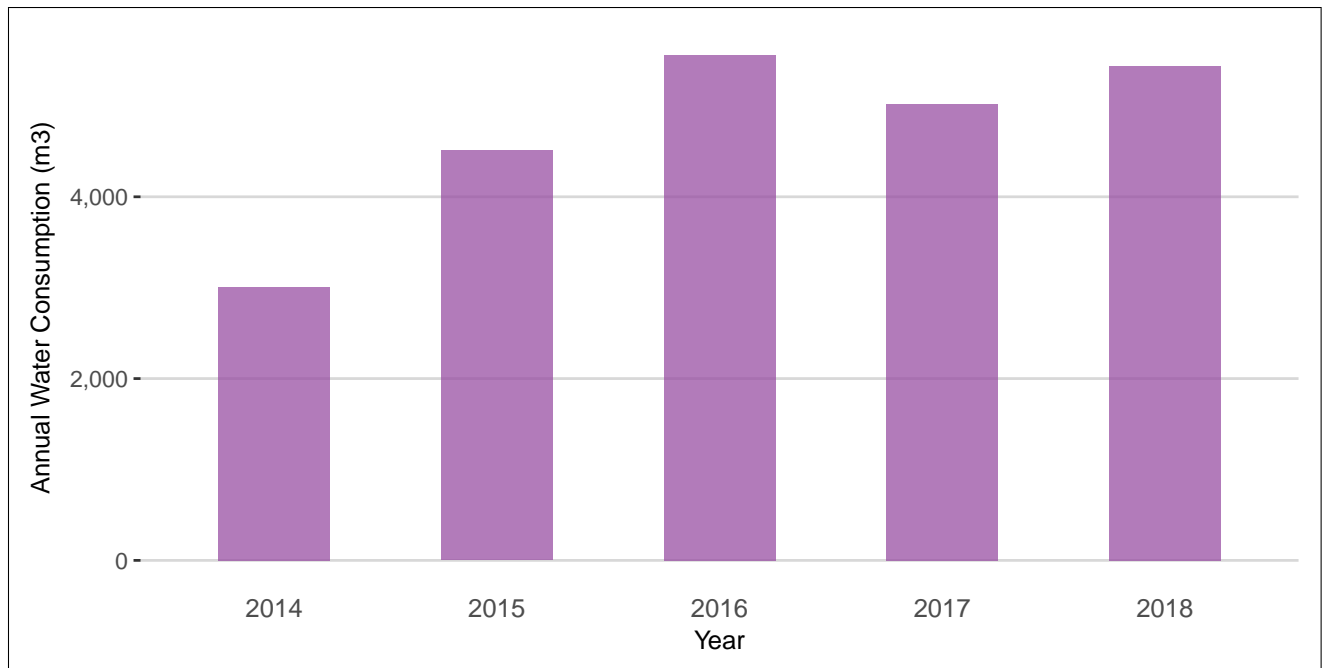


Figure 28: CPH annual water consumption

6.2 Energy Conservation Measures

6.2.1 Previous ECMs

A number of ECMs have been implemented since the 2014 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 16.

Table 16: CPH previous ECMs summary table

Building	ECM	Year Completed	Electricity Savings [kWh]	Natural Gas Savings [m ³]	Capital Cost [\$]
CPH	Kitchen exhaust - scheduling	2016	9,775	16,500	500
CPH	HVAC#1 - scheduling	2016	27,200	0	500
CPH	Kitchen exhaust - system	2016	15,740	23,000	27,225
CPH	Interior lighting	2016	259,990	0	155,640
CPH	Outdoor lighting	2016	18,390	0	13,540
CPH	RTU replacement	2017			
CPH	SF7 RTU replacement	2017			
CPH	SF1, 2, 3 RTU replacement	2018			

Note: Costs and energy savings provided by Huron Perth Healthcare Alliance.

6.2.2 Current ECMs

There are no ECMs currently planned for this facility.

6.2.3 Proposed ECMs

A number of energy audits were completed for Huron Perth Healthcare Alliance's facilities in 2014. 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 17. The planned in-service year designates the first full year following the ECM's implementation.

Table 17: CPH proposed ECMs summary table

Building	ECM	Planned In-Service Year	Electricity Savings [kWh]	Natural Gas Savings [m ³]	Capital Cost [\$]	Simple Payback [Years]
CPH	HVAC#1 - unit replacement	2021	44,220	-22,501	20,590	3.7

6.3 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 18.

Table 18: CPH baseline energy and GHG performance and reduction targets

Category	Description	Unit	CPH
Electricity	2018 Baseline consumption	[kWh]	829,213
	2023 Target maximum consumption	[kWh]	784,993
	2023 Target consumption reduction	[kWh]	44,220
	2023 Target consumption reduction	[%]	5.3
Natural gas	2018 Baseline consumption	[m ³]	117,006
	2023 Target maximum consumption	[m ³]	139,507
	2023 Target consumption reduction	[m ³]	-22,501
	2023 Target consumption reduction	[%]	-19
GHG emissions	2018 Baseline emissions	[ton,CO ₂ ,e]	257
	2018 target maximum emissions	[ton,CO ₂ ,e]	297
	2023 Target emission reduction	[ton,CO ₂ ,e]	-41
	2023 Target emission reduction	[%]	-16

To paraphrase Table 18, the 2023 energy and GHG performance targets for CPH are as follows.

- **Electricity:** To limit annual electricity consumption to 784,993 kWh.
- **Natural gas:** To limit annual natural gas consumption to 139,507 m³.
- **GHG emissions:** To limit annual GHG emissions to 297 mt,CO₂,e.

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 29 is developed according to the following methodology.

1. Each proposed ECM (from Table 17) with a planned in-service year between 2019 and 2023 is superimposed over the timeline in Figure 29 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 17. 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 17 and projected according to the same implementation timeline. Results are plotted in Figure 29.

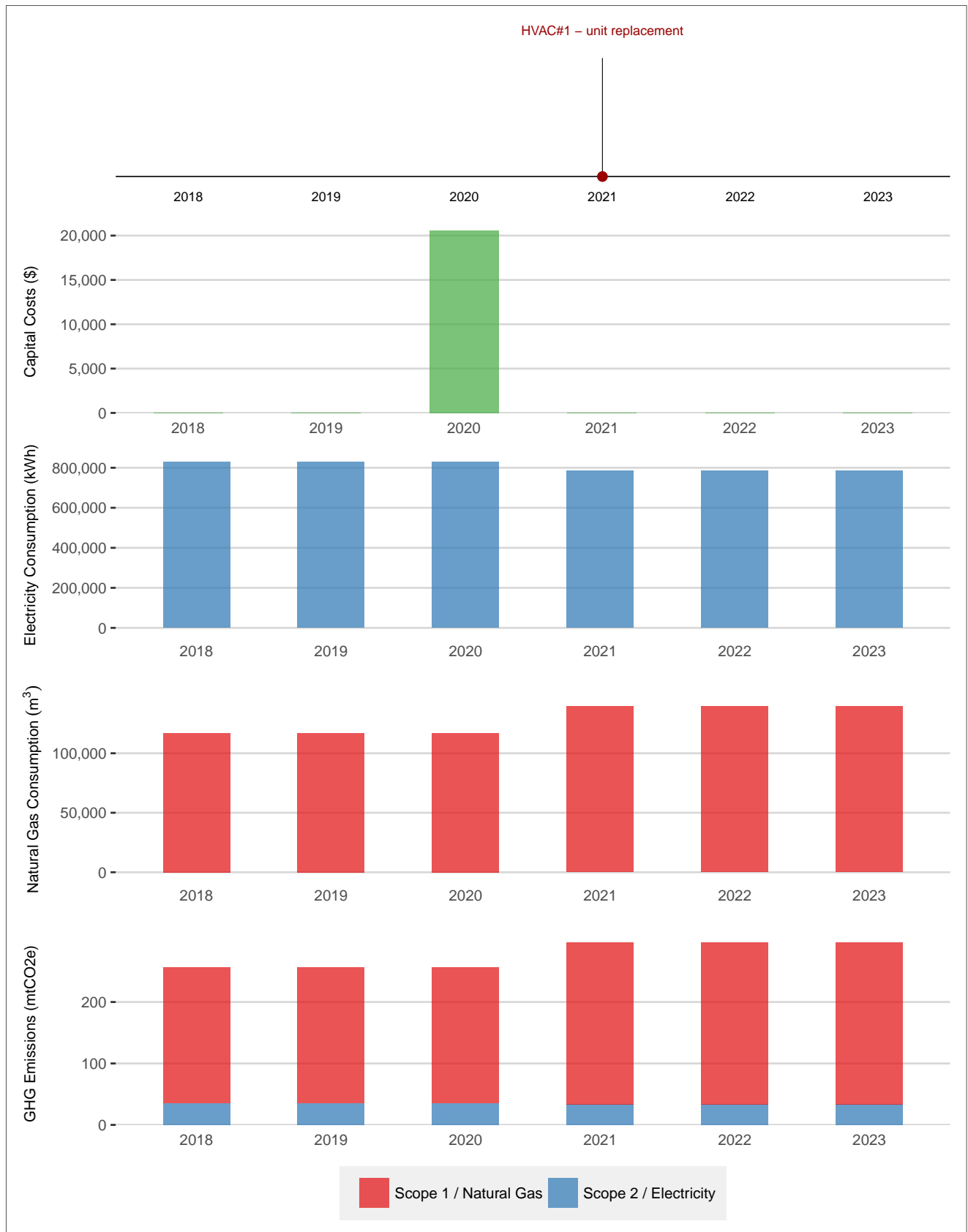


Figure 29: CPH energy and GHG road map

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.

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 2014 ECDM plan had an ambitious goal to reduce energy consumption by 15% of the 2014 baseline over five years. To evaluate this, electricity and natural gas were converted to a common unit of equivalent kilowatt-hours (ekWh). Figure 30 shows the total energy consumption from 2014 - 2018. Although significant progress was made, the goal was not met in the end.

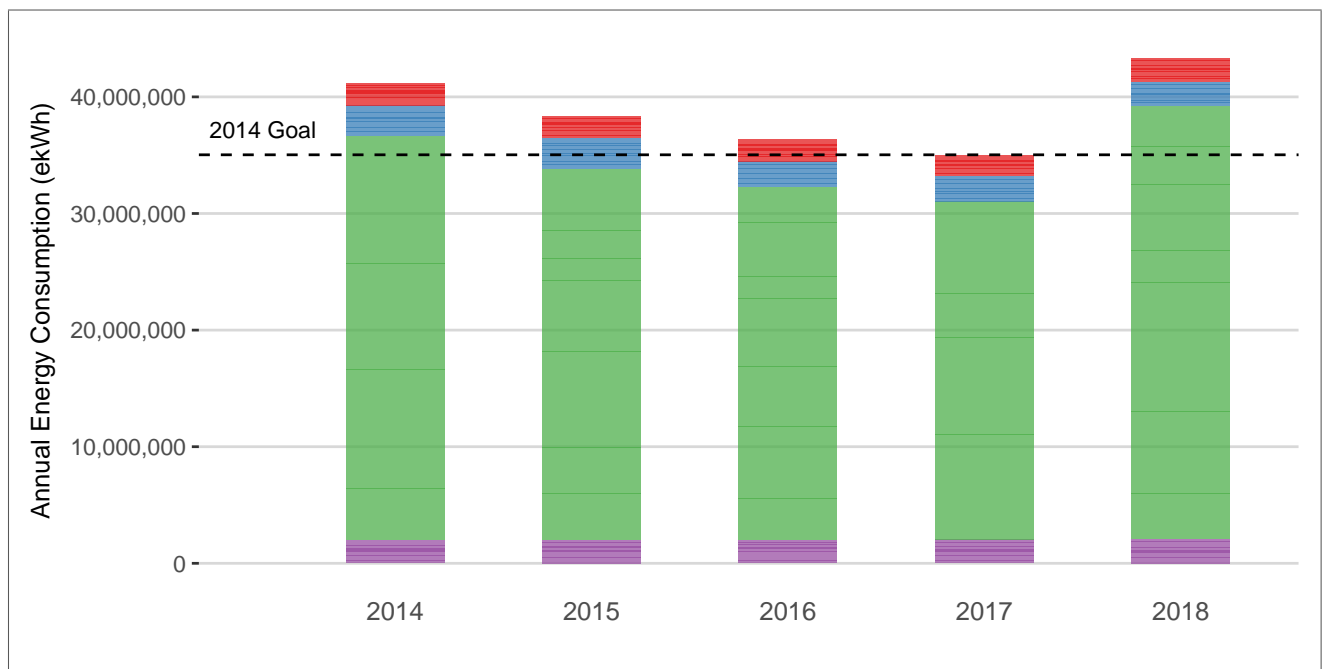


Figure 30: Total energy consumption from 2014 - 2018

8.2 Current

Table 19 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.

The energy consumption and GHG emissions reduction goals Huron Perth Healthcare Alliance will achieve by 2023 are summarized in Table 20. Figure 31 summarizes the results of achieving the goals set in this plan. It compares the estimated 2023 energy consumption to the 2018 energy consumption.

To paraphrase Tables 19 and 20, Huron Perth Healthcare Alliance's 2023 energy and GHG performance targets are as follows.

Table 19: Huron Perth Healthcare Alliance 2018 energy consumption and GHG emissions summary

		SGH	SCH	SMMH	CPH	Total
Electricity Consumption	[kWh]	1,699,307	893,591	761,111	829,213	4,183,222
Natural Gas Consumption	[m ³]	3,356,109	110,718	125,734	117,006	3,709,567
GHG Emissions	[mtCO ₂ e]	6,409	247	270	257	7,184

Table 20: Huron Perth Healthcare Alliance 2023 goals summary

		SGH	SCH	SMMH	CPH	Total
Electricity Consumption Reduction	[kWh]	293,030	112,000	207,930	44,220	657,180
Electricity Consumption Reduction	[%]	17	13	27	5.3	16
Natural Gas Consumption Reduction	[m ³]	12,143	38,726	0	-22,501	28,368
Natural Gas Consumption Reduction	[%]	0.36	35	0	-19	0.76
GHG Emissions Reduction	[mtCO ₂ e]	36	78	8.9	-41	82
GHG Emissions Reduction	[%]	0.55	31	3.3	-16	1.1

*Reductions based on 2018 energy consumption and GHG emissions.

- **Electricity:** To limit total annual electricity consumption of all its facilities to 3,526,042 kWh.
- **Natural gas:** To limit total annual natural gas consumption of all its facilities to 3,681,199 m³.
- **GHG emissions:** To limit total annual GHG emissions of all its facilities to 7,102 mt,CO₂,e.

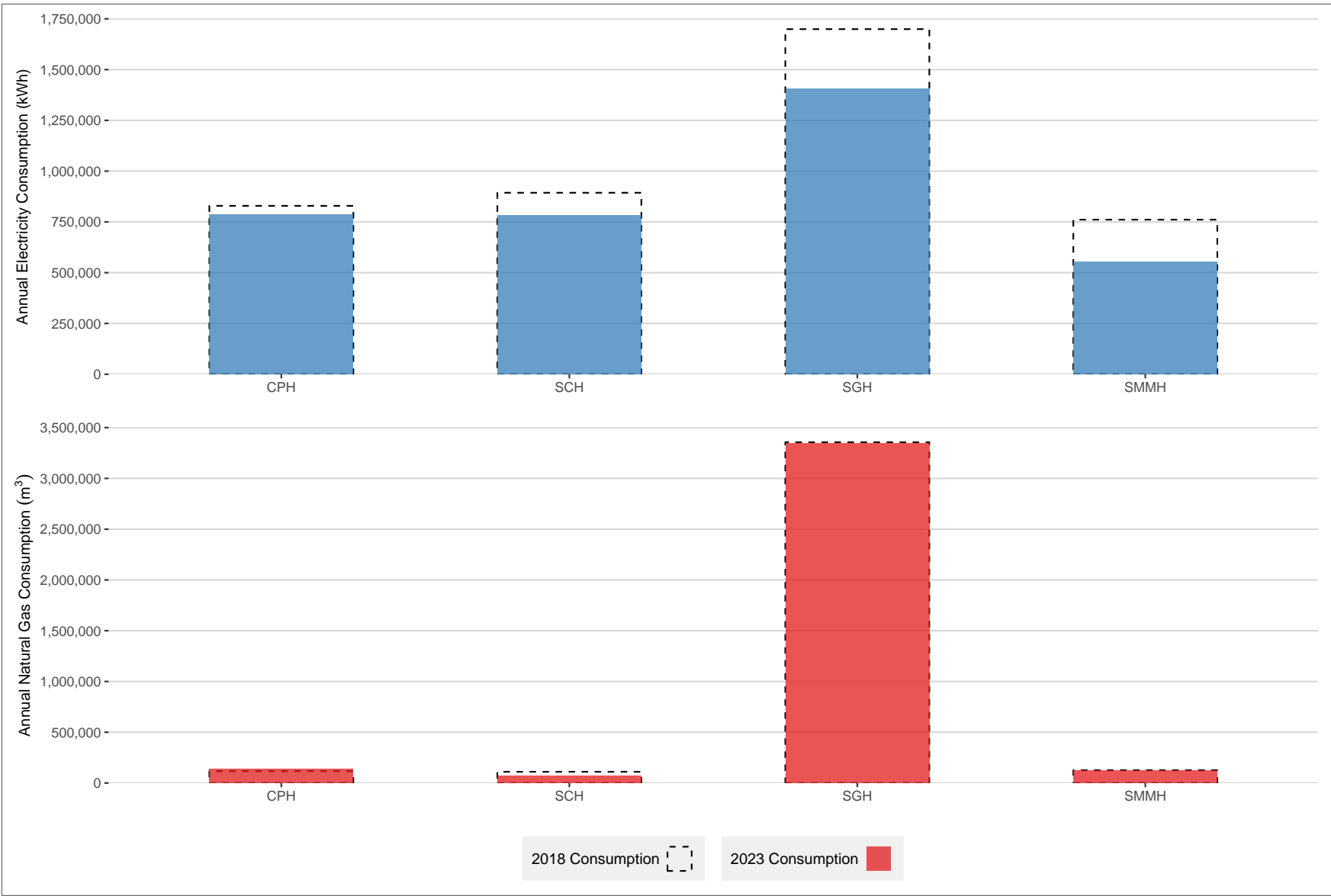


Figure 31: Annual electricity and natural gas consumption in 2018 and 2023

8.3 Action Plan

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

- **Stratford General Hospital**
 1. Ensure all planned ECMs will be implemented by 2023.
 2. Review list of proposed ECMs and plan to implement as many as possible. Prioritize ECMs with largest potential electricity and natural gas savings.
 3. Have an updated energy audit completed to explore additional ECMs as the last one was completed in 2014.
 4. Investigate projects which can lower natural gas consumption and GHG emissions to offset effects of operating CHP.
- **Seaforth Community Hospital**
 1. Ensure all planned ECMs will be implemented by 2023.
 2. Review list of proposed ECMs and plan to implement as many as possible. Prioritize ECMs with largest potential electricity and natural gas savings.
 3. Have an updated energy audit completed to explore additional ECMs as the last one was completed in 2014.
- **St. Mary's Community Hospital**
 1. Ensure all planned ECMs will be implemented by 2023.
 2. Have an updated energy audit completed to explore additional ECMs as the last one was completed in 2014.
- **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. Have an updated energy audit completed to explore additional ECMs as the last one was completed in 2014.

8.4 Additional Strategies

8.4.1 Water Conservation

The following measures should be considered to reduce water consumption at each facility:

- **Hand hygiene considerations**
 - Transition from water-based hand washing to alcohol-based hand rub for infection control to reduce water consumption.
- **Plumbing fixture replacement**
 - Replace any low-efficiency water closets to reduce average water consumption per flush.
 - Replace aerators on the hand washing lavatories to reduce flow rates.
- **Reverse Osmosis wastewater recovery**
 - Production of reverse osmosis (RO) water produces a continuous waste water stream that is typically sent to drain.
 - RO rejection water can be reused as cooling tower makeup water to reduce water consumption.

8.4.2 Energy Management

The following strategies should also 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
 - Record 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.

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