

2019



ENERGY CONSERVATION & DEMAND MANAGEMENT PLAN

St. Mary's General Hospital



Executive Summary

The purpose of this Energy Conservation and Demand Management (ECDM) Plan from St. Mary's General Hospital ("SMGH") is to outline specific actions and measures that will promote good stewardship of our environment and community resources in the years to come. The Plan will accomplish this, in part, by looking at future projections of energy consumption and reviewing past conservation measures.

In keeping with SMGH's core values of efficiency, concern for the environment and financial responsibility, this ECDM outlines how the hospital will reduce overall energy consumption, operating costs and greenhouse gas emissions. By following the measures outlined in this document, we will be able to provide compassionate service to more people in the community. This ECDM Plan is written in accordance with sections 4, 5, and 6 of the recently amended Electricity Act, 1998, O. Reg. 507/18.

Through past conservation and demand initiatives, SMGH has achieved the following results:

- 91,906 kwh reduction in electricity use
- 139,013 m3 reduction in natural gas use
- >6% reduction in the hospital's total energy use since 2013

Today, utility and energy related costs are a significant part of overall operating costs. In 2018:

- Energy Use Index (EUI) was 64 ekWh/ft²
- Energy-related emissions equaled 3,264 tCO₂e

To obtain full value from energy management activities, SMGH will take a strategic approach to fully integrate energy management into its business decision-making, policies and operating procedures. This active management of energy-related costs and risks will provide a significant economic return and will support other key organizational objectives.

With this prominent focus on energy management, SMGH can expect to achieve the following targets by 2024:

- ~ 20% reduction in electricity consumption
- ~ 12% reduction in natural gas consumption
- 127 tCO₂e carbon equivalent emissions

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1 Introduction

In order to obtain full value from energy management activities, and to strengthen our conservation initiatives, a strategic approach must be taken. Our organization will strive to fully integrate energy management into our practices by considering indoor environmental quality, operational efficiency and sustainably sourced resources when making financial decisions.

For 90 years, the Sisters of St. Joseph have maintained their tradition of ministering to the sick – an honor which dates back over two and a half centuries. The staff, physicians, and volunteers at St. Mary's General Hospital strive to carry forward the legacy of the Sisters by providing the finest possible health care. Their caring skills and insistence on excellence are a testament to the leadership and vision of the Sisters, and it is a privilege to continue their legacy by living the Mission and Values they held in such high regard.

Our Vision

To be the safest and most effective hospital in Canada, characterized by innovation, compassion and respect.

Our Mission

Our core reason for being – has created and fostered a culture of innovation, compassion, and respect at St. Mary's General Hospital for more than 90 years.

We remain committed to our Mission – to continue the healing ministry of Christ, consistent with our Catholic traditions and values.

Our values

We believe in the sacredness of life and the dignity of all people.

We are committed to:

- Heal, comfort, teach and promote health for the whole person – body, mind and spirit;
- Encouraging independence and self-responsibility;
- Serving those in need especially the poor and vulnerable;
- Being a responsible corporate citizen and neighbor;
- Use our resources wisely;
- Excellence, innovation and compassion in all we do;
- Promoting an organizational spirit by encouraging participation, responsibility, continued learning and mutual respect.

2 Regulatory Update

O. Reg. 397/11: Conservation and Demand Management Plans was introduced in 2013. Under this regulation, public agencies were required to report on energy consumption and greenhouse gas (GHG) emissions and develop Conservation and Demand Management (CDM) plans the following year.

Until recently, O. Reg. 397/11 was housed under the Green Energy Act, 2009 (GEA). On December 7, 2018, the Ontario government passed Bill 34, Green Energy Repeal Act, 2018. The Bill repealed the GEA and all its underlying Regulations, including O. Reg. 397/11. However, it re-enacted various provisions of the GEA under the Electricity Act, 1998.

As a result, the conservation and energy efficiency initiatives, namely CDM plans and broader public sector energy reporting, were re-introduced as amendments to the Electricity Act. The new regulation is now called **O. Reg. 507/18: Broader Public Sector: Energy Conservation and Demand Management Plans (ECDM)**.

As of January 1, 2019, O. Reg. 397/11 was replaced by O. Reg. 507/18, and BPS reporting and ECDM plans are under the Electricity Act, 1998 rather than the Green Energy Act, 2009.

3 About St. Mary’s General Hospital



Picture 1. St. Mary’s General Hospital

St. Mary’s General Hospital is located in the heart of Kitchener, Ontario and has been a cornerstone of the community since opening in 1924. We proudly serve the residents of Waterloo, Wellington County, and extend our reach to Dufferin, Grey-Bruce and beyond. We have more than 2,000 staff, physicians and volunteers and cares for hundreds of thousands of patients a year in our core clinical programs. We are committed to serving our community and our physicians and staff are constantly striving to advance their care.

Facility Overview	
Facility Name	St Mary's General Hospital
Type of Facility	Healthcare Services
Address	911 Queen's Boulevard, Kitchener, ON
Gross Area (ft2)	404,000

Table 1. St. Mary's General Hospital Overview

3.1 Historical Energy Intensity

Energy Utilization Index is a measure of how much energy a facility uses per square foot. By breaking down a facility’s energy consumption on a per-square-foot-basis, we can compare facilities of different sizes with ease. In this case, we are comparing our facility to the industry average for Ontario hospitals (derived from Natural Resources Canada’s Commercial and Institutional Consumption of Energy Survey), which was found to be **63.23 ekWh/sq. ft.**

Annual Consumption (EUI)						
Year	2013	2014	2015	2016	2017	2018
St Mary's Hospital	68	66	66	65	64	65

Table 2. Historic Energy Intensity

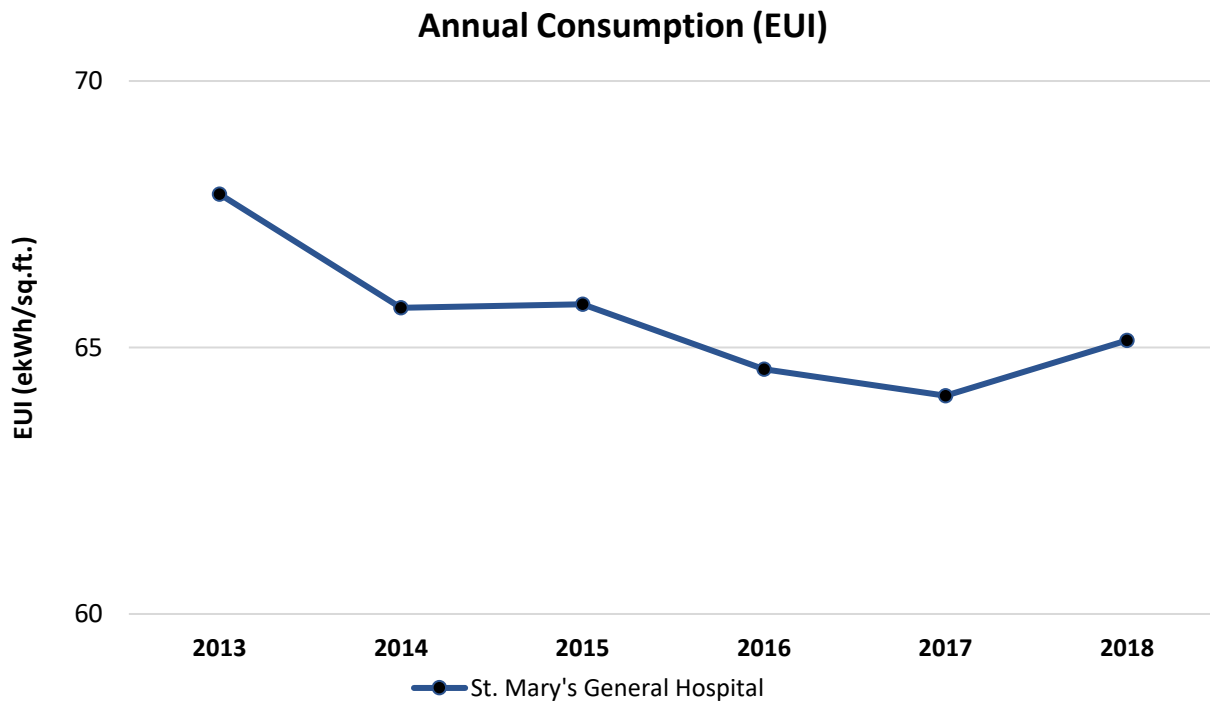


Figure 1. Historic Energy Intensity

3.2 Sustainability Strategies to Date

SMGH regularly reviews operational improvements and energy conservation measure opportunities. Below is a list of measures that have been completed since 2014.

Sustainable Measures	Impacted Utility
Sustainability Awareness & Computer Scheduling	Natural Gas & Electricity
Sub-metering & Monitoring	Natural Gas & Electricity
VFD of Fans and Pumps	Natural Gas & Electricity
DHW Water Fixture Retrofit	Natural Gas
Replacement of Exterior Lighting	Electricity
Steam Trap Auditing	Natural Gas

Table 3. Current Sustainability Strategies

4 Site Analysis



Picture 2. St. Mary's General Hospital

St. Mary's General Hospital is a 150-bed adult acute care hospital operating 24/7 or 168 hours a week. The facility has 404,000 square feet of space with nine operating rooms. St. Mary's also achieved an Energy Utilization Index (EUI) of 63 ekWh/sq. ft in 2018. We have 5 core areas of clinical focus: Cardiac Care (Regional Cardiac Centre), Respiratory Care (Level 1 Thoracic Surgery Centre), Outpatient (Day) Surgery, General Medicine, 24/7 Emergency Care.

Facility Information	
Facility Name	St. Mary's General Hospital
Address	911 Queen's Boulevard, Kitchener, ON
Gross Area (Ft. ²)	404,000
Average Operational Hours in a Week	168
Number of Beds	150
Number of Floors	Administration Building: 4 Floors Central Wing: 4 Floors Physio Building: 1 Floor Tower Wing: 9 Floors

Table 4. St. Mary's General Hospital Facility Information

4.1 Utility Consumption Analysis

In order to compare different energy sources within this report, energy will be expressed in units of ekWh – equivalent kilowatt-hours. The energy contained in a cubic metre of natural gas would be converted into the equivalent amount of the energy contained in a kilowatt hour of electricity.

Utilities to the site are electricity and natural gas. The following table summarizes the accounts for each utility. Consumption for each respective utility has been adjusted to fit a regular calendar year (365 days).

Annual Consumption (units)						
Year	2013	2014	2015	2016	2017	2018
Electricity (kWh)	10,472,731	10,107,321	10,685,424	10,360,618	10,380,825	10,451,650
Natural Gas (m ³)	1,640,837	1,592,892	1,539,311	1,523,308	1,501,824	1,535,514

Table 5. Historic Annual Utility Consumption

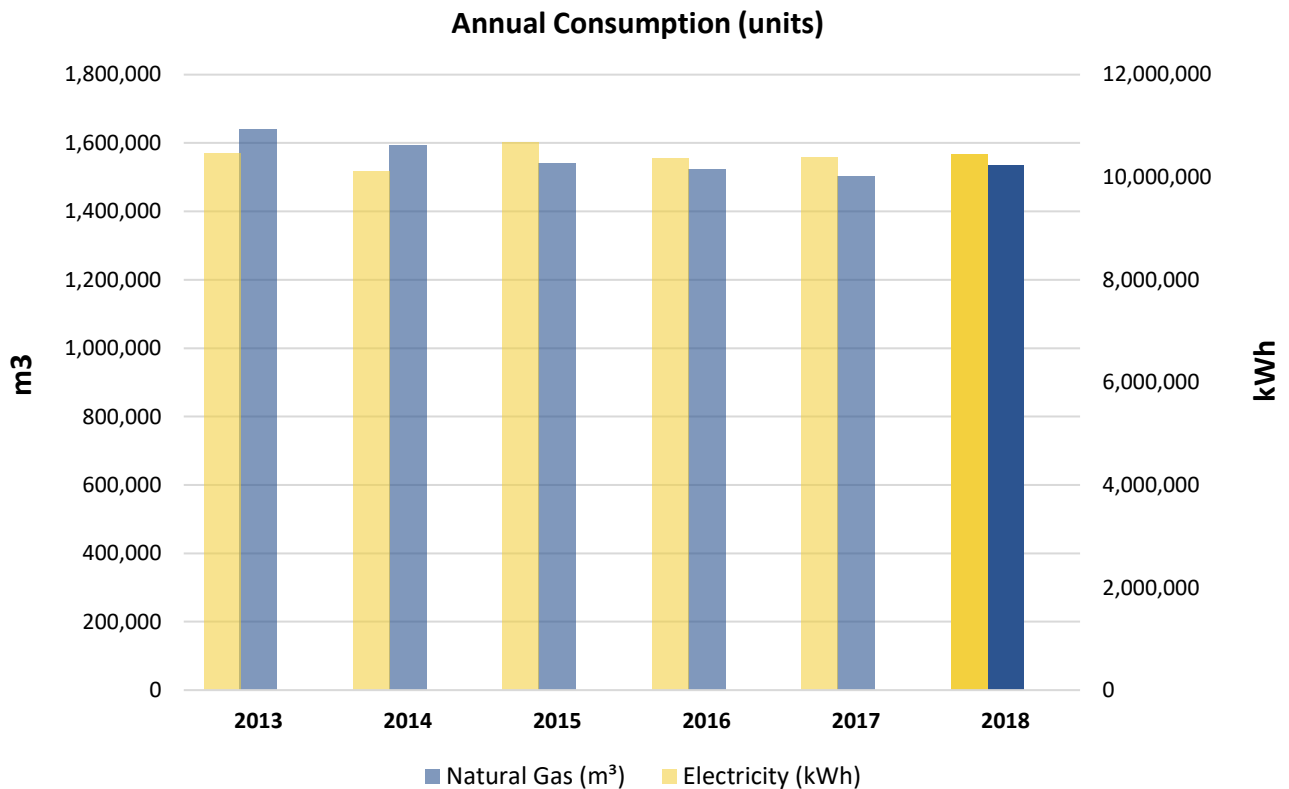


Figure 2. Historic Annual Utility Consumption

4.2 GHG Emissions Analysis

Greenhouse gas (GHG) emissions are expressed in terms of equivalent tonnes of Carbon Dioxide (tCO₂e). The GHG emissions associated with a facility are dependent on the fuel source — for example, hydroelectricity produces fewer greenhouse gases than coal-fired plants, and light fuel oil produces fewer GHGs than heavy oil.

Electricity from the grid in Ontario is relatively “clean”, as the majority is derived from low-GHG hydroelectricity, and coal-fired plants have been phased out. Scope 1 (natural gas) and Scope 2 (electricity) consumptions have been converted to their equivalent tonnes of greenhouse gas emissions in the table below. Scope 1 represents the direct emissions from sources owned or controlled by the institution, and Scope 2 consists of indirect emissions from the consumption of purchased energy generated upstream from the institution.

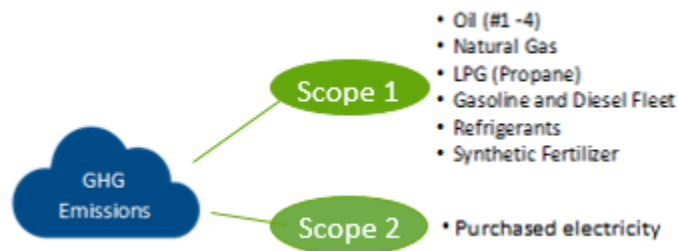


Figure 3. Examples of Scope 1 and 2

GHG Emissions	2013	2014	2015	2016	2017	2018
Electricity	429	414	438	425	426	429
Natural Gas	3,101	3,011	2,909	2,879	2,838	2,902
Totals	3,531	3,425	3,347	3,304	3,264	3,331

Table 6. Historic Greenhouse Gas Emissions

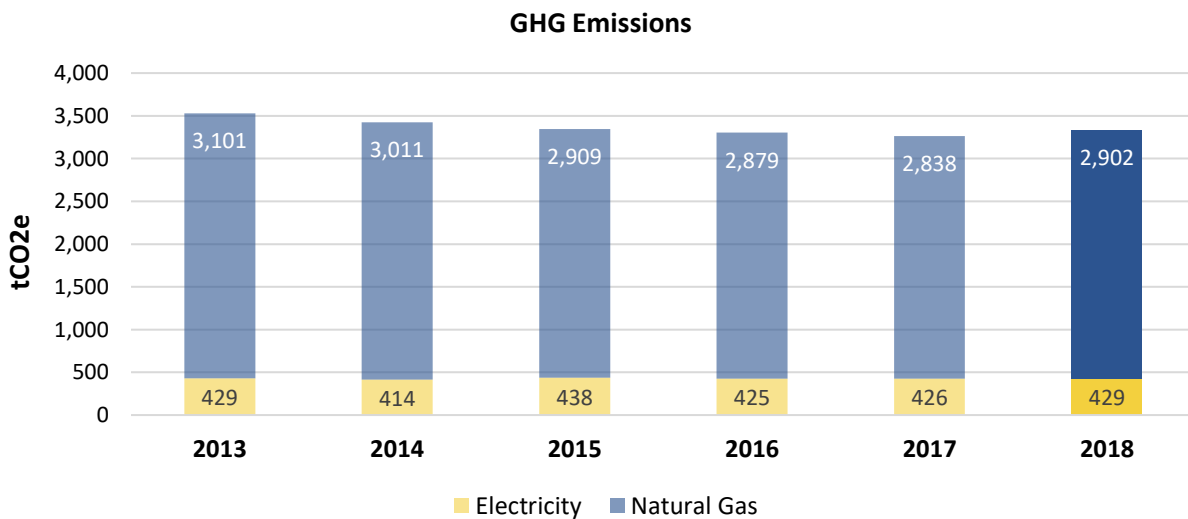


Figure 4. Historic Greenhouse Gas Emissions

4.3 Proposed Conservation Measures

Our energy analysis has revealed several conservation strategies for the facility. SMGH's proposed energy saving initiatives are summarized in the table below outlining the targeted utilities. These measures will remain in place until a more efficient and cost-effective technology is found.

Measure	Impacted Utility	Estimated Annual Savings		Simple Payback (years)	Year of Implementation
		kWh	m3		
Computer Sleep Settings	Electricity	TBD	TBD	TBD	Ongoing
Sustainability Culture Programs	Electricity & Natural Gas	TBD	TBD	TBD	Ongoing
Interior Lighting Retrofit	Electricity	902,033	0	7.21	2019
Chiller Plant Optimization	Electricity	491,512	0	8.91	2019
Building Automation System Upgrade	Electricity & Natural Gas	314,010	77,023	1.94	2019
VSDs on Fans and Pumps	Electricity	402,992	19,638	7.03	2019
Domestic Water Fixture Retrofit	Natural Gas	0	2,289	1.62	2020
Boiler Staging Control	Natural Gas	0	88,667	2.40	2020
Steam System - Heat Exchanger	Natural Gas	0	TBD	TBD	2020
Removable Insulated Jackets on Steam Valves	Natural Gas	0	61,476	4.67	2020
Air Curtain for Shipping Bay Doors	Natural Gas	0	TBD	TBD	2020
Steam Trap Repair	Natural Gas	0	7,500	4.36	2019
Totals		2,110,547	256,593		

Table 7. Proposed Conservation Measures

4.4 Utility Consumption Forecast

By implementing the energy conservation measures stated in the previous section, the forecasted electricity and natural gas use could be forecasted based on the utility savings generated from individual measures. The forecasted utility consumption is tabulated below. The percentage of change is based off the data from the baseline year of 2018.

	Annual Consumption Forecast (units)											
	2019		2020		2021		2022		2023		2024	
	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change
Electricity (kWh)	8,341,103	20%	8,341,103	20%	8,341,103	20%	8,341,103	20%	8,341,103	20%	8,341,103	20%
Natural Gas (m ³)	1,431,353	7%	1,278,921	17%	1,278,921	17%	1,278,921	17%	1,278,921	17%	1,278,921	17%

Table 8. Forecast for Annual Utility Consumption

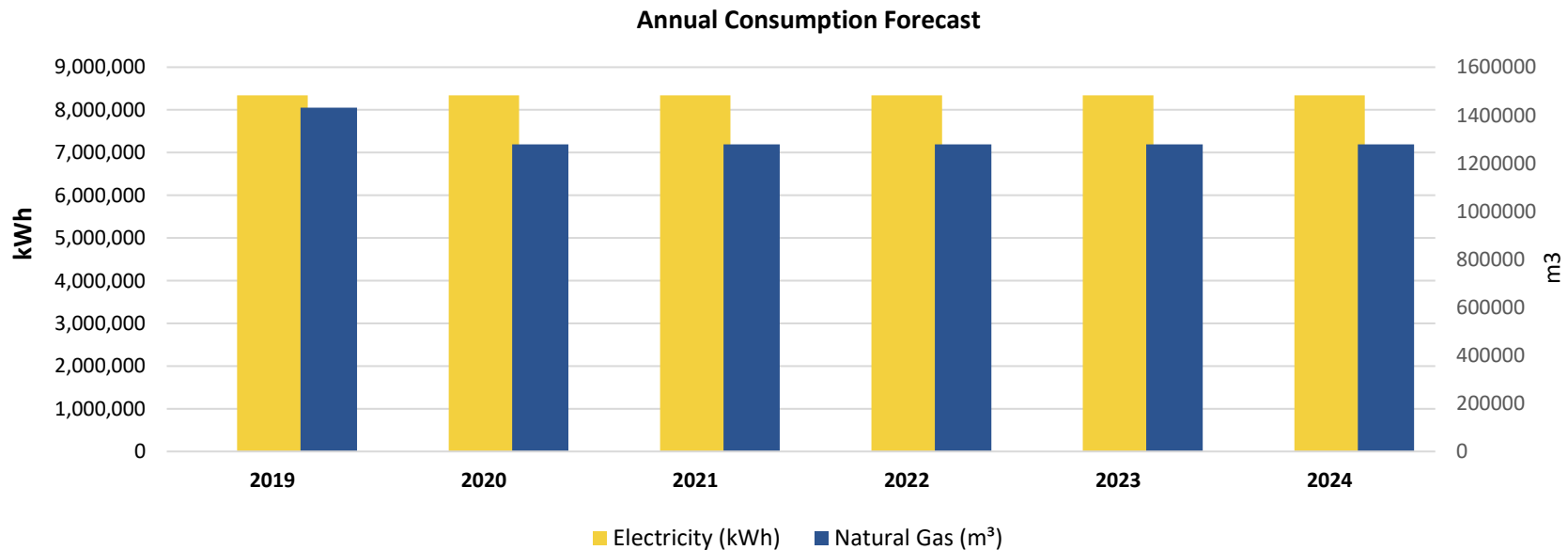


Figure 5. Forecast for Annual Utility Consumption

4.5 GHG Emissions Forecast

The forecasted greenhouse gas emissions are calculated based on the forecasted energy consumption data analyzed in the previous section and are tabulated in the following table. The percentage of reduction is based off the data from the baseline year of 2018.

Annual Emissions Forecast (units)						
Utility Source	2019	2020	2021	2022	2023	2024
Electricity	342	342	342	342	342	342
Natural Gas	2,705	2,417	2,417	2,417	2,417	2,417
Totals	3,047	2,759	2,759	2,759	2,759	2,759
Reduction from Baseline Year (2018)	8.5%	17.2%	17.2%	17.2%	17.2%	17.2%

Table 9. Forecast for Annual Greenhouse Gas Emissions

GHG Emissions Forecast

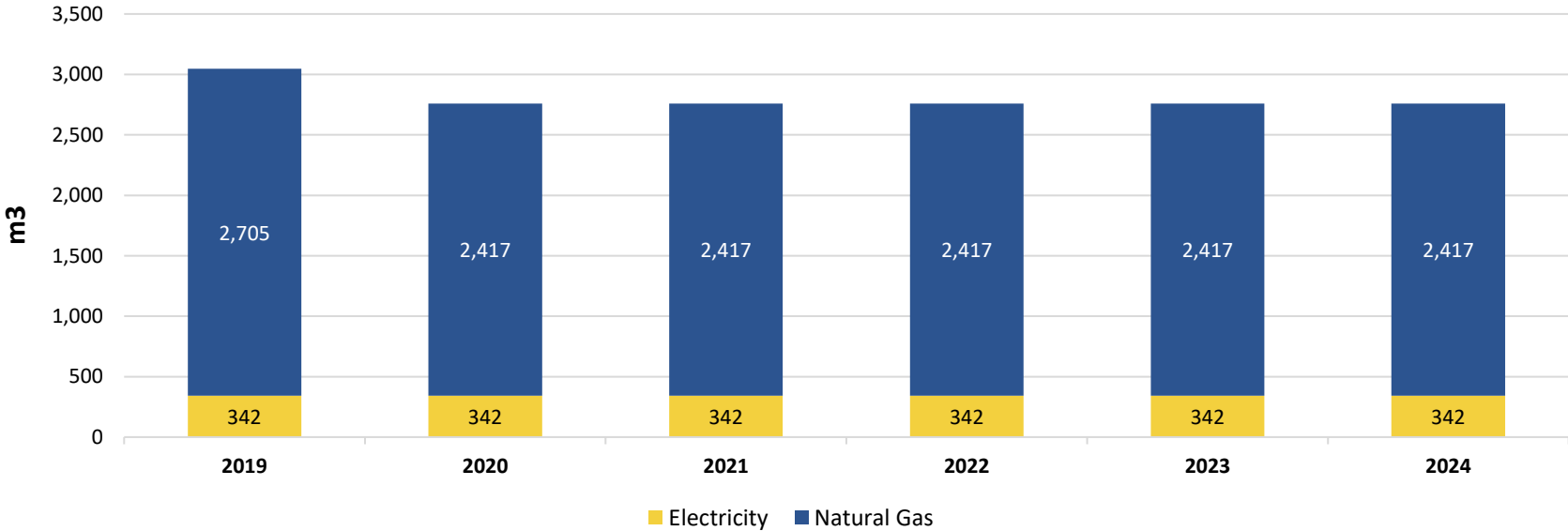


Figure 6. Forecast for Annual Greenhouse Gas Emissions

5 Closing Comments

Thank you to all who contributed to St. Mary's General Hospital's Energy Conservation & Demand Management Plan. We consider our facility a primary source of care, and an integral part of the local community. The key to this relationship is being able to use our facilities efficiently and effectively to maximize our ability to provide the highest quality of healthcare services while integrating environmental stewardship into all aspects of facility operations.

On behalf of the senior management team here at St. Mary's General Hospital, we approve this Energy Conservation & Demand Management Plan.

This ECDM plan was created through a collaborative effort between St. Mary's General Hospital and Blackstone Energy Services.

6 Appendix

6.1 Glossary of Terms

Word	Abbreviation	Meaning
Baseline Year		A baseline is a benchmark that is used as a foundation for measuring or comparing current and past values.
Building Automation System	BAS	Building automation is the automatic centralized control of a building's heating, ventilation and air conditioning, lighting and other systems through a building management system or building automation system (BAS)
Carbon Dioxide	CO ₂	Carbon dioxide is a commonly referred to greenhouse gas that results, in part, from the combustion of fossil fuels.
Energy Usage Intensity	EUI	Energy usage intensity means the amount of energy relative to relative to a buildings physical size typically measured in square feet.
Equivalent Carbon Dioxide	CO ₂ e	CO ₂ e provides a common means of measurement when comparing different greenhouse gases.
Greenhouse Gas	GHG	Greenhouse gas means a gas that contributes to the greenhouse effect by absorbing infrared radiation, e.g., carbon dioxide and chlorofluorocarbons.
Metric Tonnes	t	Metric tonnes are a unit of measurement. 1 metric tonne = 1000 kilograms
Net Zero		A net-zero energy building, is a <u>building</u> with zero net <u>energy consumption</u> , meaning the total amount of energy used by the building on an annual basis is roughly equal to the amount of <u>renewable energy</u> created on the site,
Variable Frequency Drive	VFD	A variable frequency drive is a device that allows for the modulation of an electrical or mechanical piece of equipment.

6.2 List of Tables, Figures and Pictures

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