

# Energy Conservation & Demand Management Plan

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2019



Lakeridge  
Health



# Executive Summary

The purpose of this Energy Conservation and Demand Management (ECDM) Plan from Lakeridge Health 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 Lakeridge Health'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.

In the past 5 years, Lakeridge Health has achieved the following results:

- 1,251,591 kWh reduction in electricity use
- 935,343 m<sub>3</sub> increase in natural gas use

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

- Energy Use Index (EUI) was 72 ekWh/ft<sup>2</sup>
- Energy-related emissions equaled 18,260 tCO<sub>2</sub>e

To obtain full value from energy management activities, Lakeridge Health 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, Lakeridge Health can expect to achieve the following targets by 2024:

- 14% reduction in annual electricity consumption
- 10% reduction in annual natural gas consumption
- 1,872 tCO<sub>2</sub>e reduction in annual 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. The results and the progress of the past five years, and the projected impact of the new ECDM Plan is presented in the chart below.

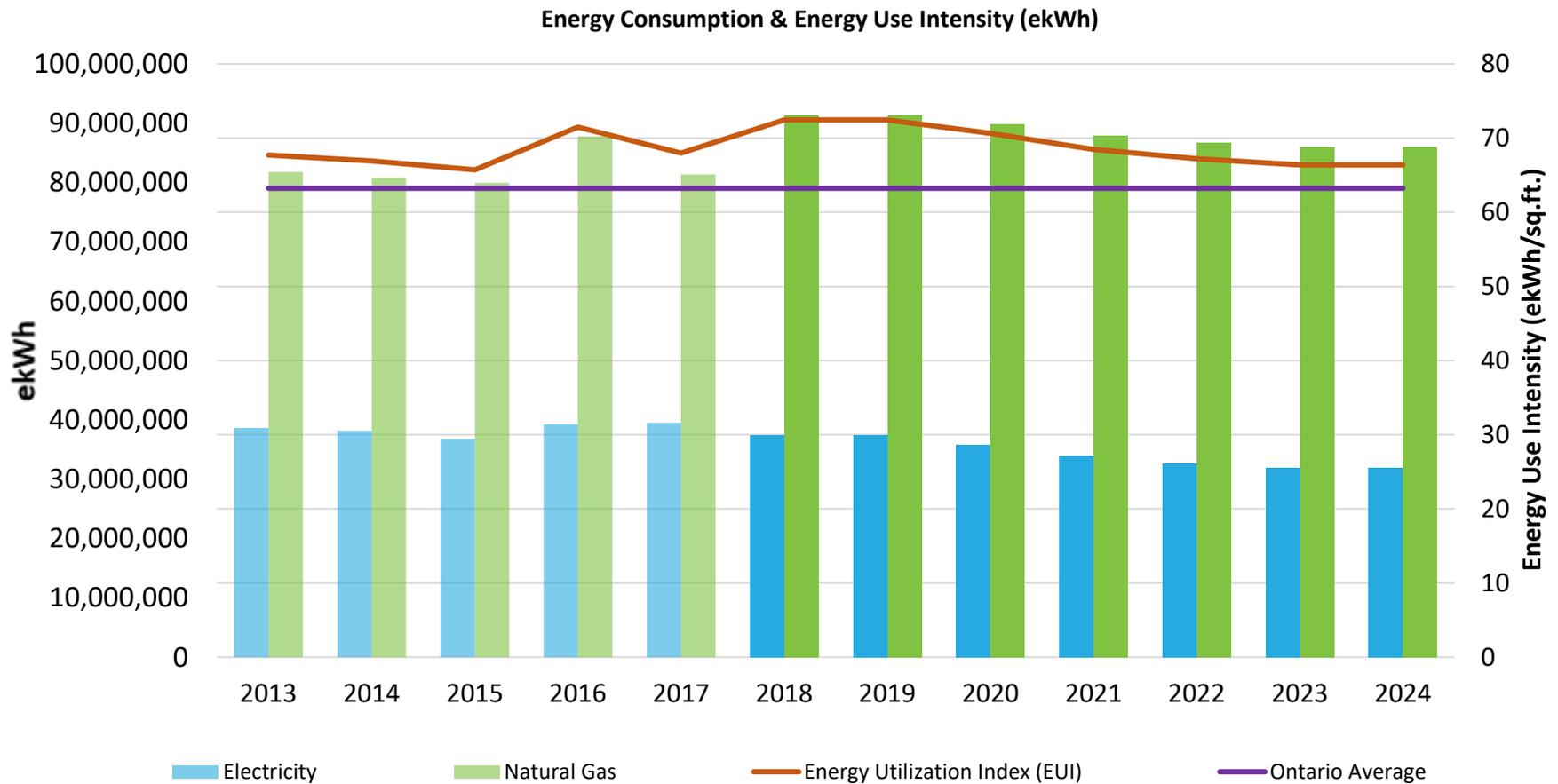


Figure 1. Site-Wide Energy Consumption Trends & Projections

Lakeridge Health is developing a reputation as a quality leader and innovator, and our dedicated team of health care professionals give their all every day to keep improving the quality of care delivered, drive down wait times, and improve results. We are part of our community and it shows in the care we provide - because the people coming through our doors are our neighbours, family and friends.

### *Our Vision*

One System. **Best Health.**

### *Our Mission*

We empower people to live their **best health.**

### *Our Values*

- Inclusion
- Compassion
- Innovation
- Teamwork
- Joy



## 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 Lakeridge Health

Lakeridge Health is one of Ontario’s largest community hospitals, serving people across Durham Region and beyond. With five hospital sites and four Emergency Rooms, more than 4,900 doctors, nurses and other health care professionals on staff and over 1,500 amazing volunteers, Durham Region families rely on our many services.

## 3.1. Site-Wide 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 facilities to the industry average for each category of facility (derived from Natural Resources Canada’s Commercial and Institutional Consumption of Energy Survey). The industry comparison can be found on each sites Introduction Page (section 4.2, 4.3, 4.4, 4.5, 4.6).

Annual Consumption (EUI)						
Site	2013	2014	2015	2016	2017	2018
Oshawa Hospital	68	67	66	77	71	79
Pinewood Centre	34	37	35	35	35	37
Bowmanville Hospital	59	56	55	47	46	51
Whitby Hospital	60	56	56	50	56	59
Port Perry Hospital	93	95	94	83	76	26*
Ajax Pickering Hospital	75	76	72	75	75	80

\*based on partial consumption due to closure, not a full calendar year

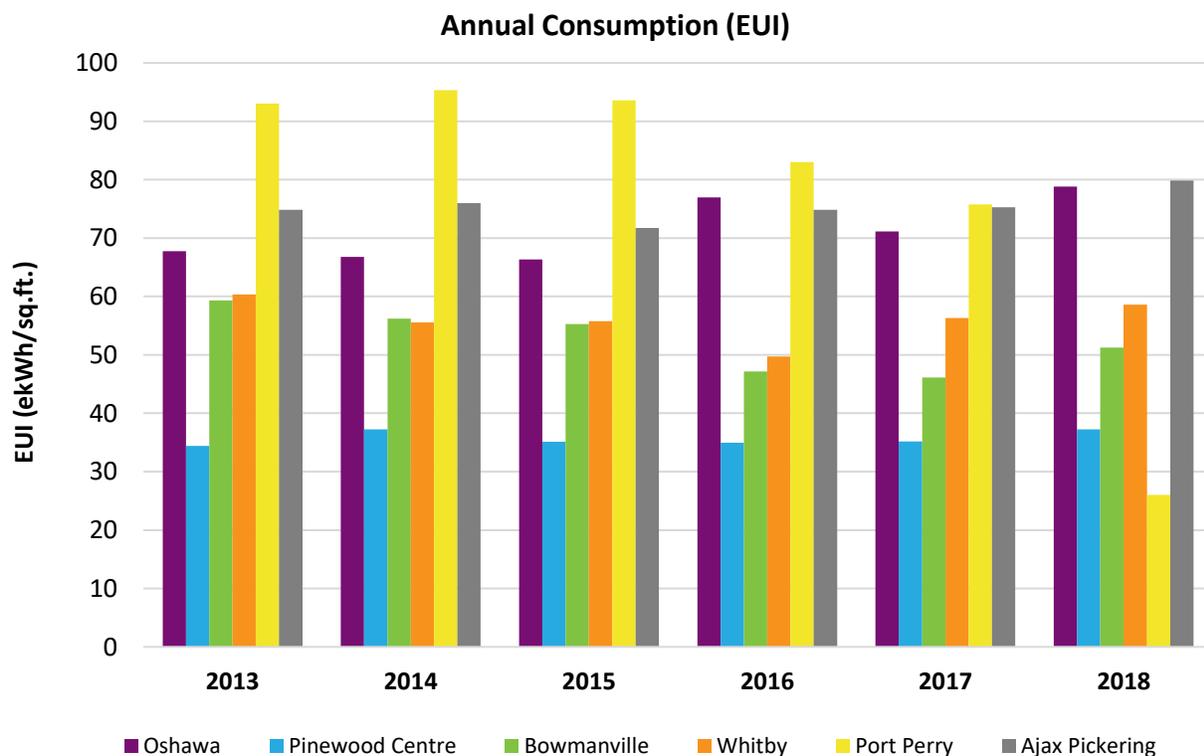


Figure 2. Historic Annual Energy Utilization Indices for all Sites

## 3.2. Site-Wide Historical GHG Emissions

Greenhouse gas (GHG) emissions are expressed in terms of equivalent tonnes of Carbon Dioxide (tCO<sub>2</sub>e). 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.

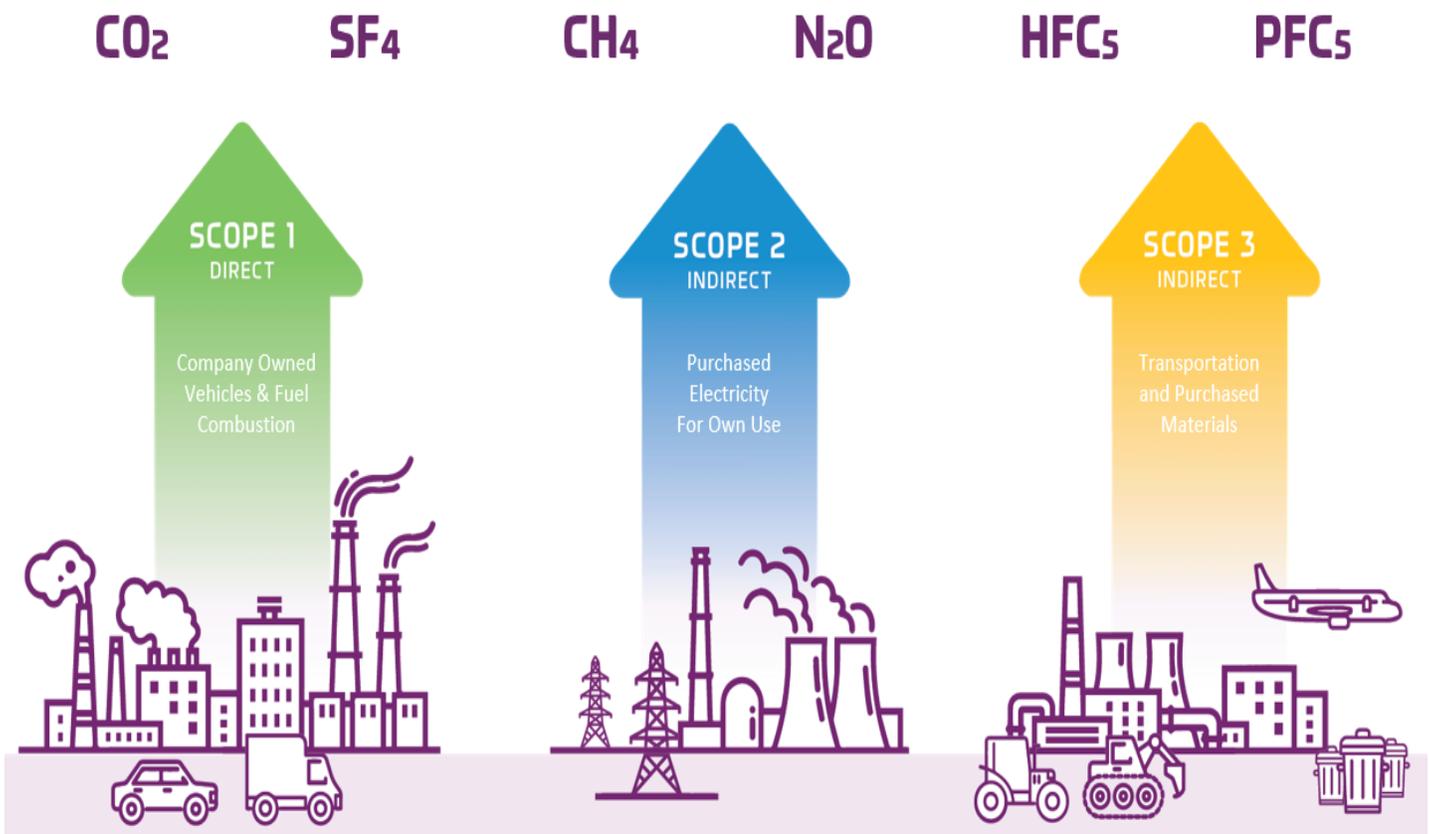


Figure 3. Examples of Scope 1 and 2

The site-wide greenhouse gas emissions for Lakeridge Health have been tabulated and are represented in the table and graph below.

GHG Emissions	2013	2014	2015	2016	2017	2018
Electricity (scope 2)	1,584	1,565	1,511	1,611	1,620	1,533
Natural Gas (scope 1)	14,959	14,784	14,635	16,065	14,881	16,726
<b>Total Scope 1 &amp; 2 Emissions</b>	<b>16,543</b>	<b>16,349</b>	<b>16,146</b>	<b>17,676</b>	<b>16,501</b>	<b>18,260</b>

*Table 2. Historic Greenhouse Gas Emissions for all Sites*



*Figure 4. Historic Greenhouse Gas Emissions for all Sites*

## 4. Site Analysis

The following section will introduce each of our sites and provide a brief description about the building and its operations, energy & greenhouse gas (GHG) emissions trends, and specific conservation measures.

### 4.1. Oshawa Hospital



*Picture 1. Oshawa Hospital*

Oshawa Hospital is a full-service community hospital that provides safe quality care to residents who live in Oshawa and Durham Region. Services include Emergency and Critical Care, Inpatient and Outpatient Surgery, Stroke Prevention and Treatment, Palliative Care, Inpatient Rehabilitation Services, Cardiac Care, Inpatient and Outpatient Mental Health Services, Women and Children's Health, Dialysis and Kidney Care, Geriatric Assessment and Intervention Network (GAIN) Clinic, Telemedicine Clinic, Diagnostic Imaging and Laboratory Services.

Facility Information	
Facility Name	<b>Oshawa Hospital</b>
Type of Facility	Healthcare Services
Address	1 Hospital Court
Gross Area (Sq. Ft)	1,102,943
Average Operational Hours in a Week	168
Number of Beds	363
Number of Floors	9
Industry Average EUI – Acute Hospital	63 ekWh/sq. ft.
Facility Average EUI	71 ekWh/sq. ft.

*Table 3. Oshawa Hospital Facility Information*

### 4.1.1. Utility Consumption Analysis

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)						
Utility	2013	2014	2015	2016	2017	2018
Electricity (kWh)	22,217,408	21,343,923	20,839,101	22,469,252	23,302,348	20,588,188
Natural Gas (m <sup>3</sup> )	5,081,129	5,064,209	5,064,209	6,043,084	5,338,767	6,425,070

Table 4. Historic Annual Utility Consumption for the Oshawa Hospital

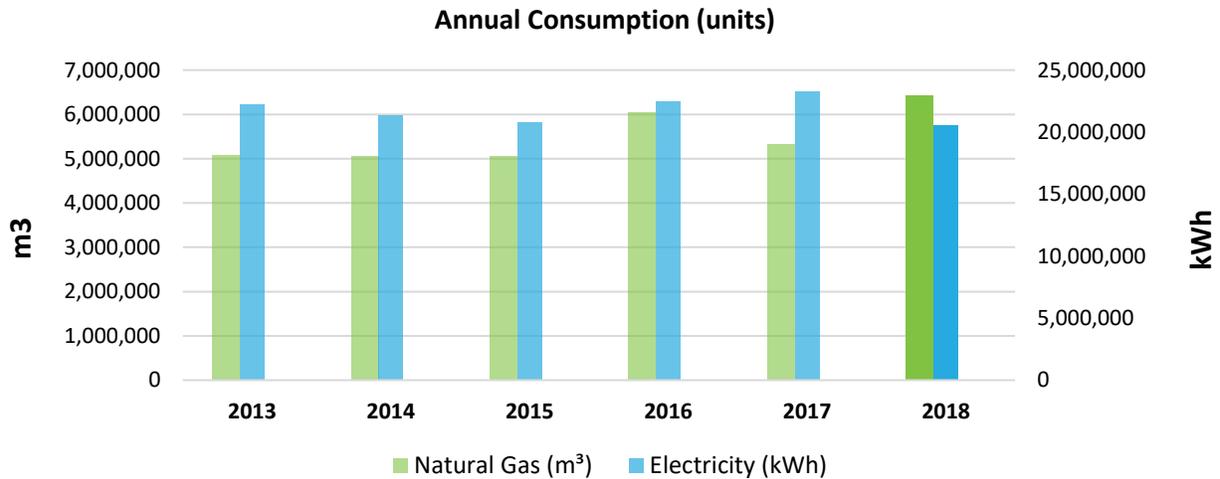


Figure 5. Historic Annual Utility Consumption for the Oshawa Hospital

### 4.1.2. GHG Emissions Analysis

The greenhouse gas emissions are calculated based on the energy consumption data analyzed in the following table.

GHG Emissions (tCO <sub>2</sub> e)						
Utility Source	2013	2014	2015	2016	2017	2018
Electricity	911	875	854	921	955	844
Natural Gas	9,603	9,571	9,571	11,421	10,090	12,143
<b>Totals</b>	<b>10,514</b>	<b>10,446</b>	<b>10,426</b>	<b>12,343</b>	<b>11,046</b>	<b>12,987</b>

Table 5. Historic Annual Greenhouse Gas Emissions for the Oshawa Hospital

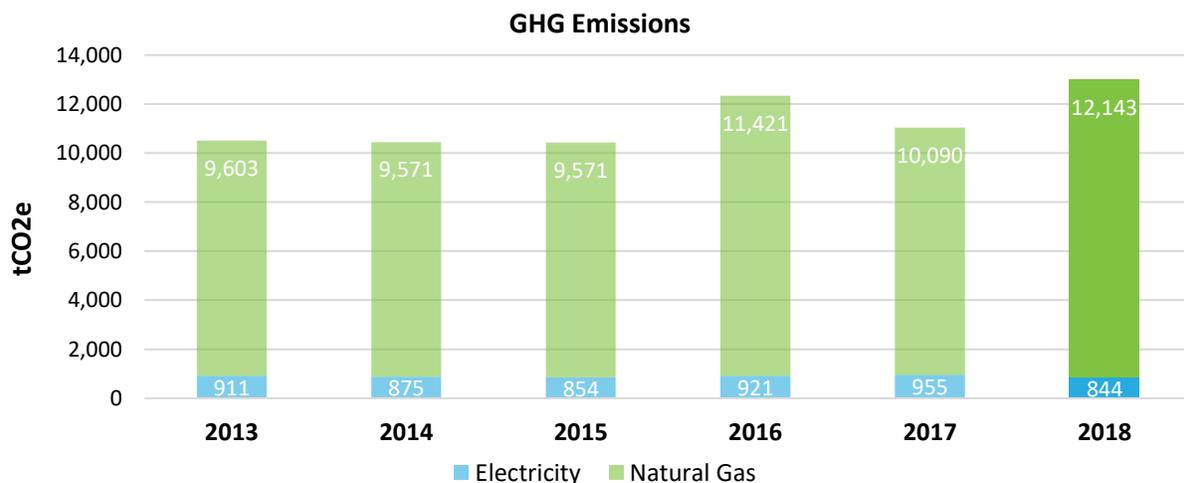


Figure 6. Historic Annual Greenhouse Gas Emissions for the Oshawa Hospital

### 4.1.3. Proposed Conservation Measures

Our energy analysis has revealed several conservation strategies for the facility. Oshawa Hospital’s proposed energy and water 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	kW	m3		
<b>LED Lighting Upgrade</b>	Electricity	1,326,593	333	0	9.43	2019
<b>Energy Control Optimization</b>	Electricity & Natural Gas	-35,069	0	241,693	1.79	2020
<b>Enhance Ventilation Zone Control</b>	Electricity & Natural Gas	1,187,006	0	221,358	3.87	2020
<b>Pipe Insulation</b>	Natural Gas	0	0	93,980	41.10	2020
<b>Building Envelope</b>	Natural Gas	0	0	22,603	10.80	2020
<b>Steam Boiler Installation</b>	Natural Gas	0	0	73,026	29.51	2020
<b>Air Compressor Replacement</b>	Electricity	23,778	0	0	46.22	2020
<b>Two Electric Vehicle Charging Stations</b>	N/A	0	0	0	0.00	2020
<b>Water Conservation Measures</b>	Natural Gas	0	0	98,608	7.37	2021
<b>Total</b>		<b>2,502,308</b>	<b>333</b>	<b>751,268</b>		

*Table 6. Proposed Conservation Measures for the Oshawa Hospital*

### 4.1.4. 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												
	2019		2020		2021		2022		2023		2024	
	Units	% Change										
Electricity (kWh)	19,261,595	6%	18,085,880	12%	18,085,880	12%	18,085,880	12%	18,085,880	12%	18,085,880	12%
Natural Gas (m <sup>3</sup> )	6,425,070	0%	5,772,411	10%	5,673,803	12%	5,673,803	12%	5,673,803	12%	5,673,803	12%

Table 7. Forecast of Annual Utility Consumption for the Oshawa Hospital

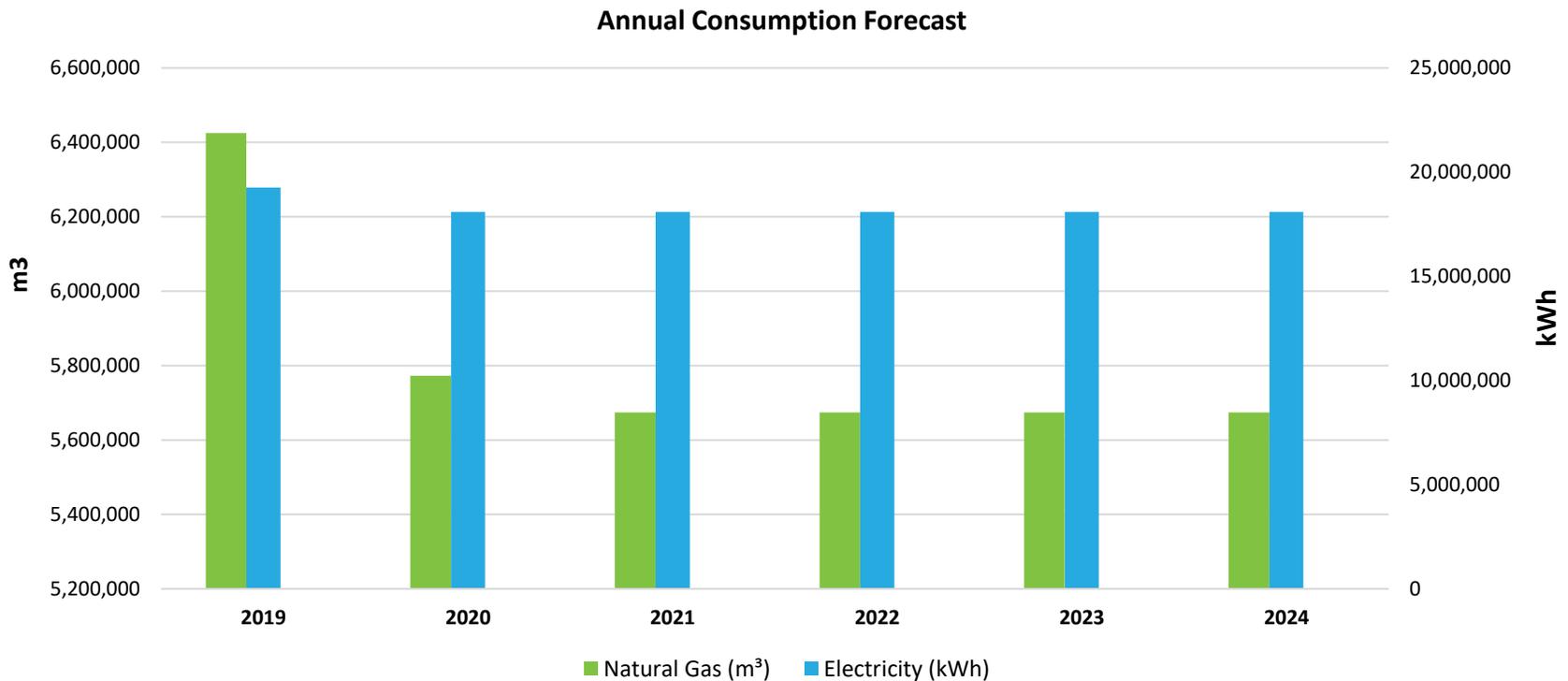


Figure 7. Forecast of Annual Utility Consumption for the Oshawa Hospital

### 4.1.5. 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.

GHG Emissions (tCO <sub>2</sub> e)						
Utility Source	2019	2020	2021	2022	2023	2024
Electricity	790	742	742	742	742	742
Natural Gas	12,143	10,910	10,723	10,723	10,723	10,723
<b>Totals</b>	<b>12,933</b>	<b>11,651</b>	<b>11,465</b>	<b>11,465</b>	<b>11,465</b>	<b>11,465</b>
<b>Reduction from Baseline Year (2018)</b>	<b>0.42%</b>	<b>10.29%</b>	<b>11.72%</b>	<b>11.72%</b>	<b>11.72%</b>	<b>11.72%</b>

Table 8. Forecast of Annual Greenhouse Gas Emissions for the Oshawa Hospital

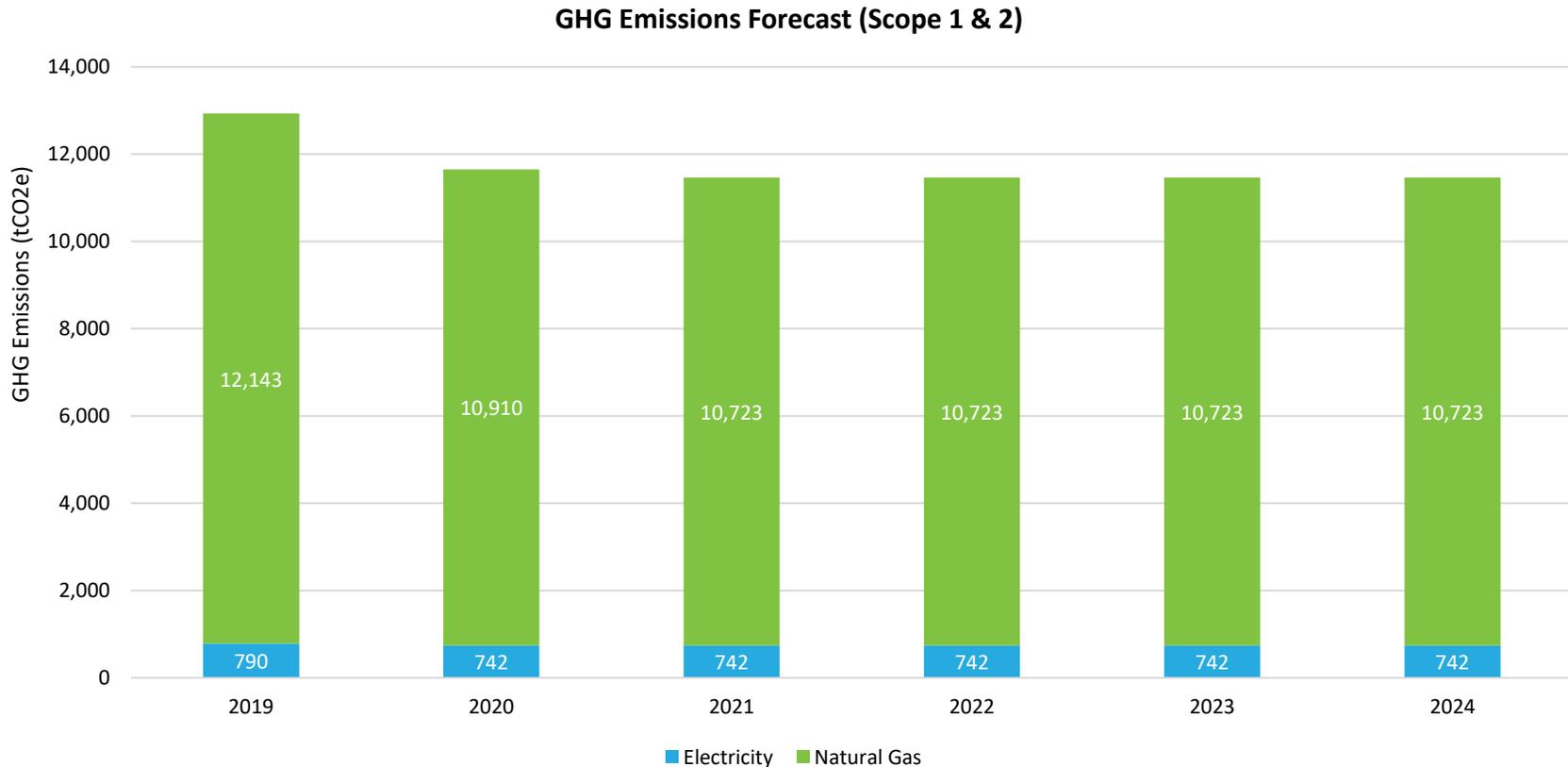


Figure 8. Forecast of Annual Greenhouse Gas Emissions for the Oshawa Hospital

## 4.2. Pinewood Centre



*Picture 2. Pinewood Centre*

Pinewood Centre of Lakeridge Health provides a variety of services to help people with alcohol, drug, concurrent mental health and gambling related concerns. Our wide range of treatment services includes residential withdrawal management services, residential treatment services, structured community-based individual and group services, and walk-in and telephone support.

Facility Information	
Facility Name	<b>Pinewood Centre</b>
Type of Facility	Healthcare Services
Address	300 Centre Street S., Oshawa, ON
Gross Area (Sq. Ft)	20,968
Average Operational Hours in a Week	56
Number of Floors	3
Industry Average EUI – Addiction Centre	33 ekWh/sq. ft.
Facility Average EUI	35 ekWh/sq. ft.

*Table 9. Pinewood Centre Facility Information*

### 4.2.1. Utility Consumption Analysis

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)						
Utility	2013	2014	2015	2016	2017	2018
Electricity (kWh)	290,600	291,700	286,500	305,900	281,700	298,536
Natural Gas (m <sup>3</sup> )	40,145	45,561	41,867	39,751	42,407	44,941

Table 10. Historic Annual Utility Consumption for the Pinewood Centre

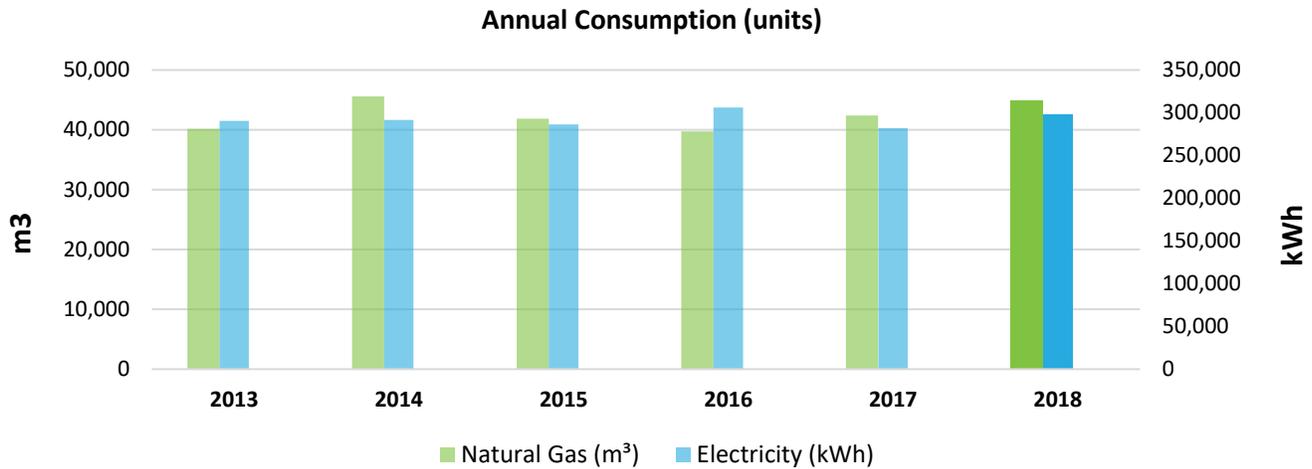


Figure 9. Historic Annual Utility Consumption for the Pinewood Centre

### 4.2.2. GHG Emissions Analysis

The greenhouse gas emissions are calculated based on the energy consumption data analyzed in the following table.

GHG Emissions (tCO <sub>2</sub> e)						
Utility Source	2013	2014	2015	2016	2017	2018
Electricity	12	12	12	13	12	12
Natural Gas	76	86	79	75	80	85
<b>Totals</b>	<b>88</b>	<b>98</b>	<b>91</b>	<b>88</b>	<b>92</b>	<b>97</b>

Table 11. Historic Annual Greenhouse Gas Emissions for the Pinewood Centre

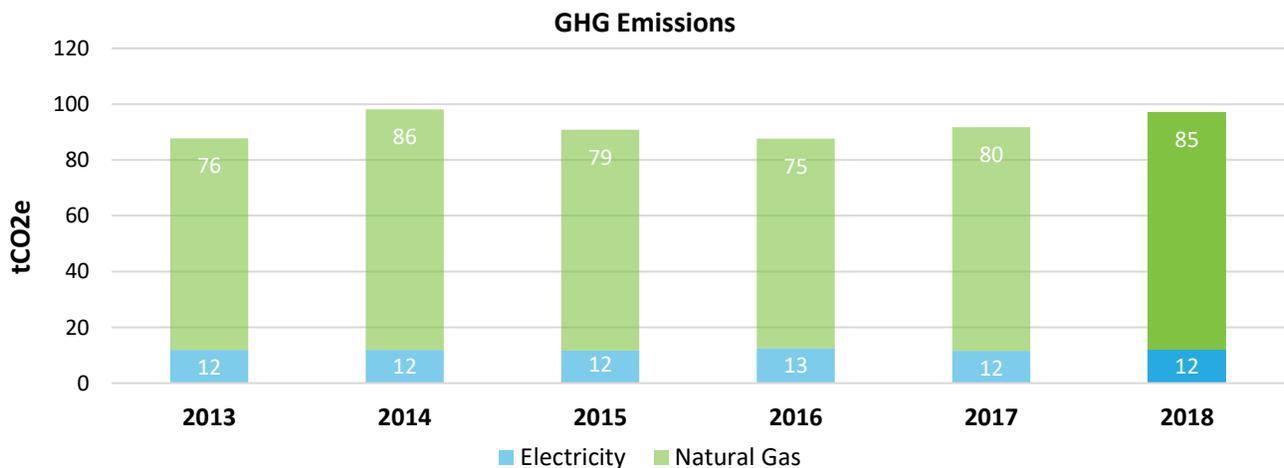


Figure 10. Historic Annual Greenhouse Gas Emissions for the Pinewood Centre

### 4.2.3. Proposed Conservation Measures

Our energy analysis has revealed several conservation strategies for the facility. Pinewood Centre’s proposed energy and water 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	kW	m3		
LED Lighting Upgrade	Electricity	41,611	0	0	8.65	2020
<b>Total</b>		<b>41,611</b>	<b>0</b>	<b>0</b>		

*Table 12. Proposed Conservation Measures for the Pinewood Centre*

#### 4.2.4. 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												
	2019		2020		2021		2022		2023		2024	
	Units	% Change										
Electricity (kWh)	298,536	0%	256,925	14%	256,925	14%	256,925	14%	256,925	14%	256,925	14%
Natural Gas (m <sup>3</sup> )	44,941	0%	44,941	0%	44,941	0%	44,941	0%	44,941	0%	44,941	0%

Table 13. Forecast of Annual Utility Consumption for the Pinewood Centre

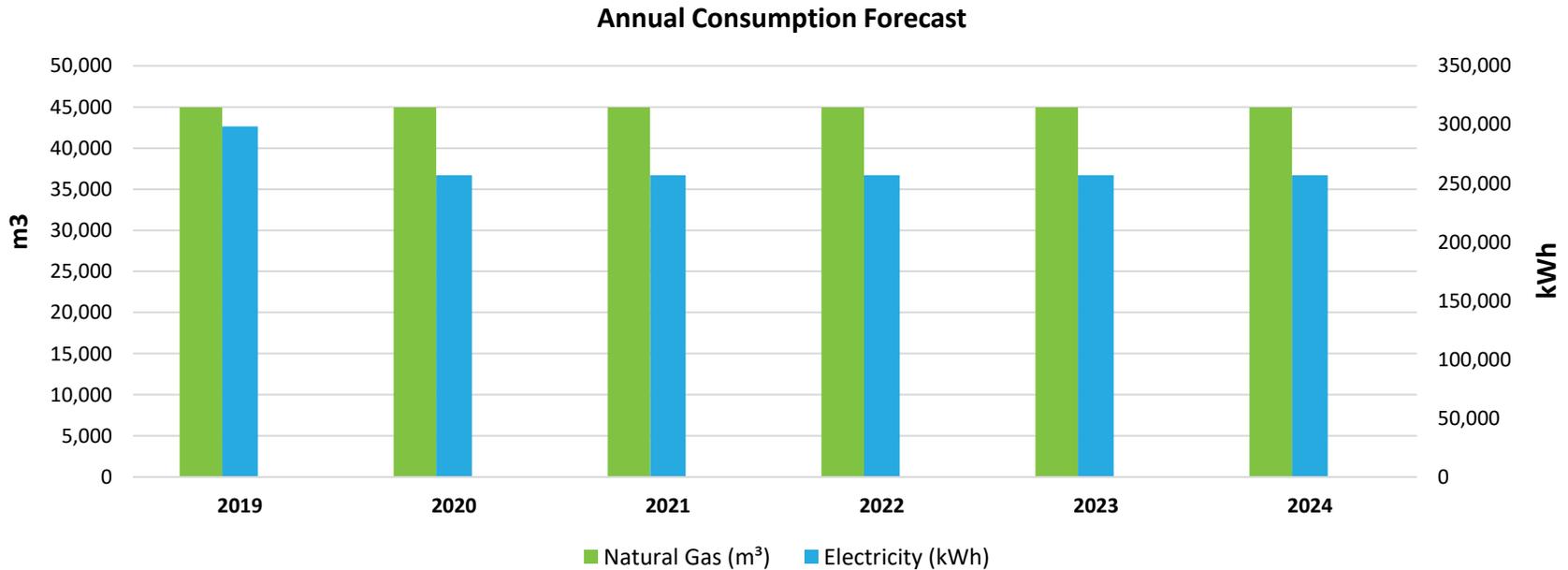


Figure 11. Forecast of Annual Utility Consumption for the Pinewood Centre

### 4.2.5. 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.

GHG Emissions (tCO <sub>2</sub> e)						
Utility Source	2019	2020	2021	2022	2023	2024
Electricity	12	11	11	11	11	11
Natural Gas	85	85	85	85	85	85
Totals	97	95	95	95	95	95
Reduction from Baseline Year (2018)	0.00%	1.76%	1.76%	1.76%	1.76%	1.76%

Table 14. Forecast of Annual Greenhouse Gas Emissions for the Pinewood Centre

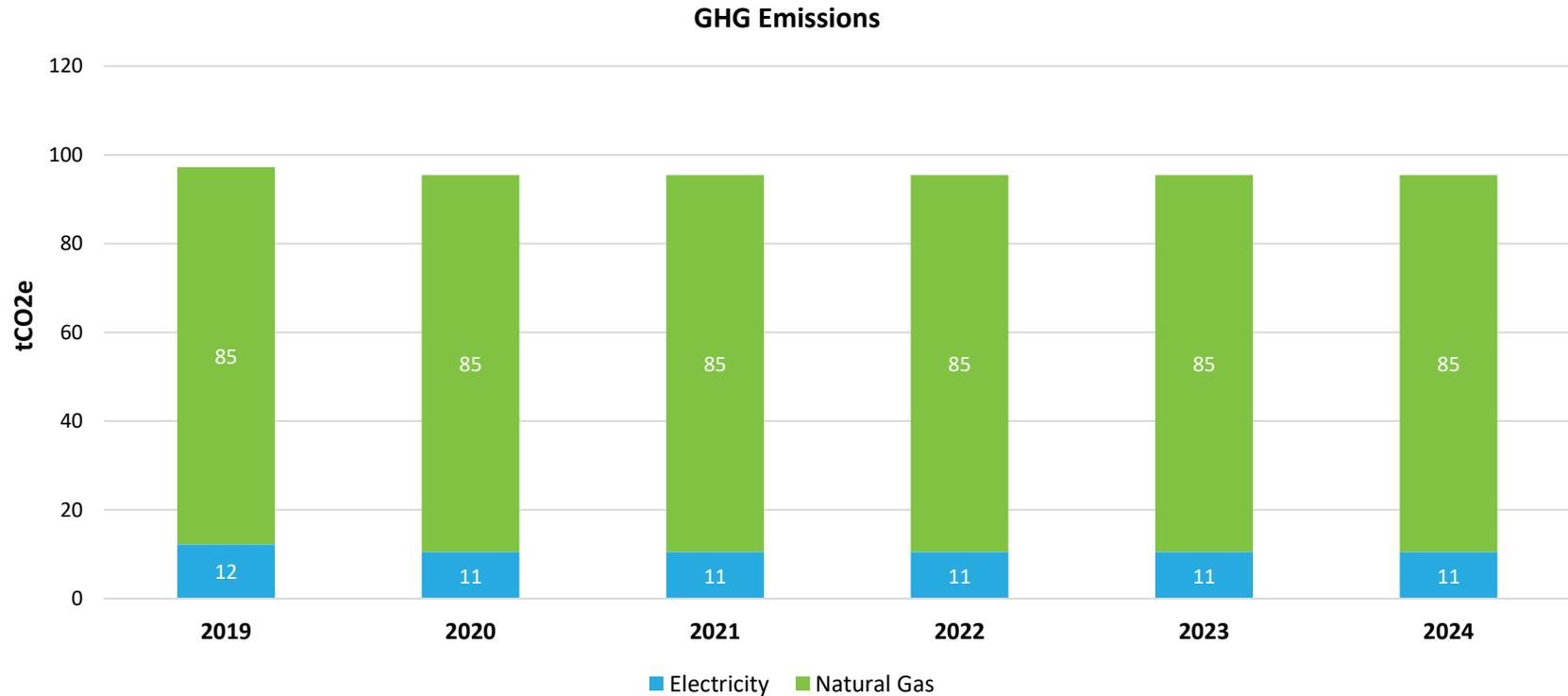


Figure 12. Forecast of Annual Greenhouse Gas Emissions for the Pinewood Centre

### 4.3. Bowmanville Hospital



Picture 3. Bowmanville Hospital

Bowmanville Hospital is a full-service community hospital that provides safe quality care to residents who live in the Municipality of Clarington. Services include Emergency and Critical Care, Inpatient and Outpatient Surgery, Complex Continuing Care, Diabetes Education Program, Inpatient and Outpatient Rehabilitation Services, Palliative Care, Diagnostic Imaging and Laboratory Services.

Facility Information	
Facility Name	<b>Bowmanville Hospital</b>
Type of Facility	Healthcare Services
Address	47 Liberty Street S., Bowmanville, ON
Gross Area (Sq. Ft)	155,442
Average Operational Hours in a Week	168
Number of Floors	4
Industry Average EUI – Acute Hospital	63 ekWh/sq. ft.
Facility Average EUI	52 ekWh/sq. ft.

Table 15. Bowmanville Hospital Facility Information

### 4.3.1. Utility Consumption Analysis

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)						
Utility	2013	2014	2015	2016	2017	2018
Electricity (kWh)	3,344,135	3,169,070	3,027,867	3,186,332	3,080,569	3,120,080
Natural Gas (m <sup>3</sup> )	546,978	518,554	518,554	385,807	380,915	451,045

Table 16. Historic Annual Utility Consumption for the Bowmanville Hospital

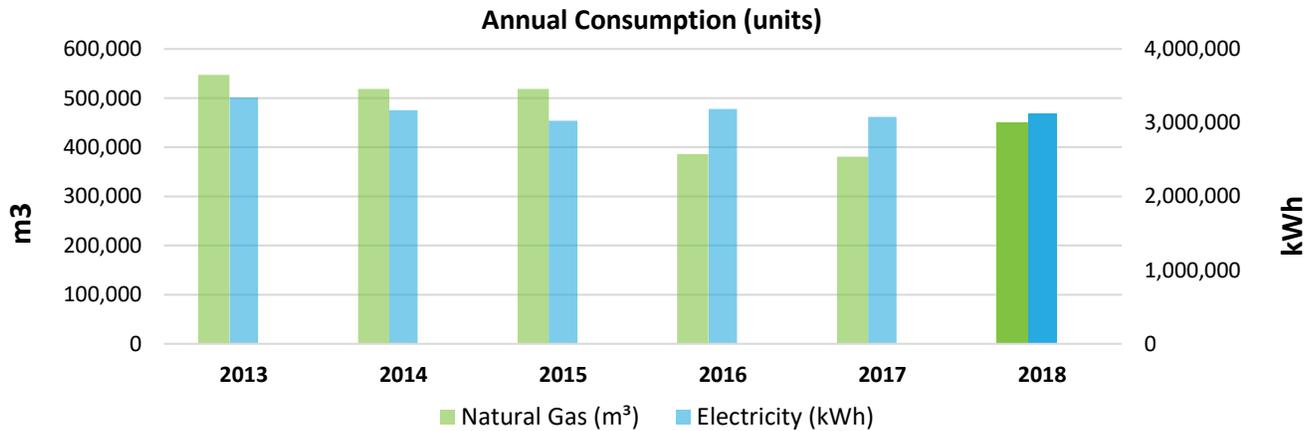


Figure 13. Historic Annual Utility Consumption for the Bowmanville Hospital

### 4.3.2. GHG Emissions Analysis

The greenhouse gas emissions are calculated based on the energy consumption data analyzed in the following table.

GHG Emissions (tCO <sub>2</sub> e)						
Utility Source	2013	2014	2015	2016	2017	2018
Electricity	137	130	124	131	126	128
Natural Gas	1,034	980	980	729	720	852
<b>Totals</b>	<b>1,171</b>	<b>1,110</b>	<b>1,104</b>	<b>860</b>	<b>846</b>	<b>980</b>

Table 17. Historic Annual Greenhouse Gas Emissions for the Bowmanville Hospital

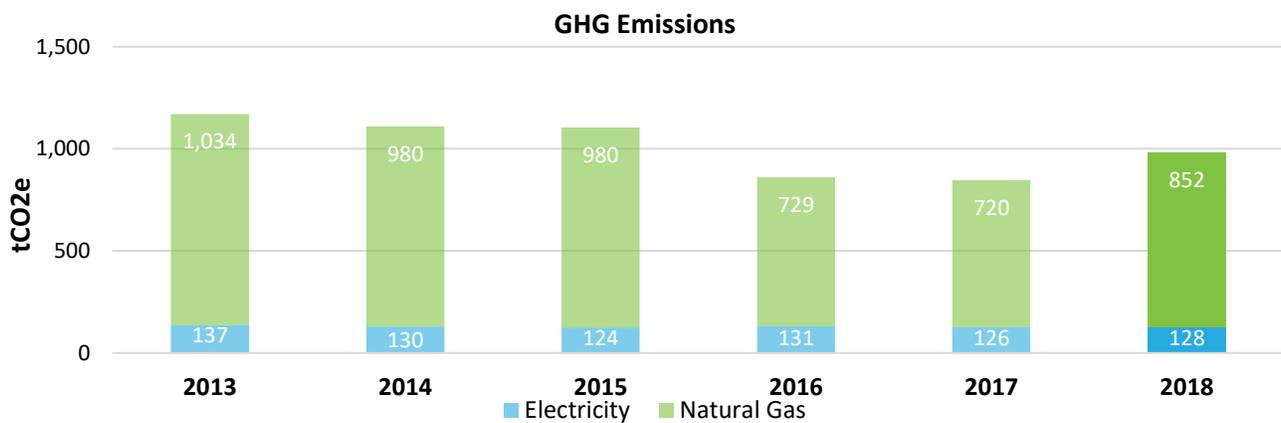


Figure 14. Historic Annual Greenhouse Gas Emissions for the Bowmanville Hospital

### 4.3.3. Proposed Conservation Measures

Our energy analysis has revealed several conservation strategies for the facility. Bowmanville Hospital’s proposed energy and water 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	kW	m3		
<b>LED Lighting Upgrade</b>	Electricity & Natural Gas	164,389	42	-4,109	7.84	2020
<b>Match AHU w/ Occupancy Schedule</b>	Electricity & Natural Gas	141,770	0	25,014	2.49	2020
<b>Replace Condensing Units Walk in Freezers</b>	Electricity	-10,456	0	0	32.26	2020
<b>Building Envelope Weather Striping &amp; Caulking</b>	Natural Gas	0	0	9,845	7.87	2020
<b>Total</b>		<b>295,703</b>	<b>42</b>	<b>30,750</b>		

*Table 18. Proposed Conservation Measures for the Bowmanville Hospital*

### 4.3.4. 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												
	2019		2020		2021		2022		2023		2024	
	Units	% Change										
Electricity (kWh)	3,120,080	0%	2,824,377	9%	2,824,377	9%	2,824,377	9%	2,824,377	9%	2,824,377	9%
Natural Gas (m <sup>3</sup> )	451,045	0%	420,295	7%	420,295	7%	420,295	7%	420,295	7%	420,295	7%

Table 19. Forecast of Annual Utility Consumption for the Bowmanville Hospital

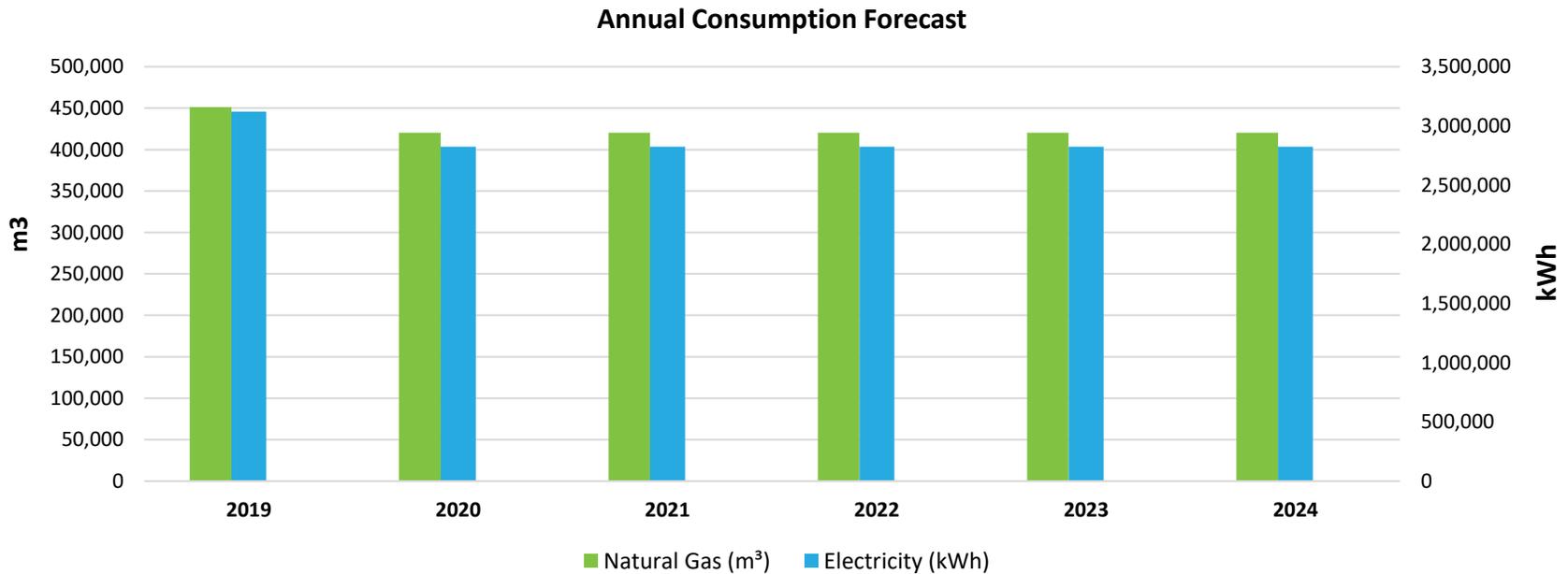


Figure 15. Forecast of Annual Utility Consumption for the Bowmanville Hospital

### 4.3.5. 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.

GHG Emissions (tCO <sub>2</sub> e)						
Utility Source	2019	2020	2021	2022	2023	2024
Electricity	128	116	116	116	116	116
Natural Gas	852	794	794	794	794	794
<b>Totals</b>	<b>980</b>	<b>910</b>	<b>910</b>	<b>910</b>	<b>910</b>	<b>910</b>
<b>Reduction from Baseline Year (2018)</b>	<b>0.00%</b>	<b>7.16%</b>	<b>7.16%</b>	<b>7.16%</b>	<b>7.16%</b>	<b>7.16%</b>

Table 20. Forecast of Annual Greenhouse Gas Emissions for the Bowmanville Hospital

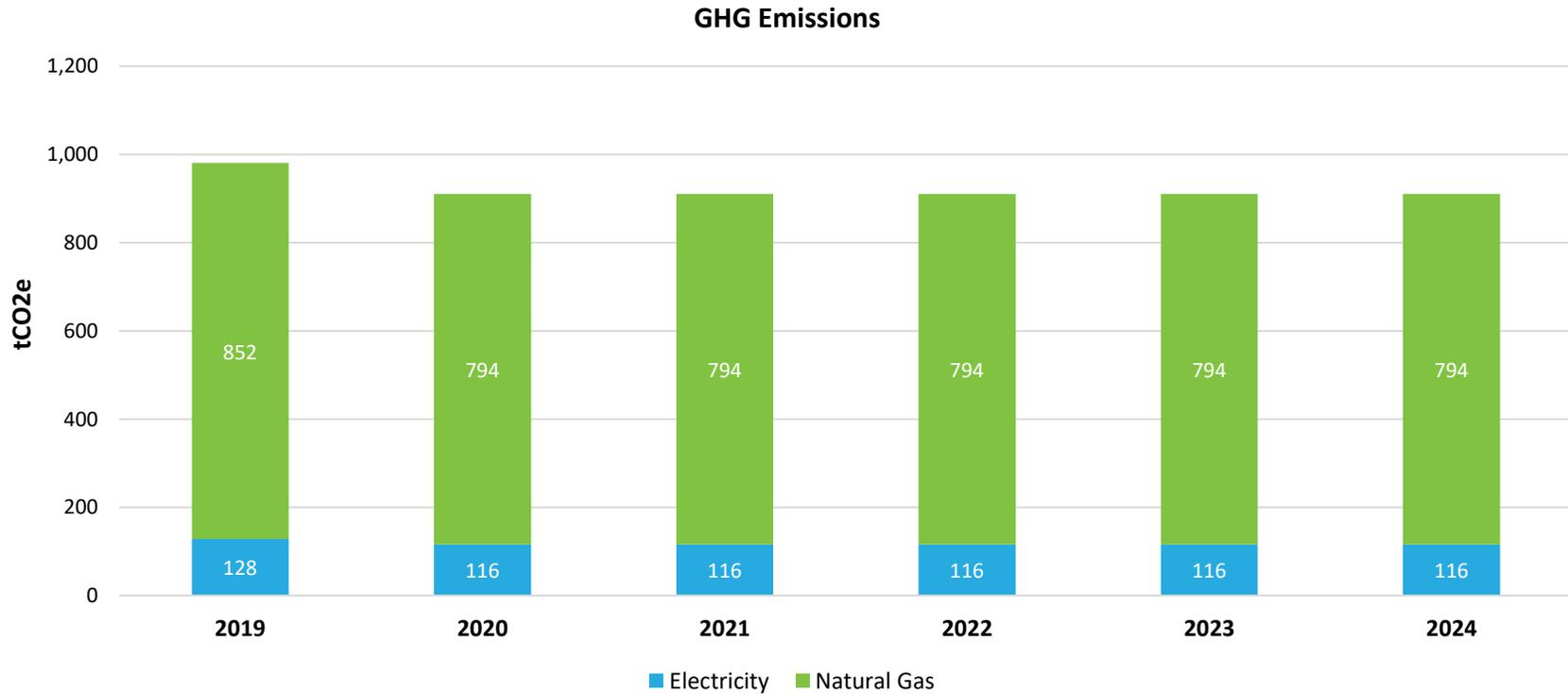


Figure 16. Forecast of Annual Greenhouse Gas Emissions for the Bowmanville Hospital

## 4.4. Whitby Hospital



*Picture 4. Whitby Hospital*

Whitby Hospital is a specialty hospital that provides high quality, specialized care to residents who live in Whitby and Durham Region. Services include Dialysis and Kidney Care, Diabetes Education, Outpatient Rehabilitation Services, Neurological Rehabilitation, Positive Care Clinic, Respiratory Rehabilitation, Complex Continuing Care, Geriatric Rehabilitation and Assessment.

Facility Information	
Facility Name	<b>Whitby Hospital</b>
Type of Facility	Healthcare Services
Address	300 Gordon Street,
Gross Area (Sq. Ft)	107,280
Average Operational Hours in a Week	168
Number of Floors	3
Industry Average EUI – Nursing Home/Hospital	47 kWh/sq. ft.
Facility Average EUI	56 kWh/sq. ft.

*Table 21. Whitby Hospital Facility Information*

### 4.4.1. Utility Consumption Analysis

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)						
Utility	2013	2014	2015	2016	2017	2018
Electricity (kWh)	1,600,641	2,000,651	2,023,312	2,122,581	2,085,585	2,296,796
Natural Gas (m <sup>3</sup> )	453,994	368,891	368,891	299,074	368,466	371,540

Table 22. Historic Annual Utility Consumption for the Whitby Hospital

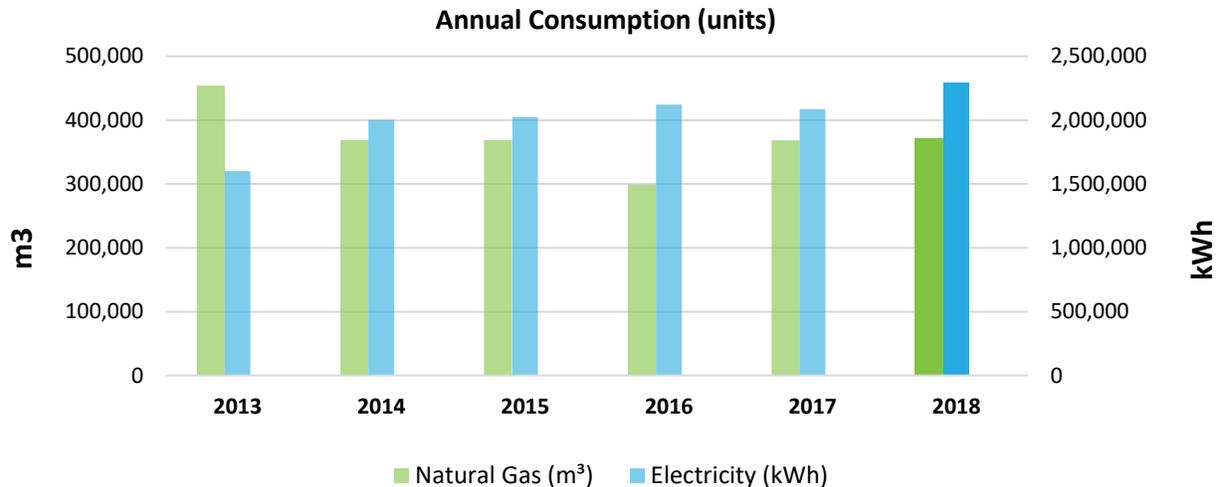


Figure 17. Historic Annual Utility Consumption for the Whitby Hospital

### 4.4.2. GHG Emissions Analysis

The greenhouse gas emissions are calculated based on the energy consumption data analyzed in the following table.

GHG Emissions (tCO <sub>2</sub> e)						
Utility Source	2013	2014	2015	2016	2017	2018
Electricity	66	82	83	87	86	94
Natural Gas	858	697	697	565	696	702
<b>Totals</b>	<b>924</b>	<b>779</b>	<b>780</b>	<b>652</b>	<b>782</b>	<b>796</b>

Table 23. Historic Annual Greenhouse Gas Emissions for the Whitby Hospital

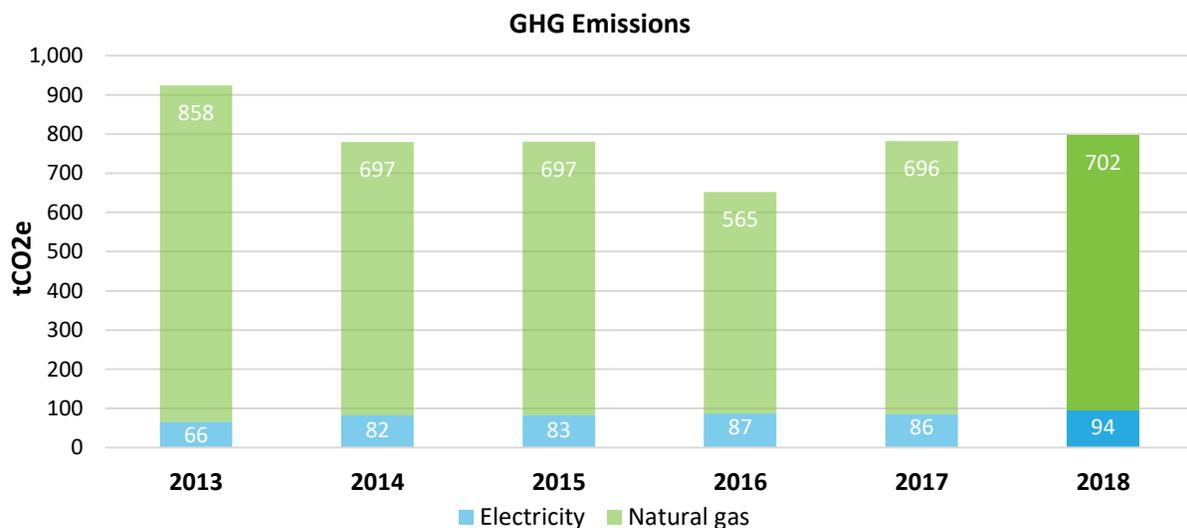


Figure 18. Historic Annual Greenhouse Gas Emissions for the Whitby Hospital

### 4.4.3. Proposed Conservation Measures

Our energy analysis has revealed several conservation strategies for the facility. Whitby Hospital’s proposed energy and water 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	kW	m3		
<b>LED Lighting Upgrade</b>	Electricity & Natural Gas	149,195	48	-3,729	9.78	2021
<b>Match AHU w/ Occupancy Schedule</b>	Electricity & Natural Gas	88,808	0	11,685	0.49	2020
<b>Replace Condensing Units Walk in Freezers</b>	Electricity	-1,089	0	0	24.55	2020
<b>Building Envelope Weather Striping &amp; Caulking</b>	Natural Gas	0	0	3,648	7.10	2021
<b>Dialysis RTU Replacement</b>	Electricity & Natural Gas	136,788	0	13,433	24.02	2021
<b>Chiller Replacement</b>	N/A	0	0	0	0.00	2021
<b>Total</b>		<b>373,702</b>	<b>48</b>	<b>25,037</b>		

*Table 24. Proposed Conservation Measures for the Whitby Hospital*

#### 4.4.4. 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												
	2019		2020		2021		2022		2023		2024	
	Units	% Change										
Electricity (kWh)	2,296,796	0%	2,209,077	4%	1,923,094	16%	1,923,094	16%	1,923,094	16%	1,923,094	16%
Natural Gas (m <sup>3</sup> )	371,540	0%	359,855	3%	346,503	7%	346,503	7%	346,503	7%	346,503	7%

Table 25. Forecast of Annual Utility Consumption for the Whitby Hospital

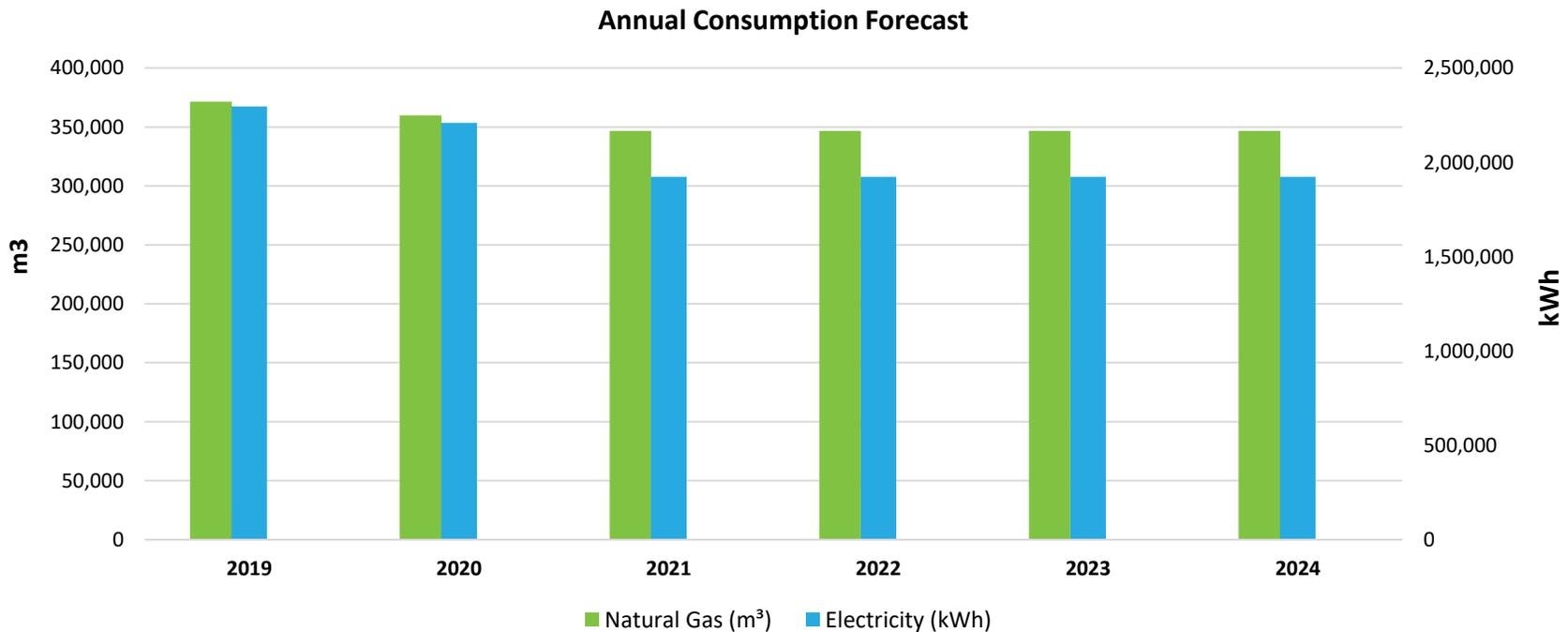


Figure 19. Forecast of Annual Utility Consumption for the Whitby Hospital

### 4.4.5. 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.

GHG Emissions (tCO <sub>2</sub> e)						
Utility Source	2019	2020	2021	2022	2023	2024
Electricity	94	91	79	79	79	79
Natural Gas	702	680	655	655	655	655
<b>Totals</b>	<b>796</b>	<b>771</b>	<b>734</b>	<b>734</b>	<b>734</b>	<b>734</b>
Reduction from Baseline Year (2018)	<b>0.00%</b>	<b>3.22%</b>	<b>7.87%</b>	<b>7.87%</b>	<b>7.87%</b>	<b>7.87%</b>

Table 26. Forecast of Annual Greenhouse Gas Emissions for the Whitby Hospital

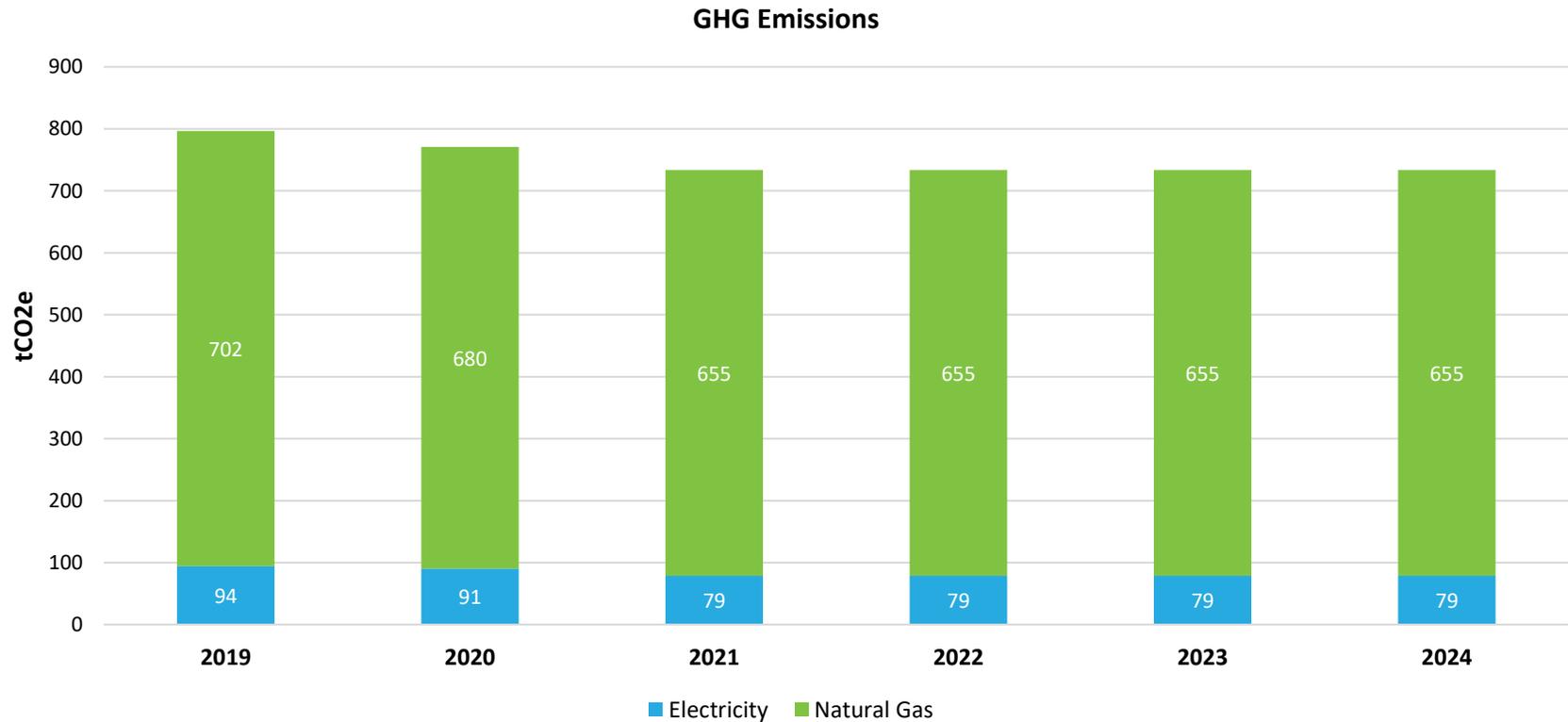


Figure 20. Forecast of Annual Greenhouse Gas Emissions for the Whitby Hospital

## 4.5. Port Perry Hospital



*Picture 5. Port Perry Hospital*

Port Perry Hospital is a full-service community hospital that provides high-quality, safe care to the residents of North Durham. Services include an acute Emergency Department, Diagnostic Imaging services, the New Life Centre, helipad access, in-patient medicine beds and surgical services and outpatient clinics.

In August of 2017 a fire occurred at the hospital, resulting in a temporary closure. The hospital reopened in September of 2018. Due to this there will be no conservation measures or forecasting data provided. The historical data can be found in section 4.5.1 and 4.5.2 below. The 2018 data represented in the following sections is based on partial consumption, and not a full calendar year.

Facility Information	
Facility Name	<b>Port Perry Hospital</b>
Type of Facility	Healthcare Services
Address	451 Paxton Street, Port Perry, ON
Gross Area (Sq. Ft)	63,673
Average Operational Hours in a Week	168
Number of Floors	1
Industry Average EUI – Acute Hospital	63 ekWh/sq. ft.
Facility Average EUI	77 ekWh/sq. ft.

*Table 27. Port Perry Hospital Facility Information*

### 4.5.1. Utility Consumption Analysis

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)						
Utility	2013	2014	2015	2016	2017	2018
Electricity (kWh)	1,706,621	1,674,341	1,560,957	1,604,635	1,117,919	1,275,447
Natural Gas (m <sup>3</sup> )	392,709	409,317	409,317	342,864	345,263	35,645

Table 28. Historic Annual Utility Consumption for the Port Perry Hospital

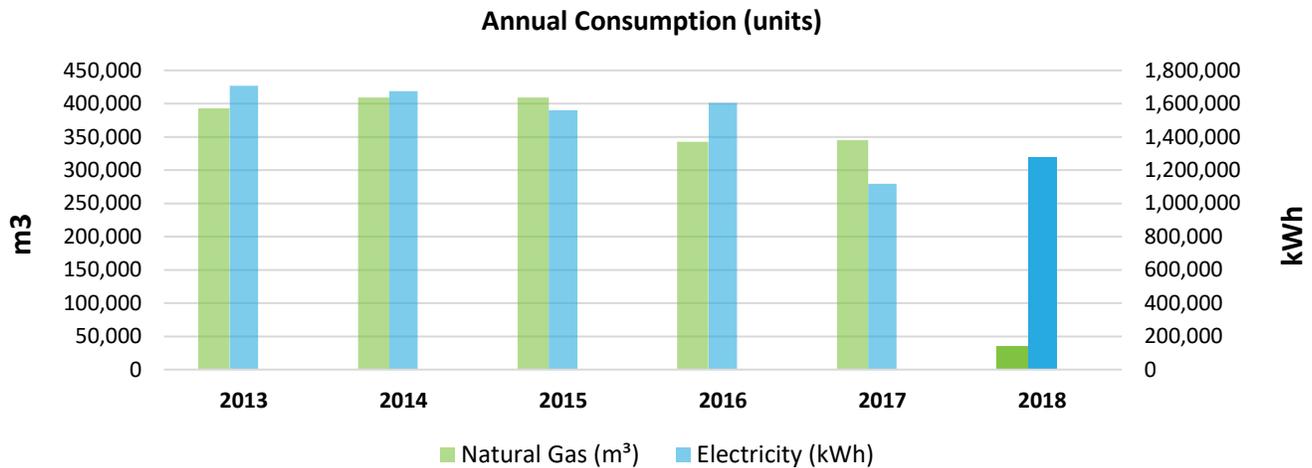


Figure 21. Historic Annual Utility Consumption for the Port Perry Hospital

### 4.5.2. GHG Emissions Analysis

The greenhouse gas emissions are calculated based on the energy consumption data analyzed in the following table.

GHG Emissions (tCO <sub>2</sub> e)						
Utility Source	2013	2014	2015	2016	2017	2018
Electricity	70	69	64	66	46	52
Natural Gas	742	774	774	648	653	67
<b>Totals</b>	<b>812</b>	<b>842</b>	<b>838</b>	<b>714</b>	<b>698</b>	<b>120</b>

Table 29. Historic Annual Greenhouse Gas Emissions for the Port Perry Hospital

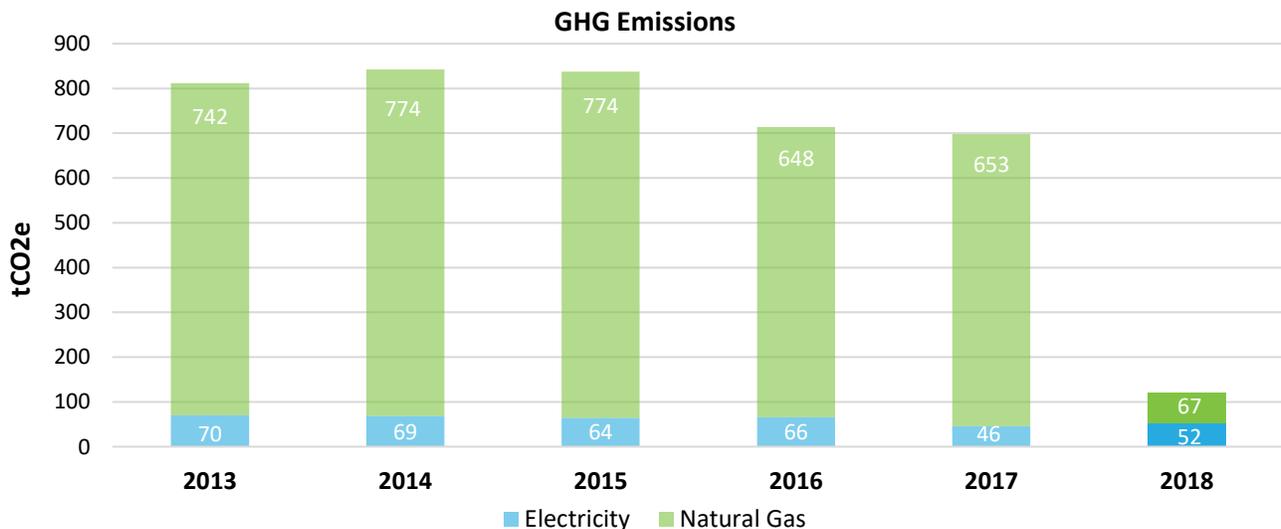


Figure 22. Historic Annual Greenhouse Gas Emissions for the Port Perry Hospital

## 4.6. Ajax Pickering Hospital



*Picture 6. Ajax Pickering Hospital*

Ajax Pickering Hospital is a full-service community hospital that provides safe quality care to residents who live in the communities of Ajax and Pickering. Services include Emergency and Critical Care, Women and Children's Health, Cardiac Care, Shoulder Centre, Diabetes Education, Outpatient Mental Health Services, Inpatient and Outpatient Surgery, Diagnostic Imaging and Laboratory Services.

Facility Information	
Facility Name	<b>Ajax Pickering Hospital</b>
Type of Facility	Healthcare Services
Address	580 Hardwood Avenue S., Ajax, ON
Gross Area (Sq. Ft)	327,620
Average Operational Hours in a Week	168
Number of Beds	144
Number of Floors	4
Industry Average EUI – Acute Hospital	63 ekWh/sq. ft.
Facility Average EUI	75 ekWh/sq. ft.

*Table 30. Ajax Pickering Hospital Facility Information*

### 4.6.1. Utility Consumption Analysis

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)						
Utility	2013	2014	2015	2016	2017	2018
Electricity (kWh)	9,483,927	9,681,348	9,110,909	9,605,456	9,648,060	9,812,694
Natural Gas (m <sup>3</sup> )	1,399,693	1,415,828	1,340,484	1,389,313	1,397,754	1,521,750

Table 31. Historic Annual Utility Consumption for the Ajax Pickering Hospital

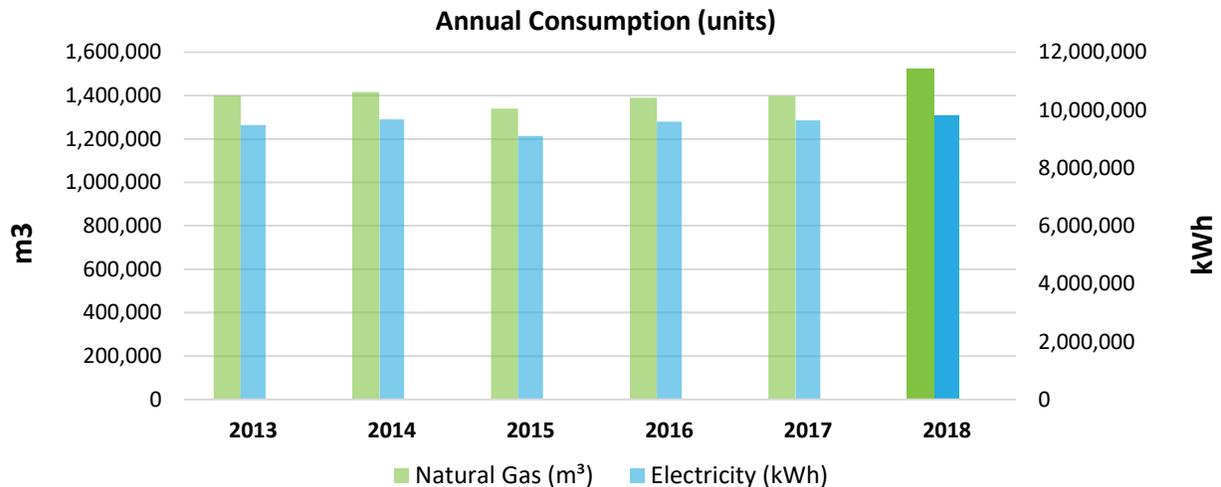


Figure 23. Historic Annual Utility Consumption for the Ajax Pickering Hospital

### 4.6.2. GHG Emissions Analysis

The greenhouse gas emissions are calculated based on the energy consumption data analyzed in the following table.

GHG Emissions (tCO <sub>2</sub> e)						
Utility Source	2013	2014	2015	2016	2017	2018
Electricity	389	397	374	394	396	402
Natural Gas	2,645	2,676	2,534	2,626	2,642	2,876
<b>Totals</b>	<b>3,034</b>	<b>3,073</b>	<b>2,907</b>	<b>3,020</b>	<b>3,037</b>	<b>3,278</b>

Table 32. Historic Annual Greenhouse Gas Emissions for the Ajax Pickering Hospital

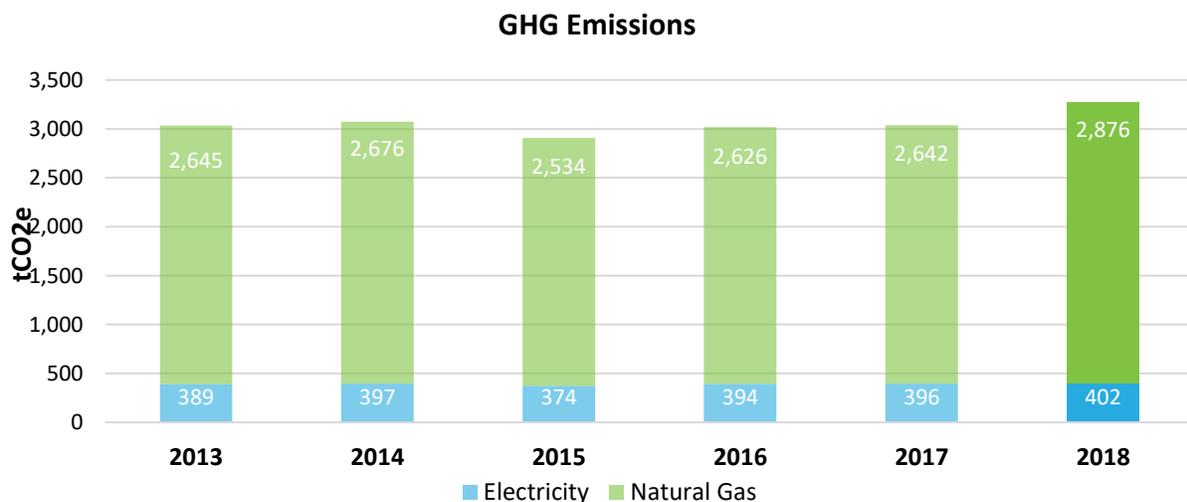


Figure 24. Historic Annual Greenhouse Gas Emissions for the Ajax Pickering Hospital

### 4.6.3. Proposed Conservation Measures

Our energy analysis has revealed several conservation strategies for the facility. Ajax Pickering Hospital’s proposed energy and water 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	kW	m3		
500 kW Solar PV	Electricity	765,000	159	0	14.56	2022
LED Lighting Upgrade	Electricity	827,525	224	0	6.83	2021
Energy Control Optimization	Electricity & Natural Gas	333,912	0	8,609	3.91	2020
Enhance Ventilation Zone Control	Electricity & Natural Gas	265,736	0	49,290	3.16	2019
Building Envelope	Natural Gas	0	0	7,956	6.36	2021
Two Electric Vehicle Charging Stations	N/A	0	0	0	0.00	2020
<b>Total</b>		<b>2,192,173</b>	<b>383</b>	<b>65,855</b>		

*Table 33. Proposed Conservation Measures for the Ajax Pickering Hospital*

#### 4.6.4. 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												
	2019		2020		2021		2022		2023		2024	
	Units	% Change										
Electricity (kWh)	9,546,958	3%	9,213,046	6%	8,385,521	15%	7,620,521	22%	7,620,521	22%	7,620,521	22%
Natural Gas (m <sup>3</sup> )	1,472,460	3%	1,463,851	4%	1,455,895	4%	1,455,895	4%	1,455,895	4%	1,455,895	4%

Table 34. Forecast of Annual Utility Consumption for the Ajax Pickering Hospital

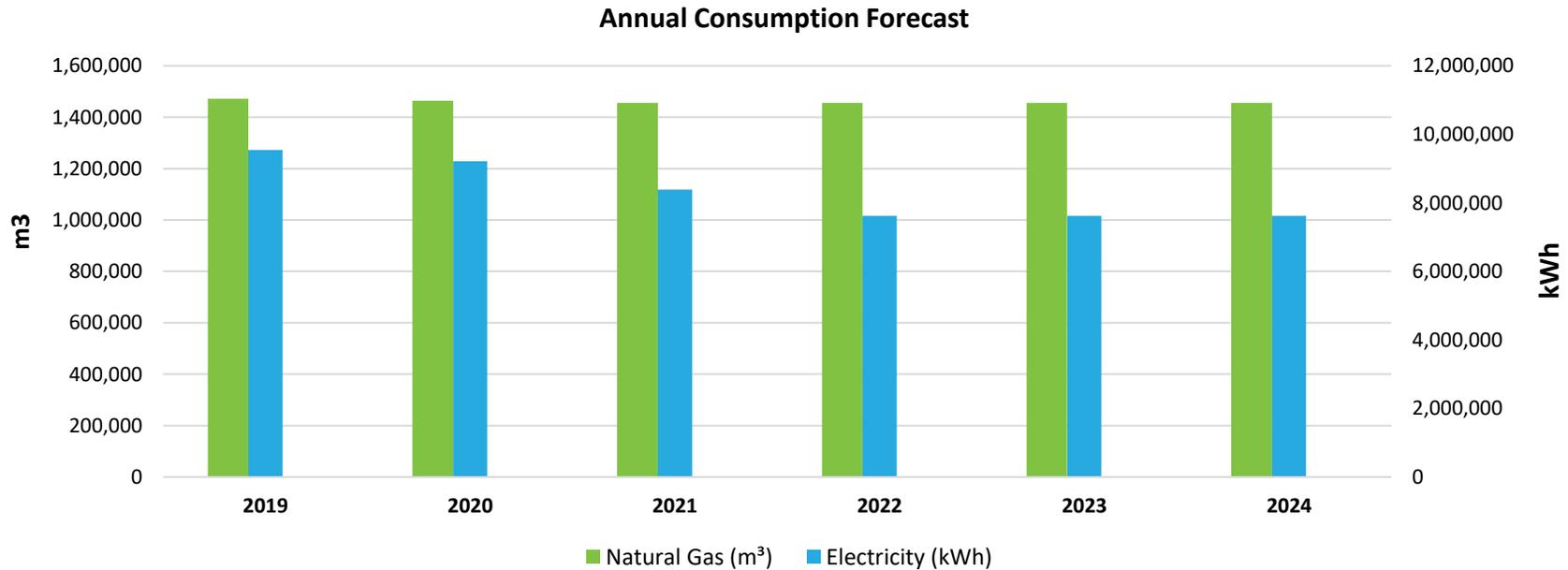


Figure 25. Forecast of Annual Utility Consumption for the Ajax Pickering Hospital

### 4.6.5. 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.

GHG Emissions (tCO <sub>2</sub> e)						
Utility Source	2019	2020	2021	2022	2023	2024
Electricity	391	378	344	312	312	312
Natural Gas	2,783	2,767	2,752	2,752	2,752	2,752
<b>Totals</b>	<b>3,174</b>	<b>3,144</b>	<b>3,095</b>	<b>3,064</b>	<b>3,064</b>	<b>3,064</b>
Reduction from Baseline Year (2018)	3.17%	4.09%	5.58%	6.54%	6.54%	6.54%

Table 35. Forecast of Annual Greenhouse Gas Emissions for the Ajax Pickering Hospital

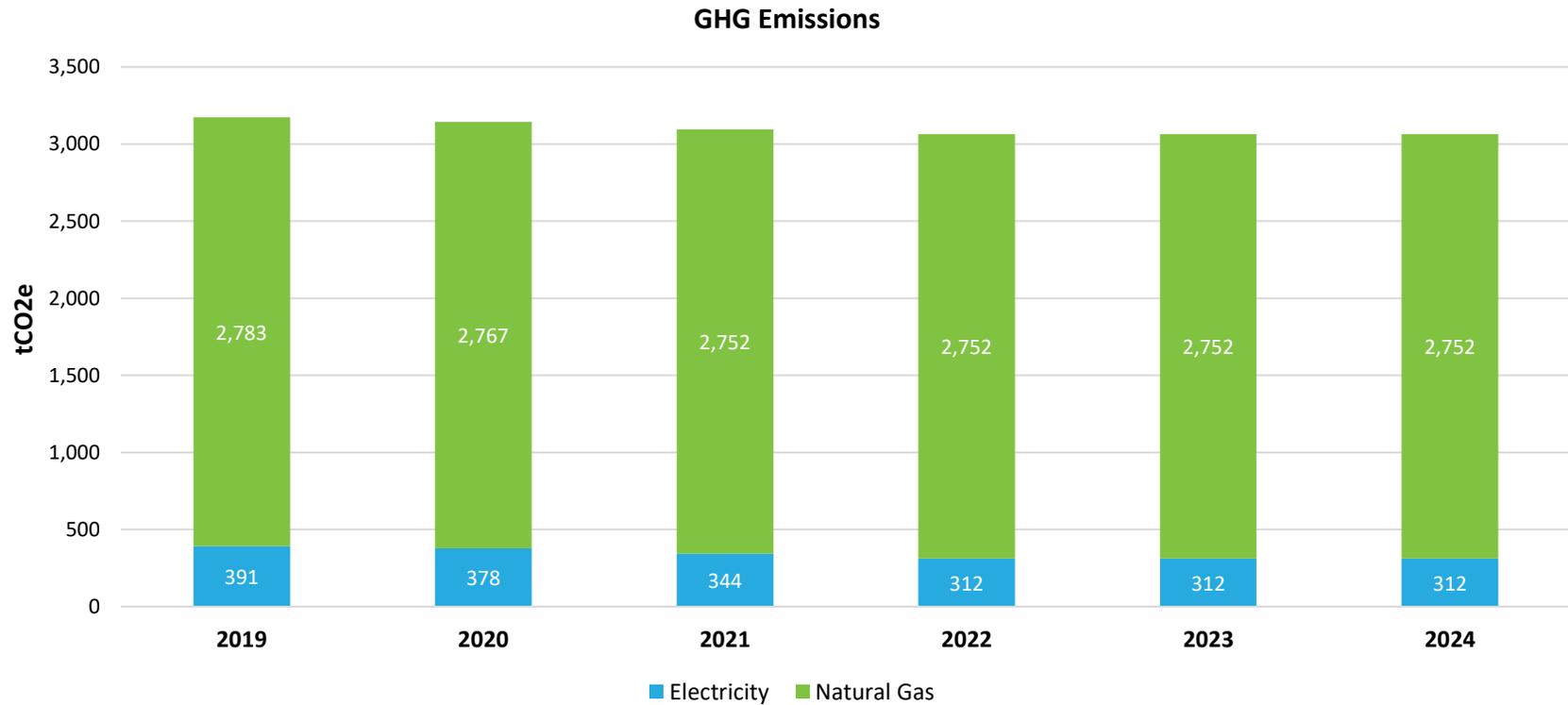


Figure 26. Forecast of Annual Greenhouse Gas Emissions for the Ajax Pickering Hospital

# 5. Site Outlook

## 5.1. Site-Wide Utility Consumption Forecast

By implementing the energy conservation measures stated in the previous sections, in each respective site, Lakeridge Health’s site-wide projected electricity and natural gas use could be forecasted based on the utility savings generated from individual measures. The site-wide forecasted utility consumption is tabulated below. The percentage of change is based on the data from the baseline year of 2018.

Annual Consumption												
	2019		2020		2021		2022		2023		2024	
	Units	% Change										
Electricity (kWh)	35,799,412	4%	33,864,752	9%	32,751,244	12%	31,986,244	14%	31,986,244	14%	31,986,244	14%
Natural Gas (m <sup>3</sup> )	8,800,702	1%	8,097,000	9%	7,977,084	10%	7,977,084	10%	7,977,084	10%	7,977,084	10%

Table 36. Forecast of Annual Utility Consumption for all Sites

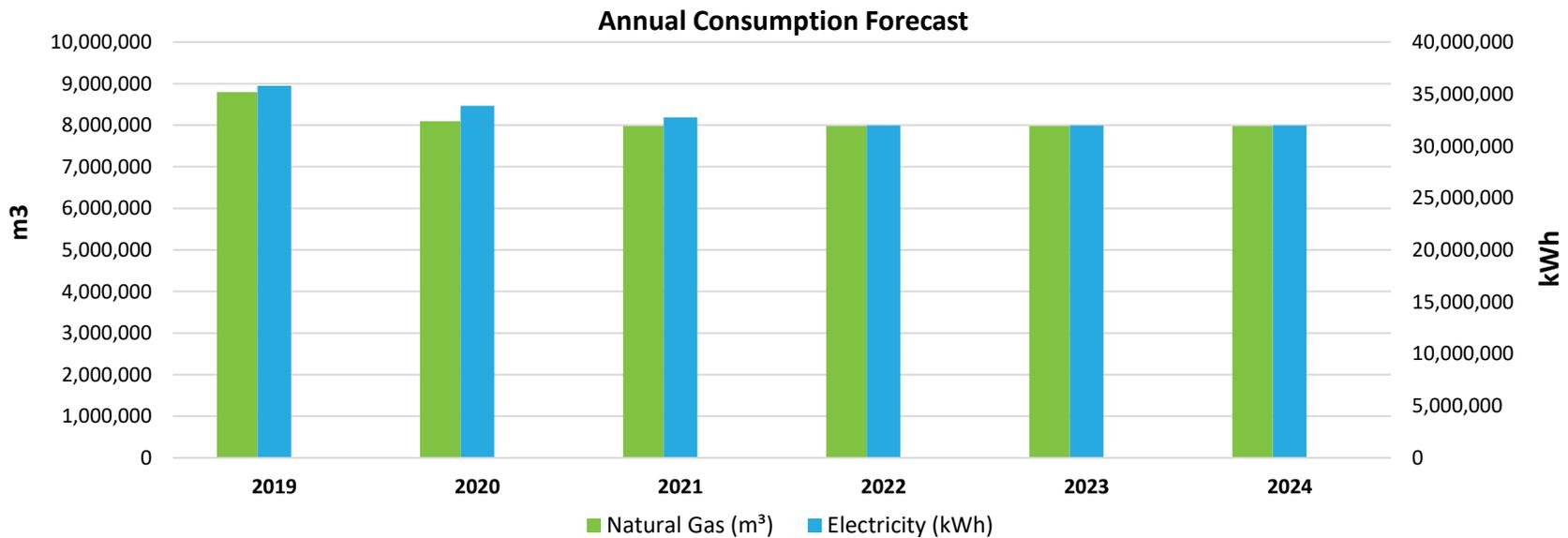


Figure 27. Forecast of Annual Utility Consumption for all Sites

## 5.2. Site-Wide GHG Emissions Forecast

The organizational greenhouse gas emissions for Lakeridge Health are calculated based on the forecasted site-wide energy consumption data analyzed in the previous section and are tabulated in the following table. The percent of reduction is based on the data from the baseline year of 2018.

GHG Emissions (tCO <sub>2</sub> e)						
Utility Source	2019	2020	2021	2022	2023	2024
Electricity	1,468	1,388	1,343	1,311	1,311	1,311
Natural Gas	16,633	15,303	15,077	15,077	15,077	15,077
<b>Totals</b>	<b>18,101</b>	<b>16,692</b>	<b>16,419</b>	<b>16,388</b>	<b>16,388</b>	<b>16,388</b>
Reduction from Baseline Year (2018)	<b>0.87%</b>	<b>8.59%</b>	<b>10.08%</b>	<b>10.25%</b>	<b>10.25%</b>	<b>10.25%</b>

Table 37. Forecast of Annual Greenhouse Gas Emissions for all Sites

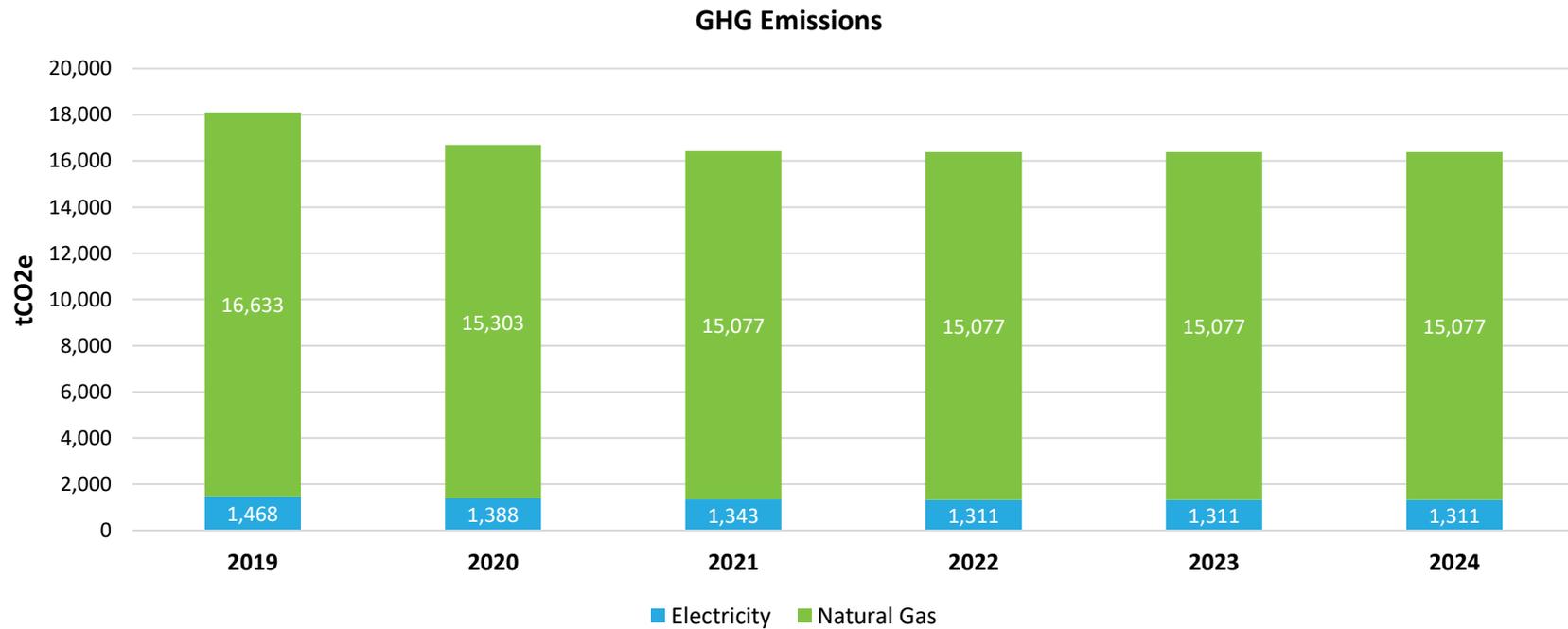


Figure 28. Forecast of Annual Greenhouse Gas Emissions for all Sites

## 6. Closing Comments

Thank you to all who contributed to Lakeridge Health'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 Lakeridge Health, we approve this Energy Conservation & Demand Management Plan

This ECDM plan was created through a collaborative effort between Lakeridge Health and Blackstone Energy Services.

# 7. Appendix

## 7.1. 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	CO2	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	CO2e	CO2e provides a common means of measurement when comparing different greenhouse gases.
GHG Protocol		GHG Protocol refers to the recognized international standards used in the measurement and quantification of 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 <a href="#">building</a> with zero net <a href="#">energy consumption</a> , meaning the total amount of energy used by the building on an annual basis is roughly equal to the amount of <a href="#">renewable energy</a> 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.

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