Energy Conservation & Demand Management Plan

Municipality of Clarington

2019-2024

Executive Summary

The purpose of this Energy Conservation and Demand Management (ECDM) Plan from the Municipality of Clarington 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.

This ECDM Plan outlines how the municipality will reduce overall energy consumption, operating costs and greenhouse gas (GHG) emissions and 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, the Municipality of Clarington has achieved the following results:

- 358,201 kwh reduction in electricity use
- 77,701 m_3 increase in natural gas use
- 490 L reduction in fuel oil use
- 26,057 L reduction in propane use

These fluctuations in utility consumption can be influenced by the expansion of building sizes, changes in facility hours of operation, as well weather conditions.

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

- Energy Use Index (EUI) average was 42 ekWh/ft^2
- Energy-related GHG emissions equaled 3,161 tCO_2e

To obtain full value from energy management activities, the Municipality of Clarington will continue to 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 an economic return and will support other key organizational objectives.

With the implementation of this ECDM Plan, it is estimated that the Municipality of Clarington can achieve the following targets by 2024 (the reduction is based off the data from the baseline year of 2018):

- 7 % reduction in electricity consumption
- 3% reduction in natural gas consumption
- 5% reduction in site-wide average EUI
- 4% reduction in tCO2e carbon equivalent emissions
- Continue to review opportunities for energy conservation and GHG reduction

1 Introduction

The objective of this document is to create a 5-year corporate plan to meet the regulatory requirements of O.Reg 507/18 (further detail in Section 2.0). This regulation requires that all Broader Public Sector (BPS) entities create a publicly accessible Energy Conservation & Demand Management (ECDM) Plan. The plan must review the historical and forecasted performance of the facilities that are owned and operated by the Municipality. In total, 27 facilities were analyzed for this report. Fleet vehicle greenhouse gas (GHG) emissions were not included in the report as per the regulatory requirements, but data is being reviewed for future reporting opportunities. Blackstone Energy Services was retained to complete the report in collaboration with a working group of municipal staff from across the corporation. The process and methodology used to complete this report is shown below.

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 graph below.

1.1 Methodology

In order to meet the regulatory requirements, annual utility consumption data for each facility was collected from 2014 – 2018. To forecast future facility performance, 2018 consumption was used as the baseline for each facility. For the purposes of the ECDM plan, the impact of weather or changes in facility hours of operation were not taken into consideration although these variables can have a significant impact on facility performance. The Municipality of Clarington had previously completed facility audits for most buildings. Audit data and working group feedback were used to develop energy conservation measure opportunities listed for each site. A collaborative strategic planning session was held to guide the draft documentation and obtain group feedback. The process below provides a high-level process overview which resulted in the final ECDM plan.

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 annually and develop Conservation and Demand Management (CDM) plans the following year. The chart below outlines the difference between the annual BPS reporting requirement and the CDM plans (now called ECDM plans).

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).**

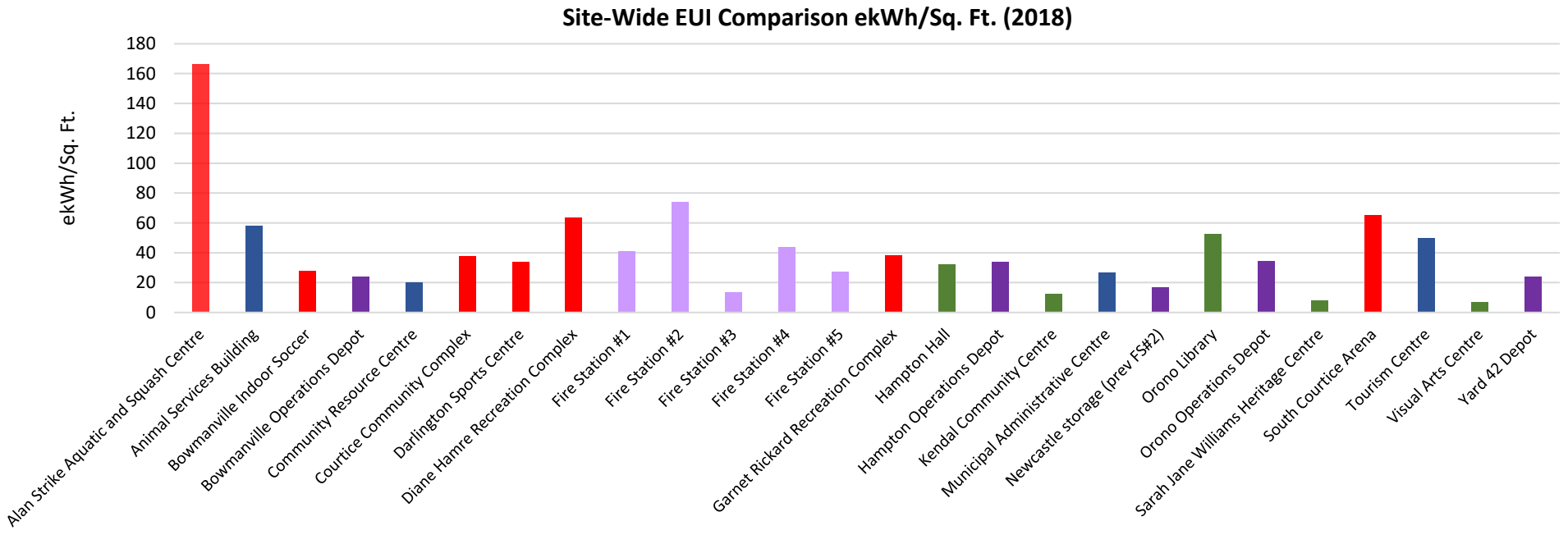
As of January 1, 2019, O. Reg. 397/11 was replaced by O. Reg. 507/18, and BPS reporting and ECDM plans are under the Electricity Act, 1998 rather than the Green Energy Act, 2009.

3 About Municipality of Clarington

The Municipality of Clarington is a community that forms the eastern boundary of the Greater Toronto Area, and is one of eight municipalities located in Durham Region. We are a large Municipality covering an area of approximately 612 square kilometers, with a population of over 95 thousand people. The Municipality has a large building inventory which is quite diverse, ranging from large recreation facilities to aging community halls. The focus of this ECDM Plan is on 27 of the 42 buildings, as these are the building that we report on for BCP. The other buildings are operated by independent boards and are being excluded from consideration in this report.

3.1 Site-Wide Historical Energy Intensity

Energy Utilization Index (EUI) 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 Clarington's different classifications of facilities against each other.



3.2 Site-Wide Historical GHG Emissions

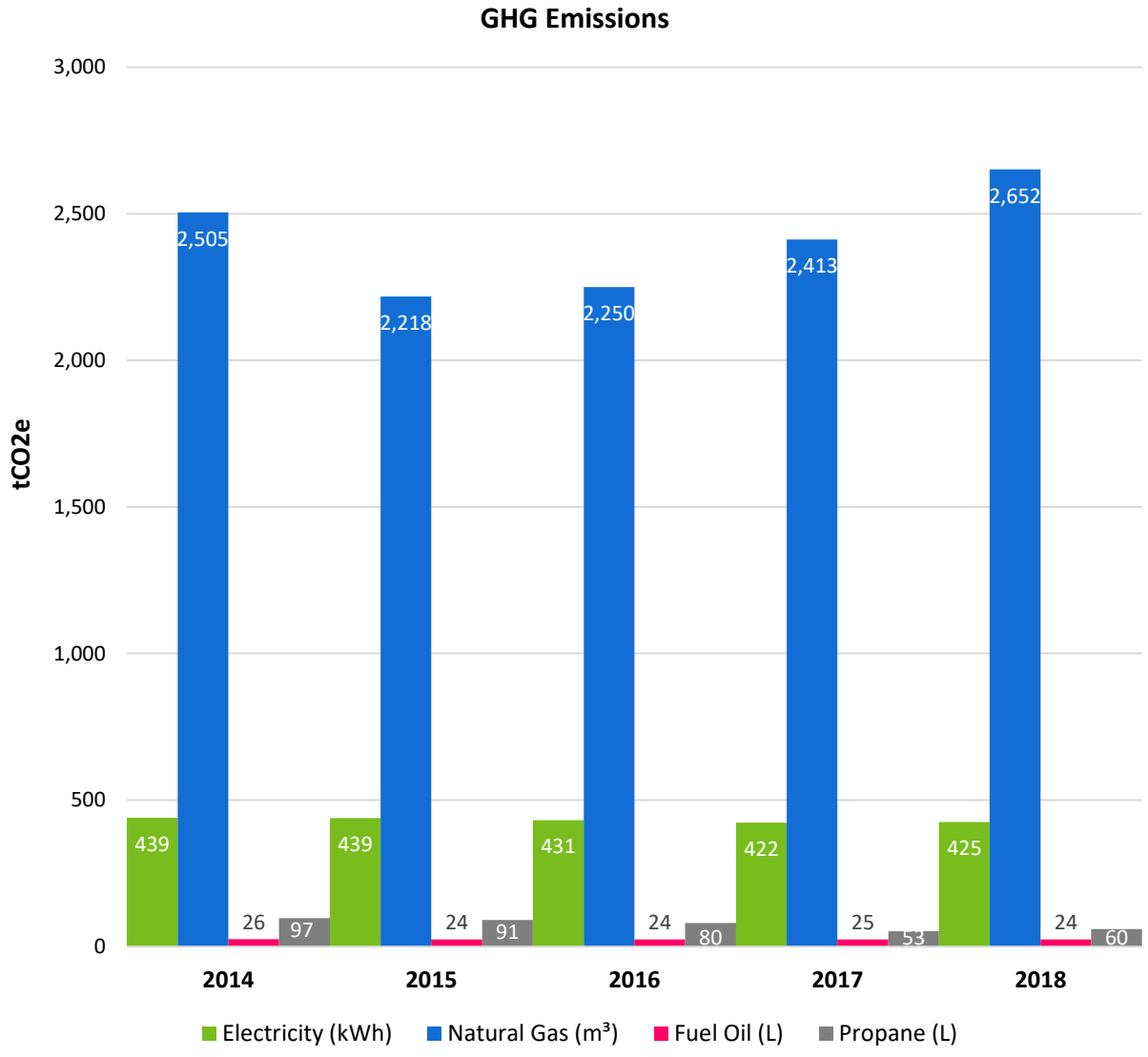
Greenhouse gas (GHG) emissions are expressed in terms of equivalent tonnes of Carbon Dioxide (tCO2e). The GHG emissions associated with a facility are dependent on the fuel source — for example, hydroelectricity produces fewer greenhouse gases than coal-fired plants, and light fuel oil produces fewer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

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

GHG Emissions	2014	2015	2016	2017	2018
Electricity	439	439	431	422	425
Natural Gas	2,505	2,218	2,250	2,413	2,652
Fuel Oil	26	24	24	25	24
Propane	97	91	80	53	60
Total	**3,067**	**2,771**	**2,785**	**2,913**	**3,161**

Table 1 Site-Wide GHG Emissions (tCO^2e)



3.3 Case Studies

The Municipality of Clarington is continuously looking for ways to improve its operations. Below are a couple of examples of past energy saving projects that were completed prior to the current ECDM period.

LED streetlight replacement to save $400,000 each year

In 2018, the Municipality of Clarington initiated the process of replacing approximately 5,800 cobra head style streetlights throughout Clarington with new energy efficient LED streetlights. This conversion will see a 40 to 50 per cent reduction in energy use for the lights, which translates to a savings of roughly $400,000 annually for electricity. There will also be significant savings in streetlight maintenance as the new lights have a life span of roughly 100,000 hours (20 years) compared to roughly 20,000 to 25,000 hours for an HPS light. The reduced maintenance will save the Municipality of Clarington approximately $150,000 annually. This initiative will continue in 2019 with LED replacement planned for approximately 1,000 decorative streetlights installed throughout Clarington.

De-oxygenated Water System Retrofit

In 2017, the Community Services Department upgraded its ice flooding equipment at South Courtice Arena to use a de-oxygenated water system. The new system removes oxygen from the source water, allowing the use of warm water instead of hot water in ice flooding operations. The Municipality received a $10,000 incentive from Enbridge Gas for implementing the new technology, and additional savings have been identified on monthly utility bills due to the reduced amount of natural gas needed to heat the water.

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 Alan Strike Aquatic and Squash Centre

This center features a pool (25m/6-lane leisure pool), squash courts, co-ed whirlpool and sauna.

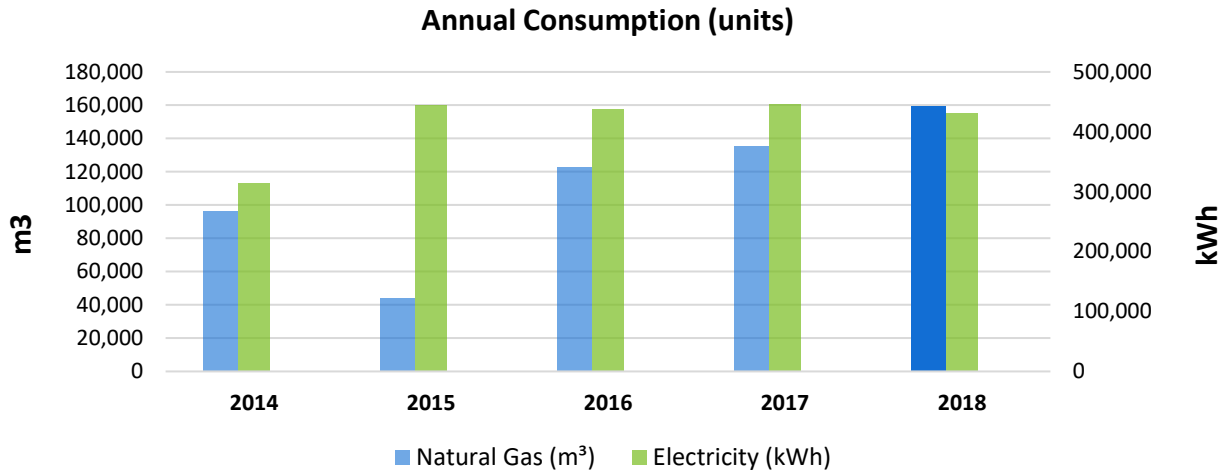
Facility Information	
Facility Name	**Alan Strike Aquatic and Squash Centre**
Address	49 Liberty Street, Bowmanville, ON
Gross Area (Sq. Ft)	16,070
Type of Operation	Indoor Recreation Facility
Average Operational Hours Per Week	102

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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	314,294	444,865	438,703	445,653	431,101
Natural Gas (m³)	96,532	43,919	122,955	135,186	159,736

Table 2 Annual Consumption Summary

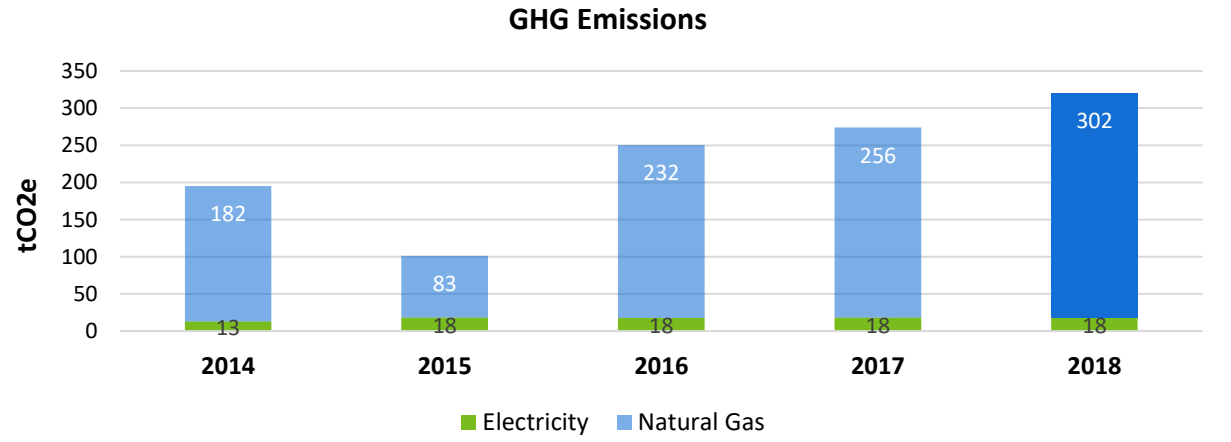


4.1.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	13	18	18	18	18
Natural Gas	182	83	232	256	302
Totals	**195**	**101**	**250**	**274**	**320**

Table 3 Annual GHG Emissions Analysis



4.1.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
Pool Liquid Thermal Blanket	Natural Gas	$10,000.00	0	5,325	8.60	2020
Building System Recommissioning	Electricity & Natural Gas	$15,000	6,467	2,396	2.85	2020
Install Air Curtains	Electricity & Natural Gas	$4,000	TBA	1,000	18.00	2023
Totals		**$29,000.00**	**6,467**	**8,721**		

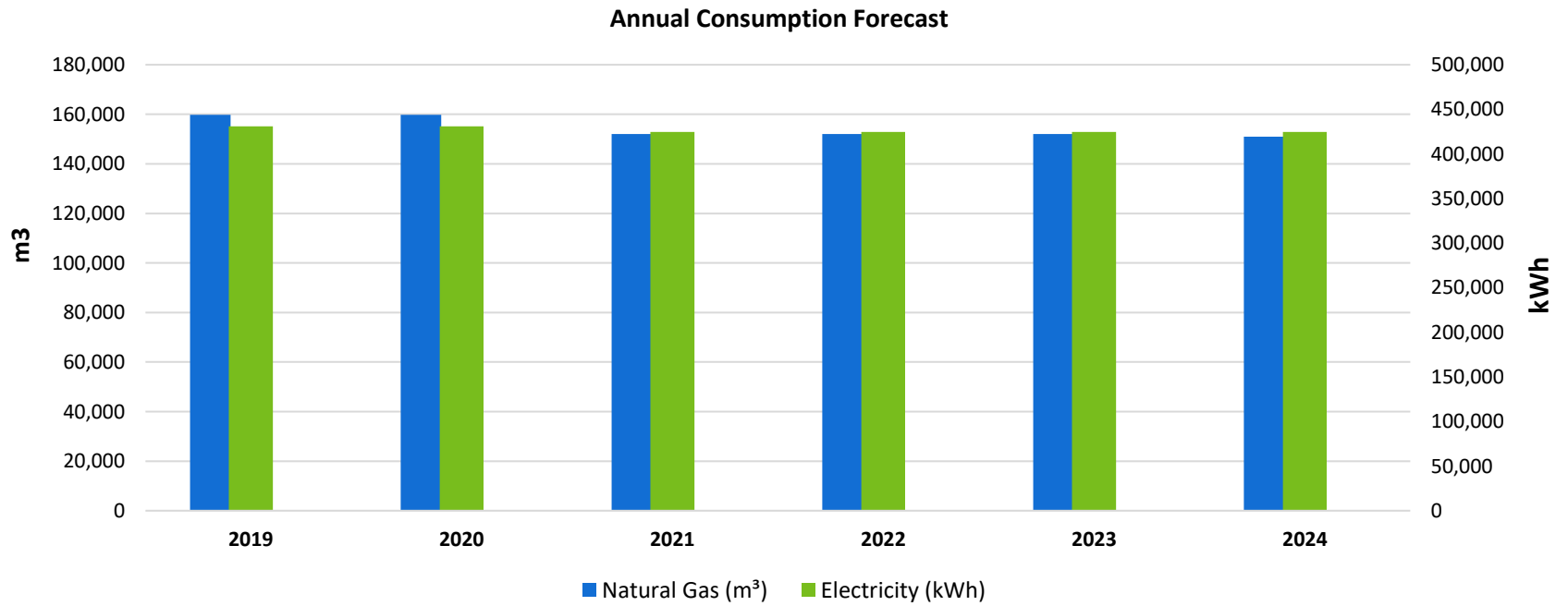
Table 4 Proposed Energy Conservation Initiatives

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 Forecast (units)											
	2019		2020		2021		2022		2023		2024	
	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change
Electricity (kWh)	431,101	0%	431,101	0%	424,634	2%	424,634	2%	424,634	2%	424,634	2%
Natural Gas (m^3)	159,736	0%	159,736	0%	152,015	5%	152,015	5%	152,015	5%	151,015	5%

Table 5 Forecasted Annual Consumption

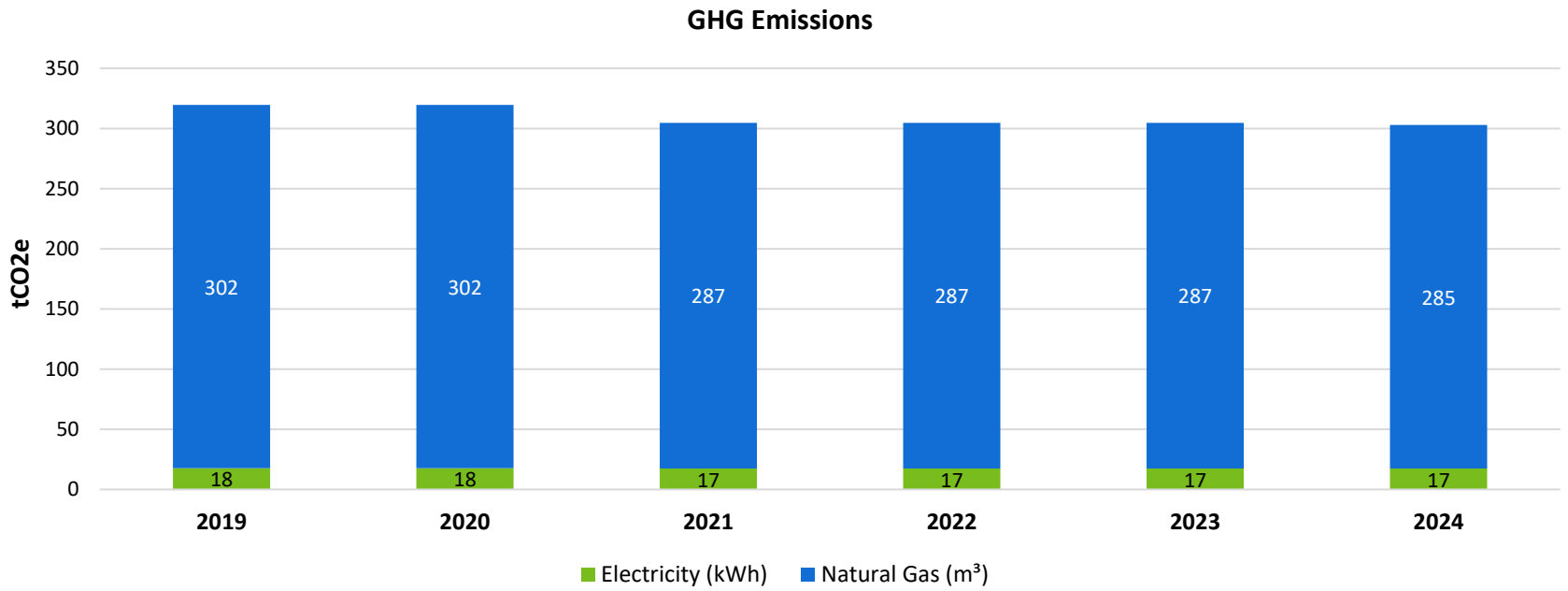


4.1.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	18	18	17	17	17	17
Natural Gas	302	302	287	287	287	285
Total Scope 1 & 2 Emissions	**320**	**320**	**305**	**305**	**305**	**303**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**5%**	**5%**	**5%**	**5%**

Table 6 Forecasted Annual GHG Emissions



4.2 Animal Services Building

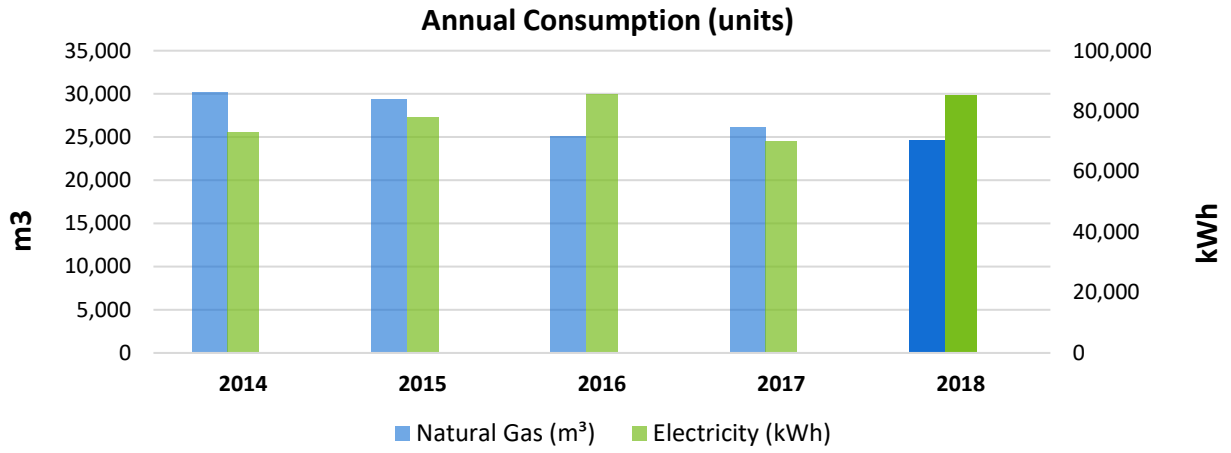
Facility Information	
Facility Name	**Animal Services Building**
Address	33 Lake Road, Bowmanville, ON
Gross Area (Sq. Ft)	5,834
Type of Operation	Administrative offices and related facilities
Average Operational Hours Per Week	47

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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	72,960	77,956	85,580	69,840	85,181
Natural Gas (m^3)	30,127	29,386	25,031	26,079	24,644

Table 7 Annual Consumption Summary

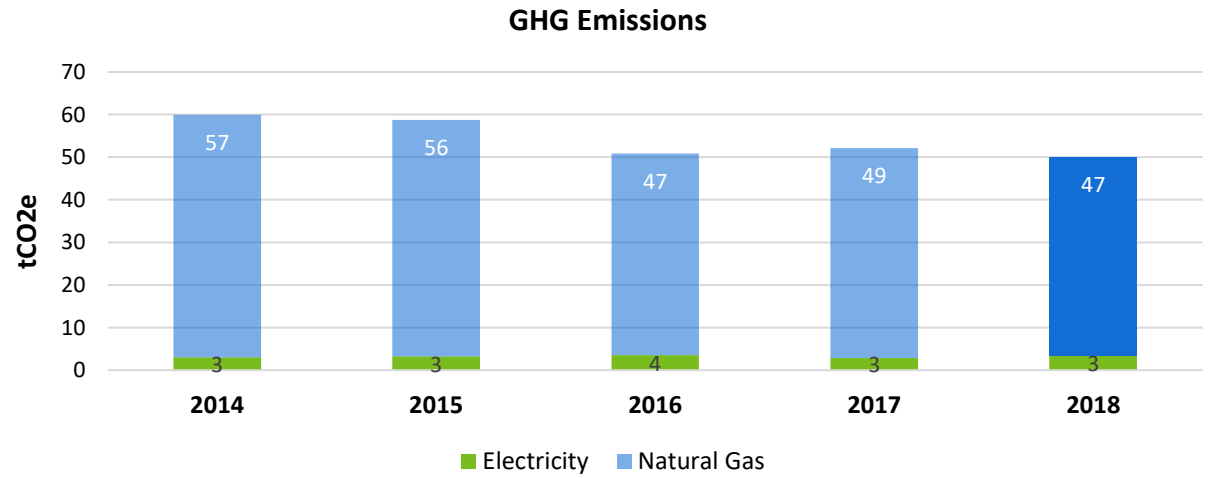


4.2.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	3	3	4	3	3
Natural Gas	57	56	47	49	47
Totals	**60**	**59**	**51**	**52**	**50**

Table 8 Annual GHG Emissions Analysis



4.2.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
Heating, Ventilation, and Air Condition (HVAC) System - Scheduling / Setback	Electricity & Natural Gas	$1,500	2,616	1,506	2.33	2019
Totals		**$1,500**	**2,616**	**1,506**		

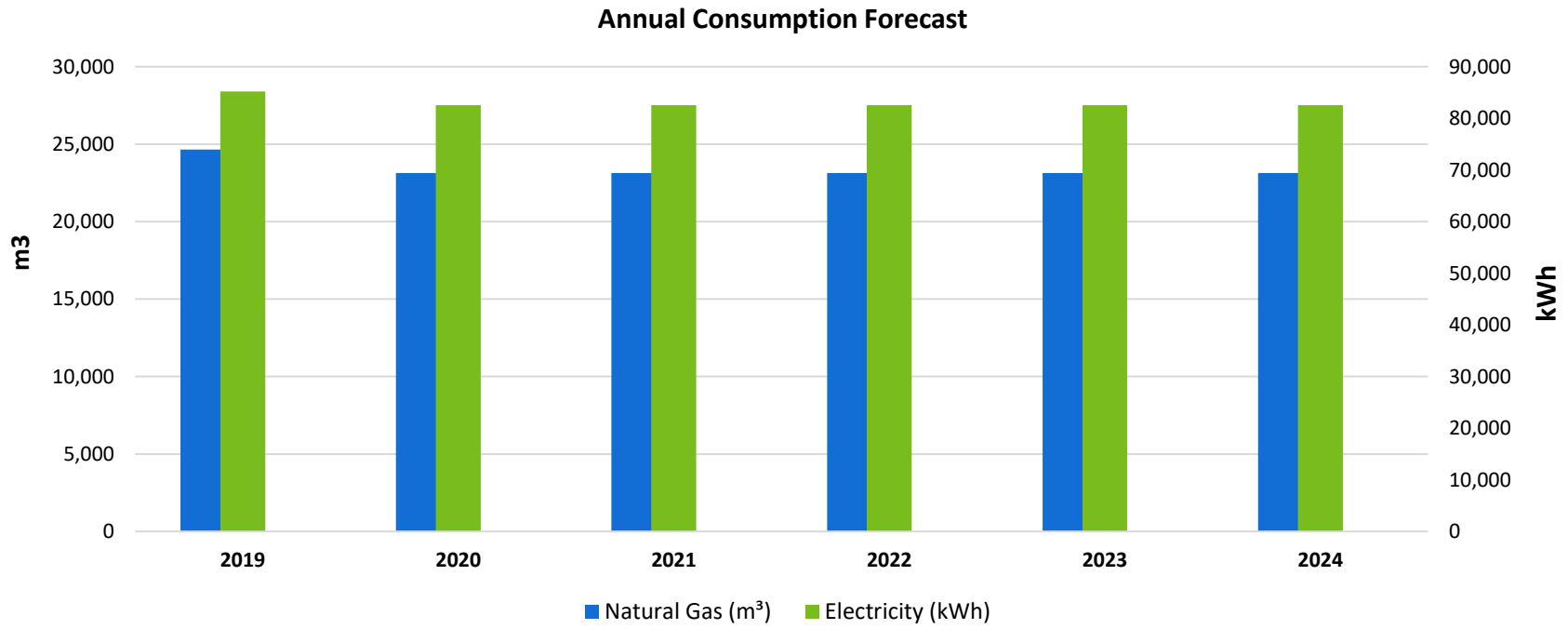
Table 9 Proposed Energy Conservation Initiatives

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 Forecast (units)											
	2019		2020		2021		2022		2023		2024	
	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change
Electricity (kWh)	85,181	0%	82,565	3%	82,565	3%	82,565	3%	82,565	3%	82,565	3%
Natural Gas (m^3)	24,644	0%	23,138	6%	23,138	6%	23,138	6%	23,138	6%	23,138	6%

Table 10 Forecasted Annual Consumption

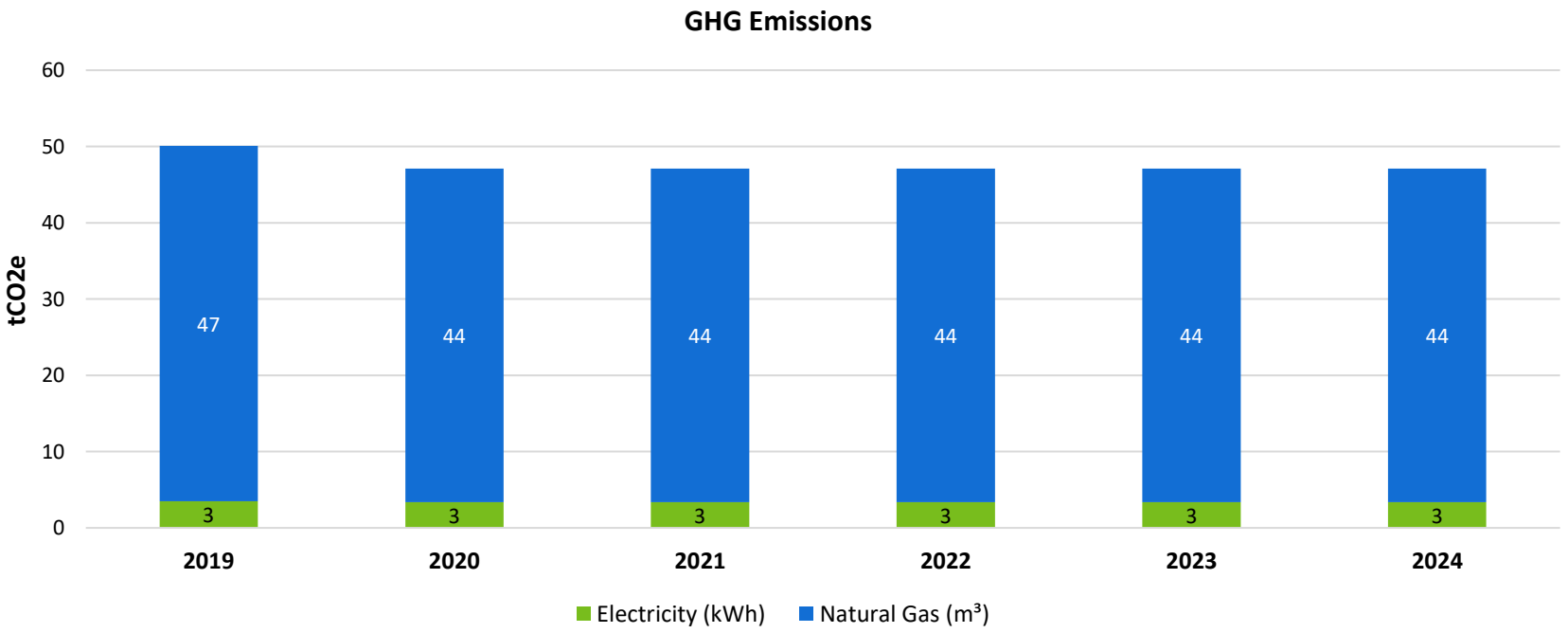


4.2.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	3	3	3	3	3	3
Natural Gas	47	44	44	44	44	44
Total Scope 1 & 2 Emissions	**50**	**47**	**47**	**47**	**47**	**47**
Reduction from the Baseline Year (2018)	**0%**	**6%**	**6%**	**6%**	**6%**	**6%**

Table 11 Forecasted Annual GHG Emissions



4.3 Bowmanville Indoor Soccer Centre

This centre features an artificial turf playing field, viewing areas, community meeting rooms and office space.

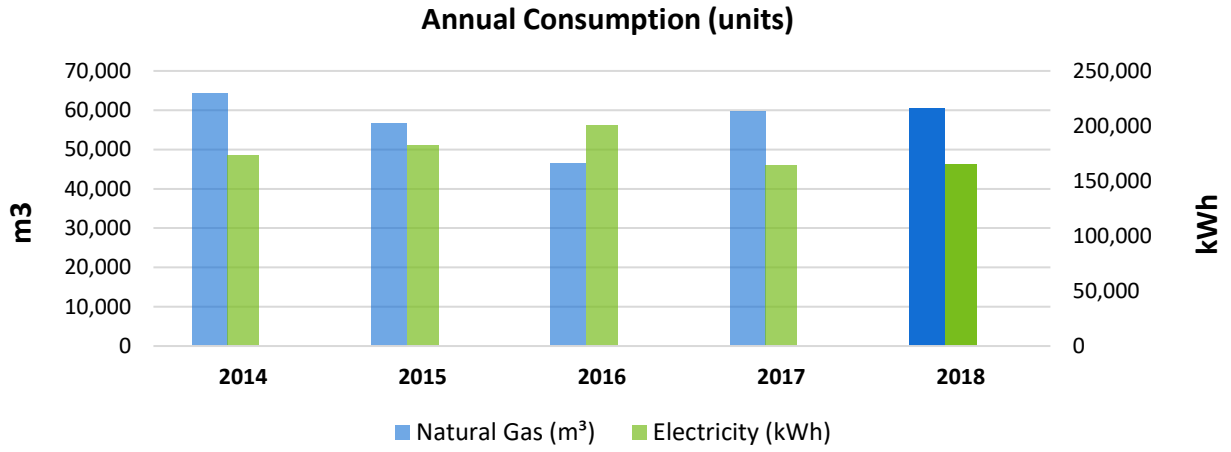
Facility Information	
Facility Name	**Bowmanville Indoor Soccer Centre**
Address	2375 Baseline Road, Bowmanville, ON
Gross Area (Sq. Ft)	28,482
Type of Operation	Indoor Recreation Facility
Average Operational Hours Per Week	112

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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	173,160	182,400	200,189	164,154	165,234
Natural Gas (m^3)	64,363	56,629	46,556	59,763	60,510

Table 12 Annual Consumption Summary

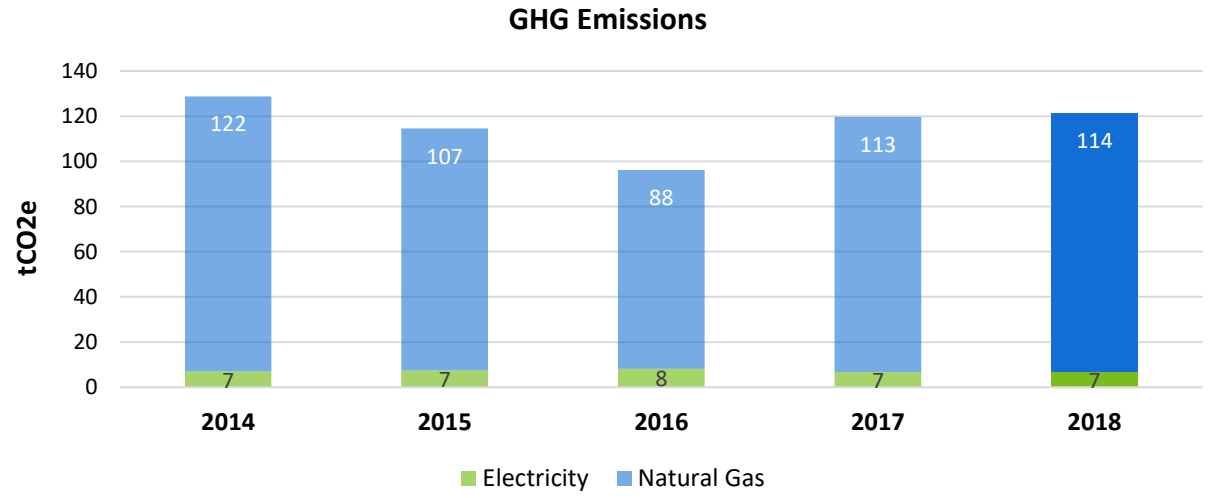


4.3.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	7	7	8	7	7
Natural Gas	122	107	88	113	114
Totals	**129**	**115**	**96**	**120**	**121**

Table 13 Annual GHG Emissions Analysis



4.3.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
Upgrade Metal Halide Lamps (In Soccer Pitches)	Electricity	$20,790	15,941	0	10.08	2024
Upgrade High Pressure Sodium Lights (Parking Lot)	Electricity	$10,620	6,091	0	13.48	2024
Heating, Ventilation, and Air Condition (HVAC) System - Scheduling / Setback	Electricity & Natural Gas	$15,000	6,157	4,631	8.19	2024
Install Air Curtains	Electricity & Natural Gas	$2,000	TBA	500	17.89	2024
Totals		**$48,410**	**28,189**	**5,131**		

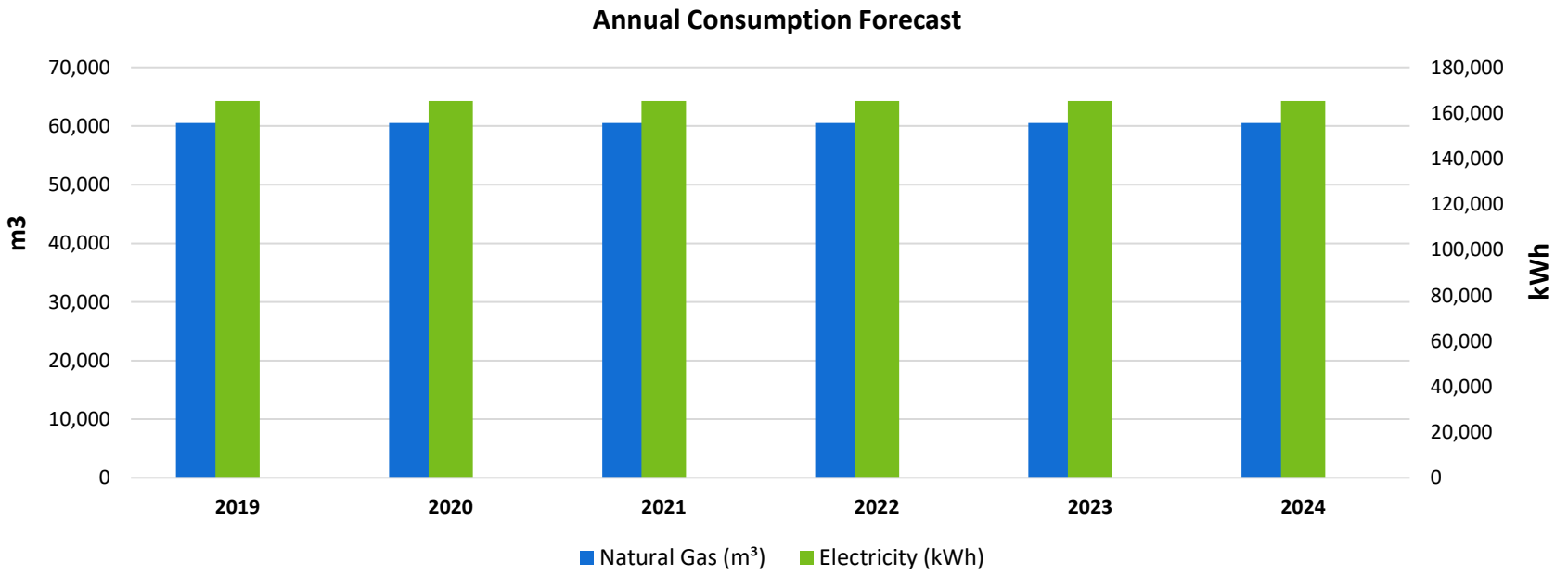
Table 14 Proposed Energy Conservation Initiatives

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. The proposed measures are not implemented until 2024 so no savings will be realized until 2025.

	Annual Consumption Forecast (units)											
	2019		2020		2021		2022		2023		2024	
	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change
Electricity (kWh)	165,234	0%	165,234	0%	165,234	0%	165,234	0%	165,234	0%	165,234	0%
Natural Gas (m^3)	60,510	0%	60,510	0%	60,510	0%	60,510	0%	60,510	0%	60,510	0%

Table 15 Forecasted Annual Consumption

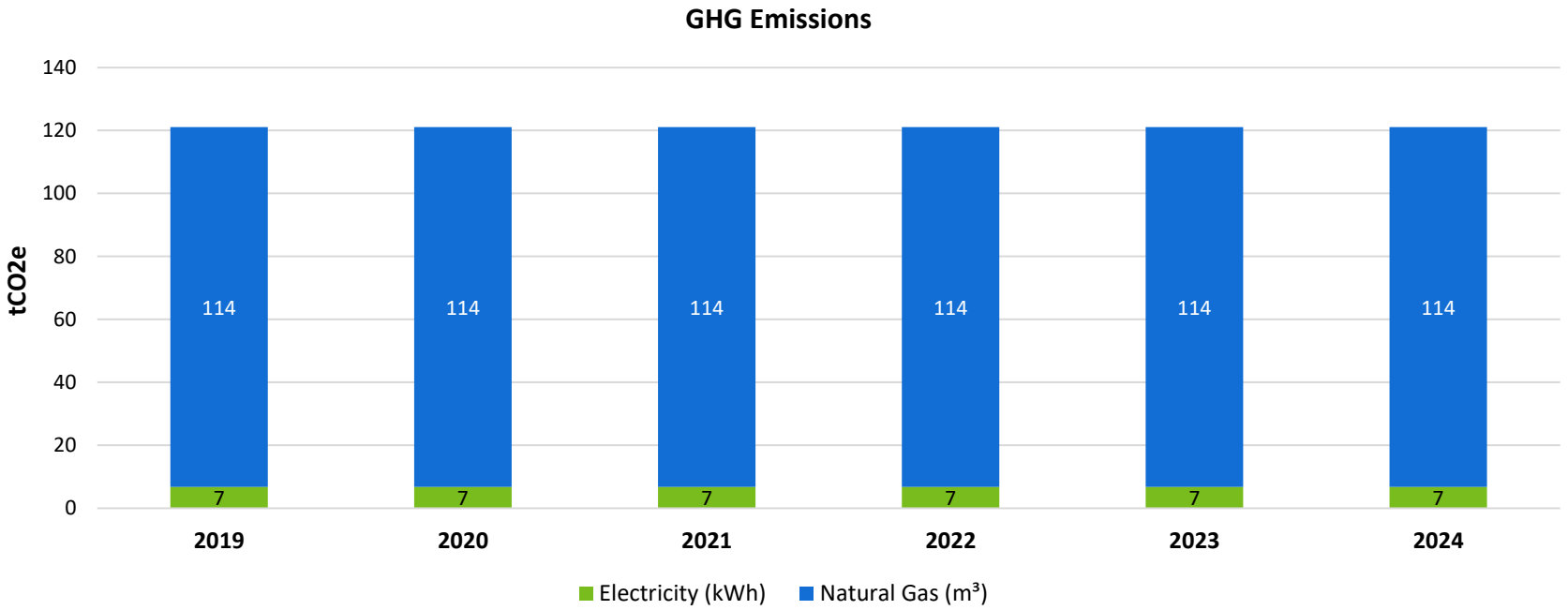


4.3.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	7	7	7	7	7	7
Natural Gas	114	114	114	114	114	114
Total Scope 1 & 2 Emissions	**121**	**121**	**121**	**121**	**121**	**121**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**

Table 16 Forecasted Annual GHG Emissions



4.4 Building & Property Services Building

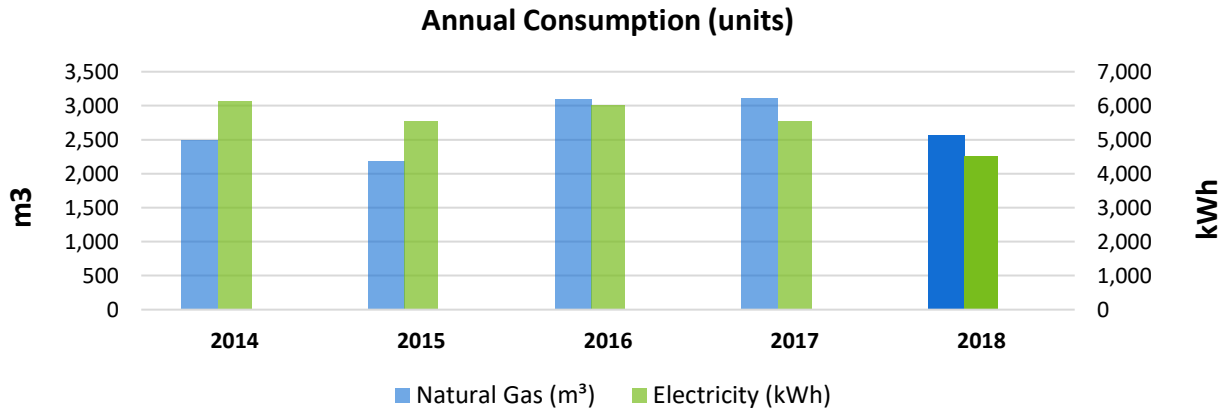
Facility Information	
Facility Name	**Building & Property Services Building**
Address	33 Lake Road, Bowmanville, ON
Gross Area (Sq. Ft)	1,300
Type of Operation	Storage facilities where equipment or vehicles are maintained, repaired or stored
Average Operational Hours Per Week	40

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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	6,138	5,539	6,004	5,548	4,518
Natural Gas (m^3)	2,494	2,180	3,098	3,114	2,574

Table 17 Annual Consumption Summary

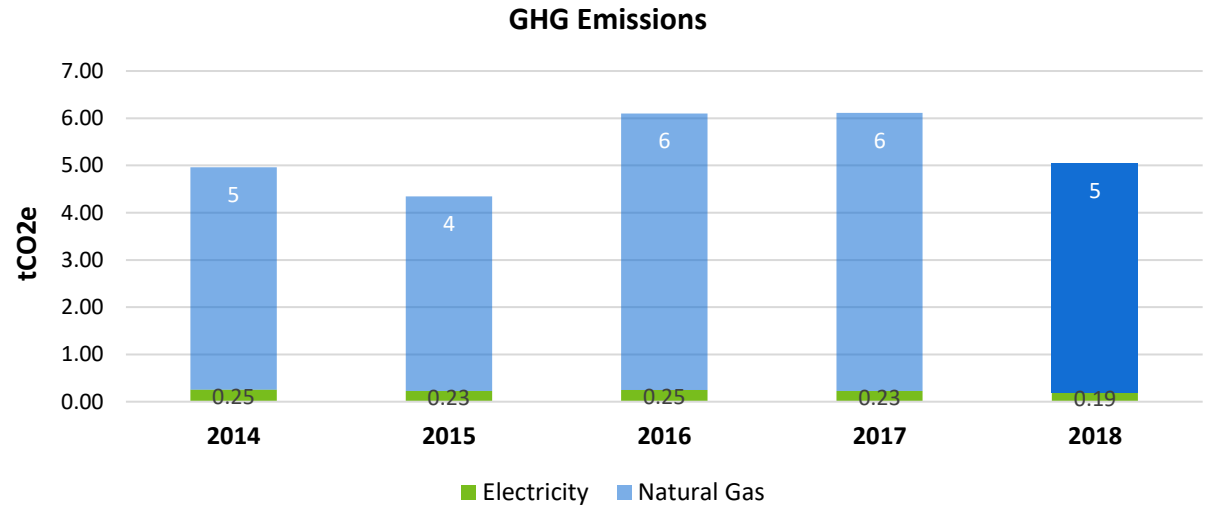


4.4.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	0.25	0.23	0.25	0.23	0.19
Natural Gas	5	4	6	6	5
Totals	**5**	**4**	**6**	**6**	**5**

Table 18 Annual GHG Emissions Analysis

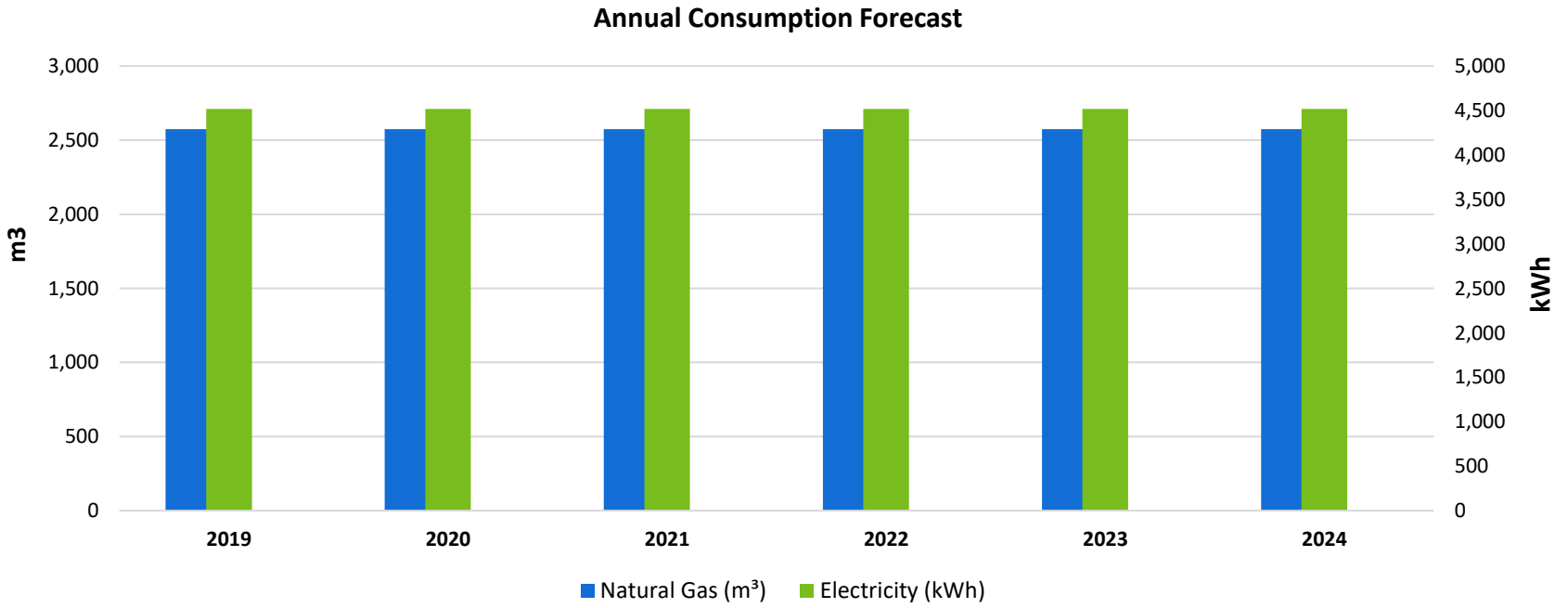


4.4.3 Utility Consumption Forecast

There are limited opportunities to reduce consumption at the Bowmanville Operations Depot. We have forecasted electricity and natural gas use based on the 2018 performance year. The forecasted utility consumption is tabulated below. Our goal will be to maintain 2018 consumption levels and review energy conservation opportunities as they present themselves.

	Annual Consumption Forecast (units)											
	2019		2020		2021		2022		2023		2024	
	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change
Electricity (kWh)	4,518	0%	4,518	0%	4,518	0%	4,518	0%	4,518	0%	4,518	0%
Natural Gas (m^3)	2,574	0%	2,574	0%	2,574	0%	2,574	0%	2,574	0%	2,574	0%

Table 19 Forecasted Annual Consumption

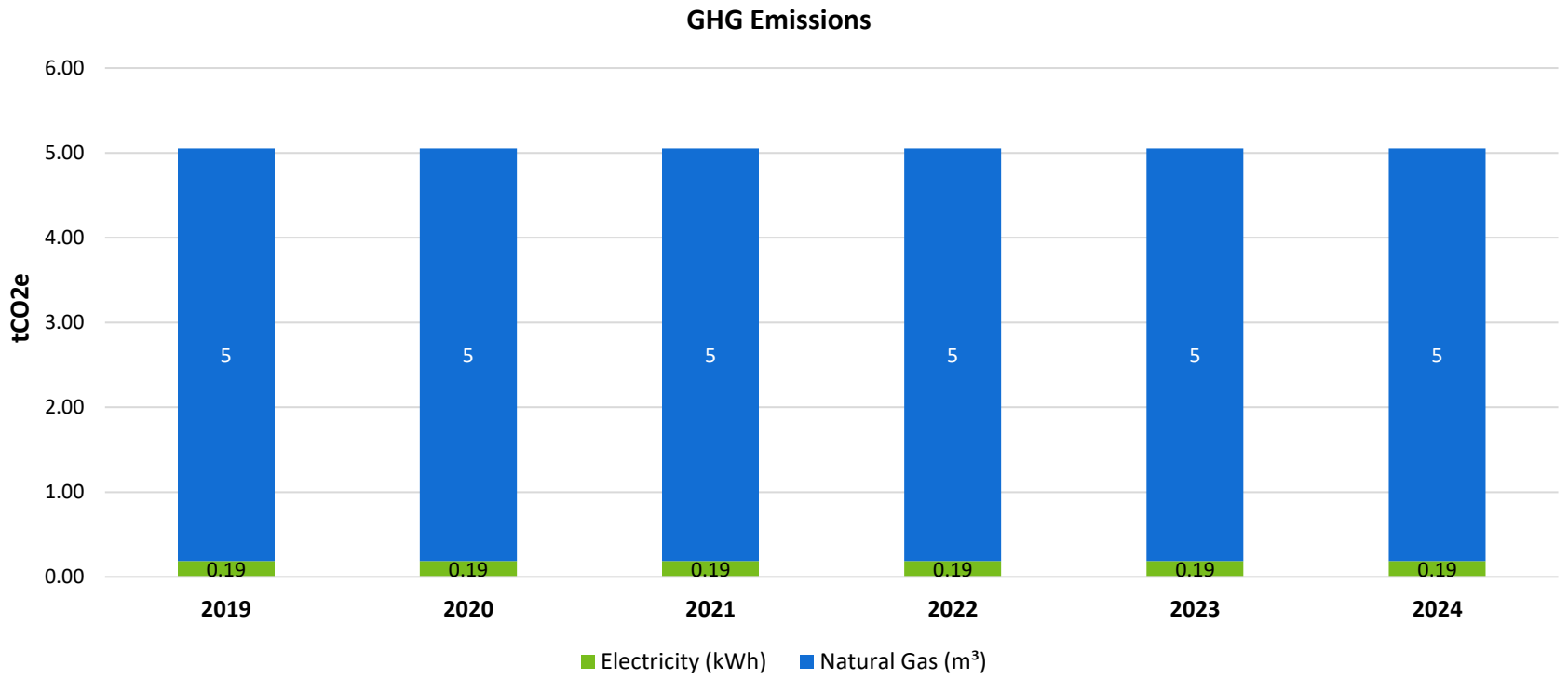


4.4.4 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	0.19	0.19	0.19	0.19	0.19	0.19
Natural Gas	5	5	5	5	5	5
Total Scope 1 & 2 Emissions	**5**	**5**	**5**	**5**	**5**	**5**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**

Table 20 Forecasted Annual GHG Emissions



4.5 Community Resource Centre

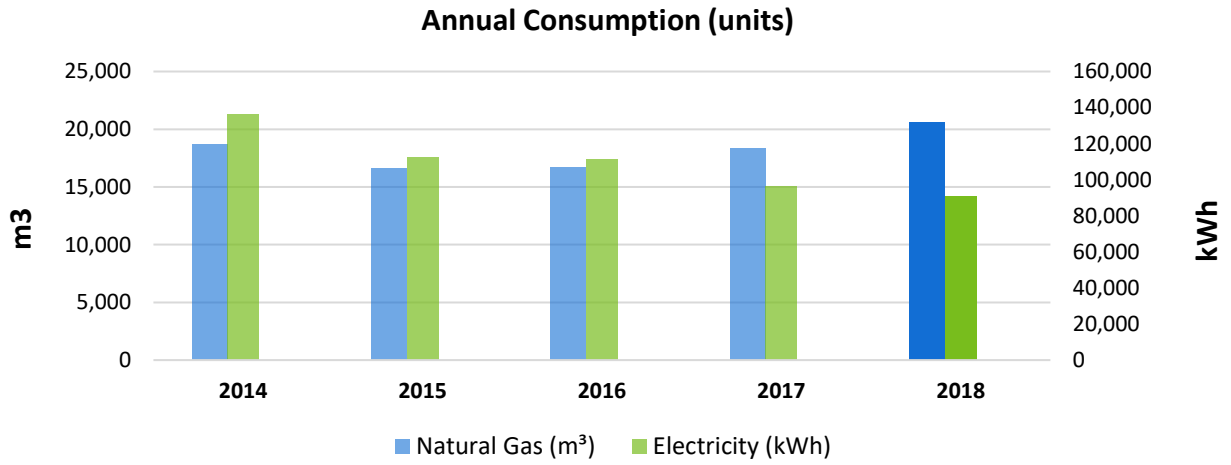
Facility Information	
Facility Name	**Community Resource Centre**
Address	132 Church Street, Bowmanville, ON
Gross Area (Sq. Ft)	15,000
Type of Operation	Lease to John Howard Society Youth Centre and meeting space
Average Operational Hours Per Week	50

4.5.1 Utility Consumption Analysis

Utilities to the site are electricity, natural gas and water. 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	136,392	112,446	111,363	96,119	90,533
Natural Gas (m³)	18,684	16,603	16,671	18,372	20,587

Table 21 Annual Consumption Summary

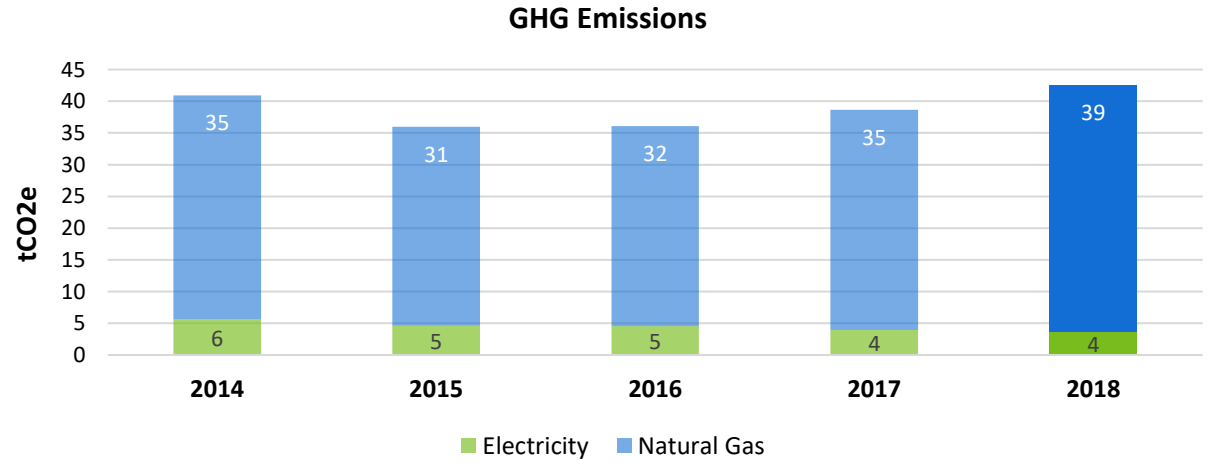


4.5.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	6	5	5	4	4
Natural Gas	35	31	32	35	39
Totals	**41**	**36**	**36**	**39**	**43**

Table 22 Annual GHG Emissions Analysis



4.5.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
Heating, Ventilation, and Air Condition (HVAC) System - Scheduling / Setback	Electricity & Natural Gas	$5,000	4,074	2,059	5.33	2019
Totals		**$5,000**	**4,074**	**2,059**		

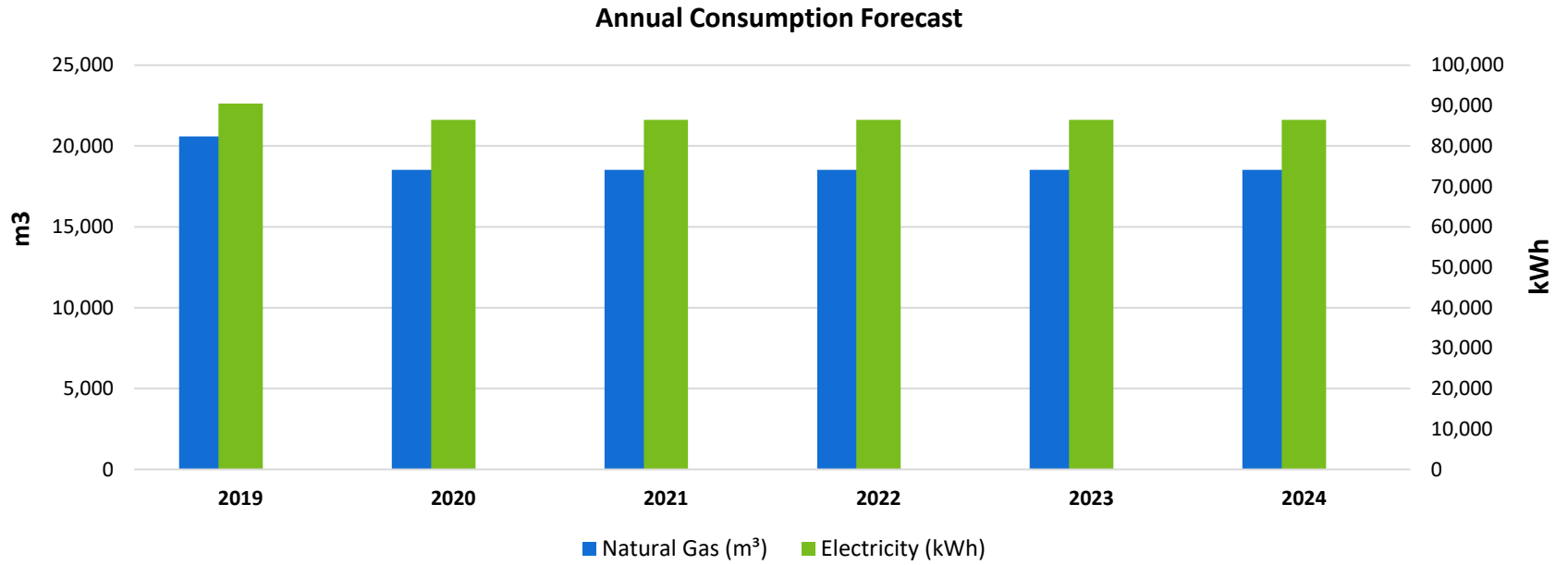
Table 23 Proposed Energy Conservation Initiatives

4.5.4 Utility Consumption Forecast

By implementing the energy conservation measure stated in the previous section, the forecasted electricity and natural gas use could be forecasted based on the utility savings generated from this measure. 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)	90,533	0%	86,459	5%	86,459	5%	86,459	5%	86,459	5%	86,459	5%
Natural Gas (m^3)	20,587	0%	18,528	10%	18,528	10%	18,528	10%	18,528	10%	18,528	10%

Table 24 Forecasted Annual Consumption

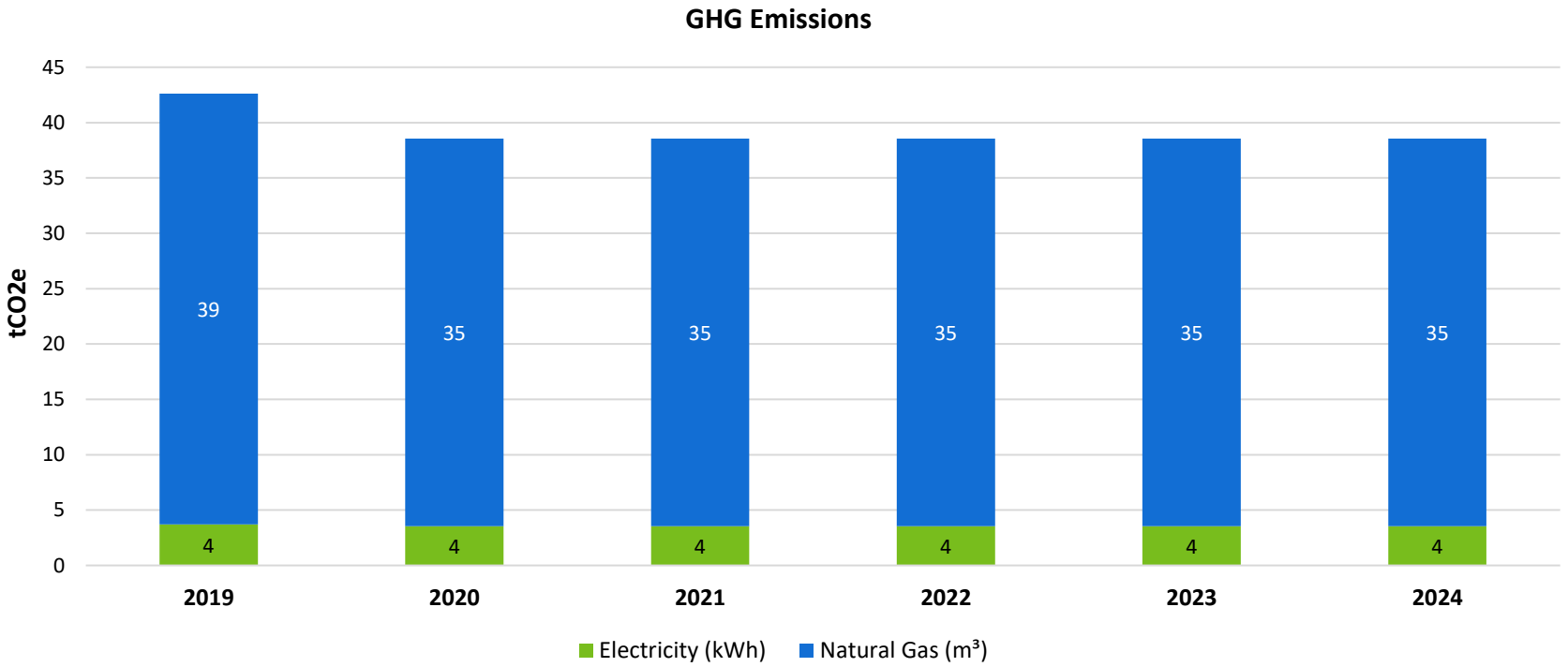


4.5.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	4	4	4	4	4	4
Natural Gas	39	35	35	35	35	35
Total Scope 1 & 2 Emissions	**43**	**39**	**39**	**39**	**39**	**39**
Reduction from the Baseline Year (2018)	**0%**	**10%**	**10%**	**10%**	**10%**	**10%**

Table 25 Forecasted Annual GHG Emissions



4.6 Courtice Community Complex

This center features a pool (25m/6-lane leisure pool), co-ed whirlpool, sauna, fitness training facility, mini soccer field and skateboard park. The facility also includes a public library and an older adult care centre.

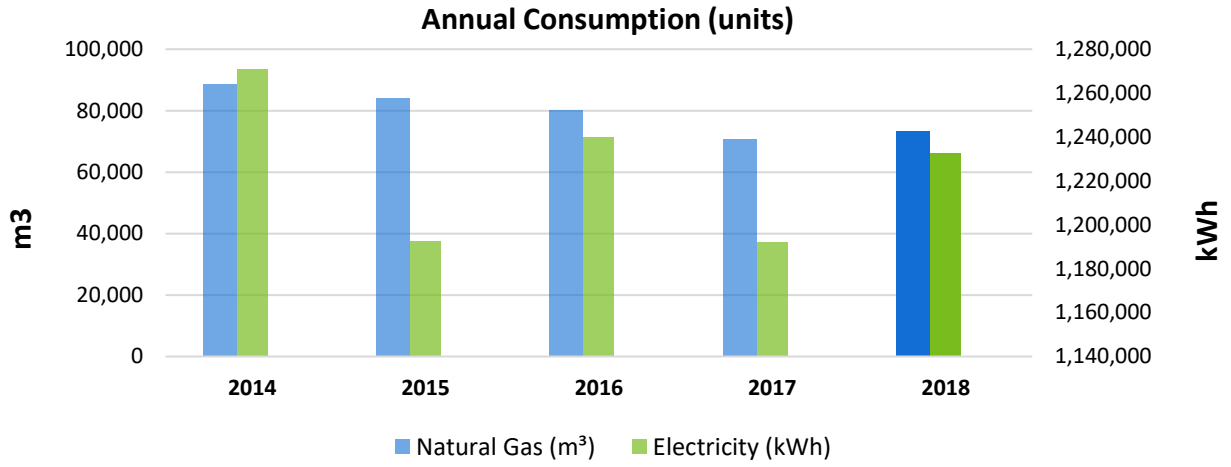
Facility Information	
Facility Name	**Courtice Community Complex**
Address	2950 Courtice Road, Courtice, ON
Gross Area (Sq. Ft)	53,000
Type of Operation	Indoor Recreation Facility
Average Operational Hours Per Week	106

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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	1,270,910	1,192,544	1,240,059	1,192,200	1,232,700
Natural Gas (m^3)	88,551	84,171	80,238	70,894	73,531

Table 26 Annual Consumption Summary

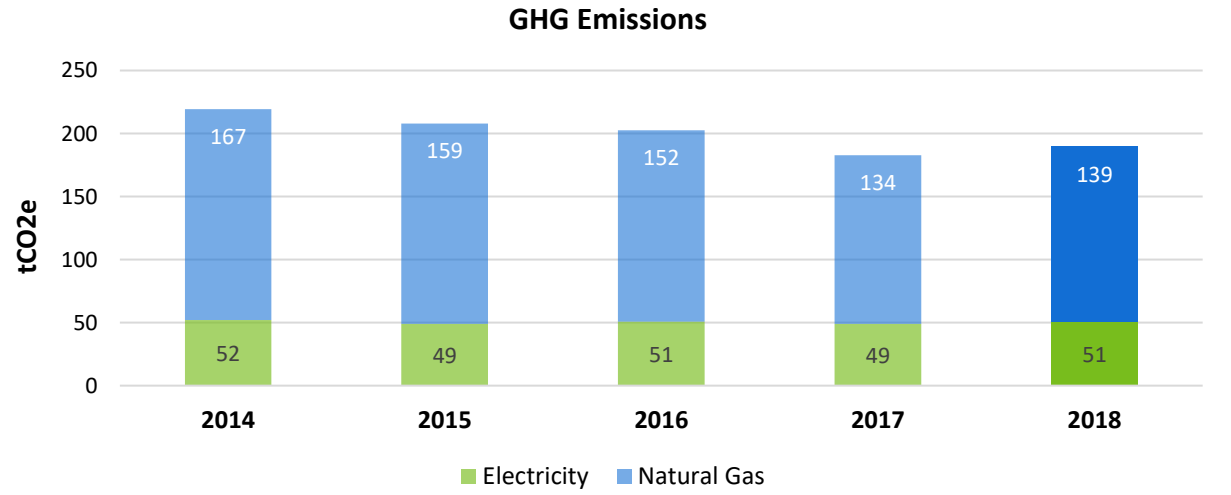


4.6.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	52	49	51	49	51
Natural Gas	167	159	152	134	139
Totals	**219**	**208**	**202**	**183**	**190**

Table 27 Annual GHG Emissions Analysis



4.6.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
***Lighting Retrofit**	Electricity	$53,000	126,531	0	3.38	2021
Lighting Controls	Electricity	$14,000	24,600	0	4.59	2021
Pool Liquid Thermal Blanket	Natural Gas	$15,000	0	16,236	4.23	2020
Pump Variable Frequency Drive (VFD)	Electricity	$2,5000	3,000	0	6.81	2020
Building System Recommissioning	Electricity & Natural Gas	$15,000	30,818	1,838	3.46	2023
Install Air Curtains	Natural Gas	$4,000	0	1,000	18.31	2020
Totals		**$126,000**	**184,949**	**19,074**		

*The library, pool and gym have already been converted to LED. Since the facility is 85-90% LED, the measure is for the remaining areas.

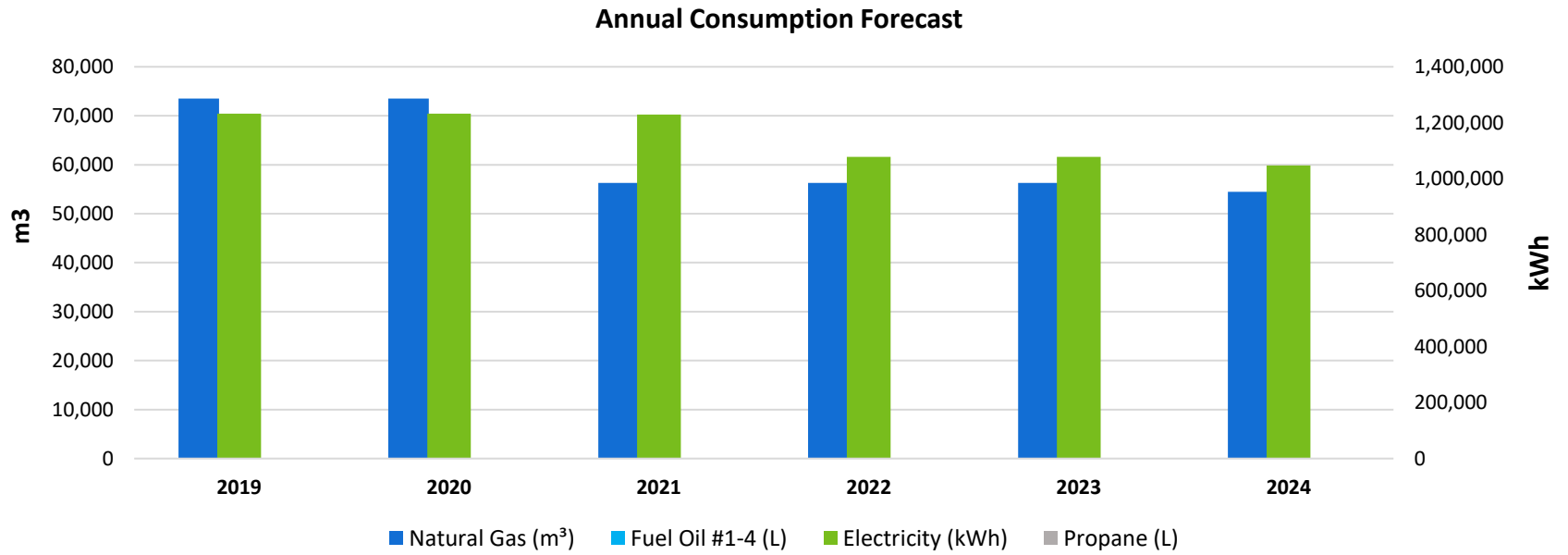
Table 28 Proposed Energy Conservation Initiatives

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 Forecast (units)											
	2019		2020		2021		2022		2023		2024	
	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change
Electricity (kWh)	1,232,700	0%	1,232,700	0%	1,229,700	0%	1,078,569	13%	1,078,569	13%	1,047,752	15%
Natural Gas (m^3)	73,531	0%	73,531	0%	56,295	23%	56,295	23%	56,295	23%	54,457	26%

Table 29 Forecasted Annual Consumption

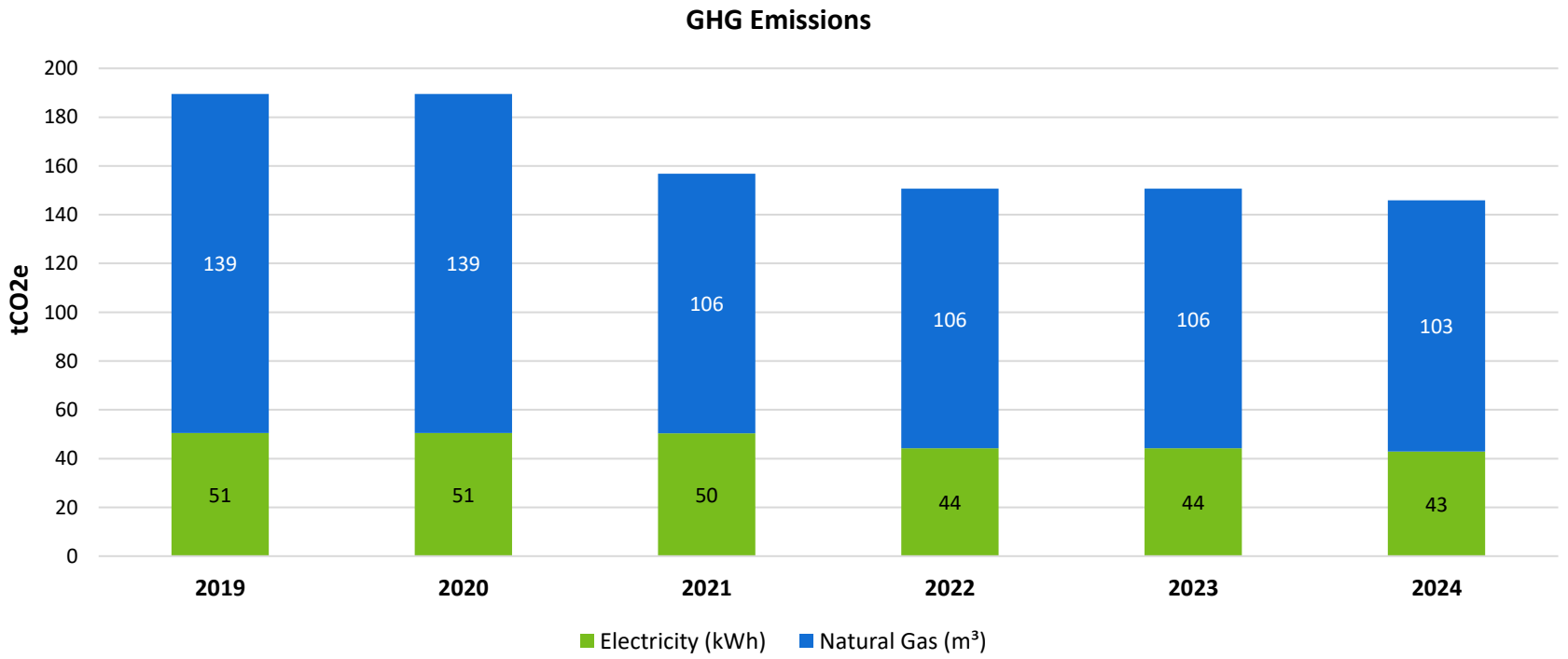


4.6.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	51	51	50	44	44	43
Natural Gas	139	139	106	106	106	103
Total Scope 1 & 2 Emissions	**190**	**190**	**157**	**151**	**151**	**146**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**17%**	**21%**	**21%**	**23%**

Table 30 Forecasted Annual GHG Emissions



4.7 Darlington Sports Centre

This center features a single ice pad with heated viewing area.

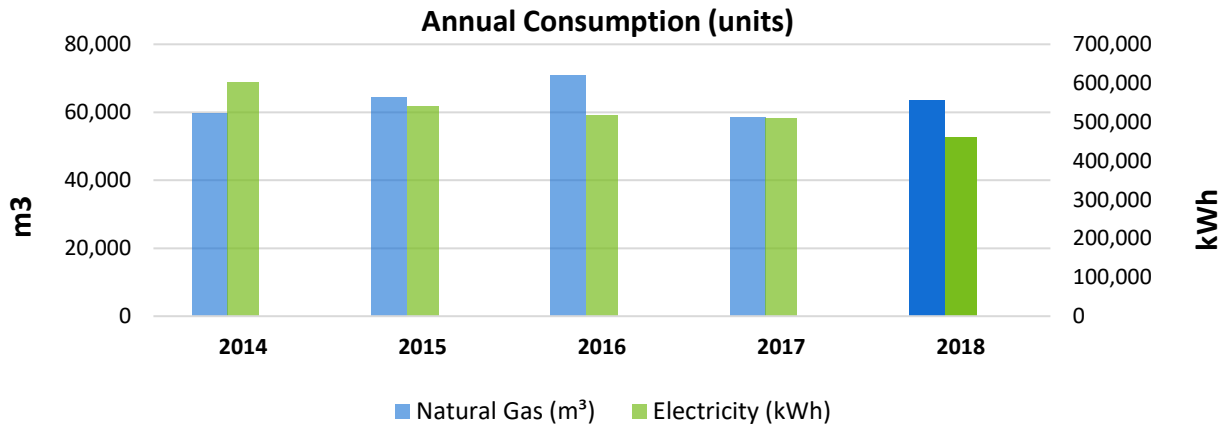
Facility Information	
Facility Name	**Darlington Sports Centre**
Address	2276 Taunton Road, Hampton, ON
Gross Area (Sq. Ft)	32,900
Type of Operation	Indoor Ice Rink
Average Operational Hours Per Week	102

4.7.1 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).
*Ice resurfacers are fueled by natural gas and this is included in the consumption.

Annual Consumption (units)					
Utility	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	601,375	541,109	518,446	508,795	461,254
Natural Gas (m^3)	59,804	64,332	70,842	58,483	63,473

Table 31 Annual Consumption Summary

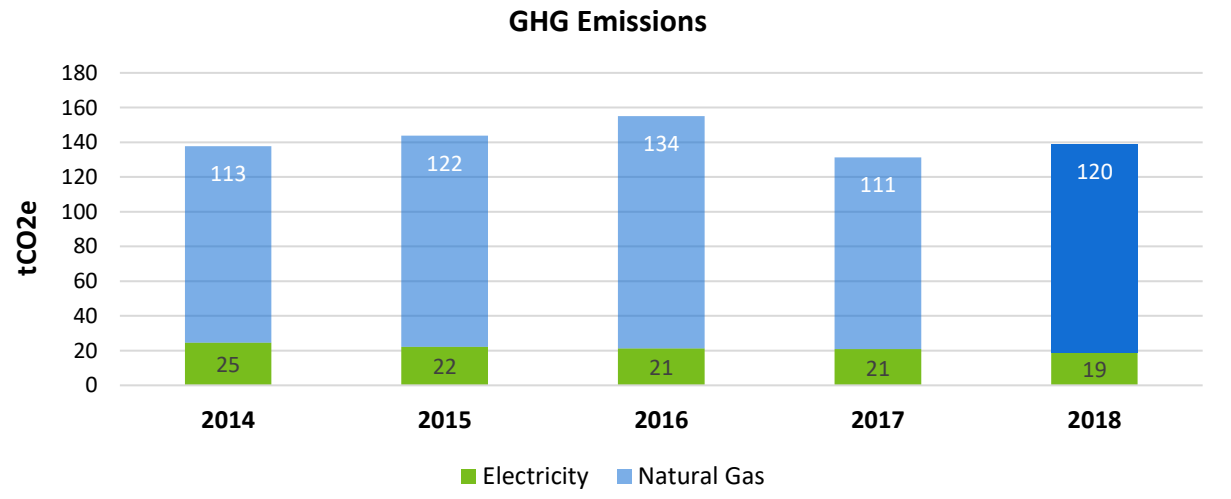


4.7.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	25	22	21	21	19
Natural Gas	113	122	134	111	120
Totals	**138**	**144**	**155**	**131**	**139**

Table 32 Annual GHG Emissions Analysis



4.7.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
***Lighting Retrofit in Arena**	Electricity	$98,700	16,000	0	47.69	2024
Totals		**$98,700**	**16,000**	**0**		

*A portion of the facility already has been converted to LED. This measure is specifically for the arena.

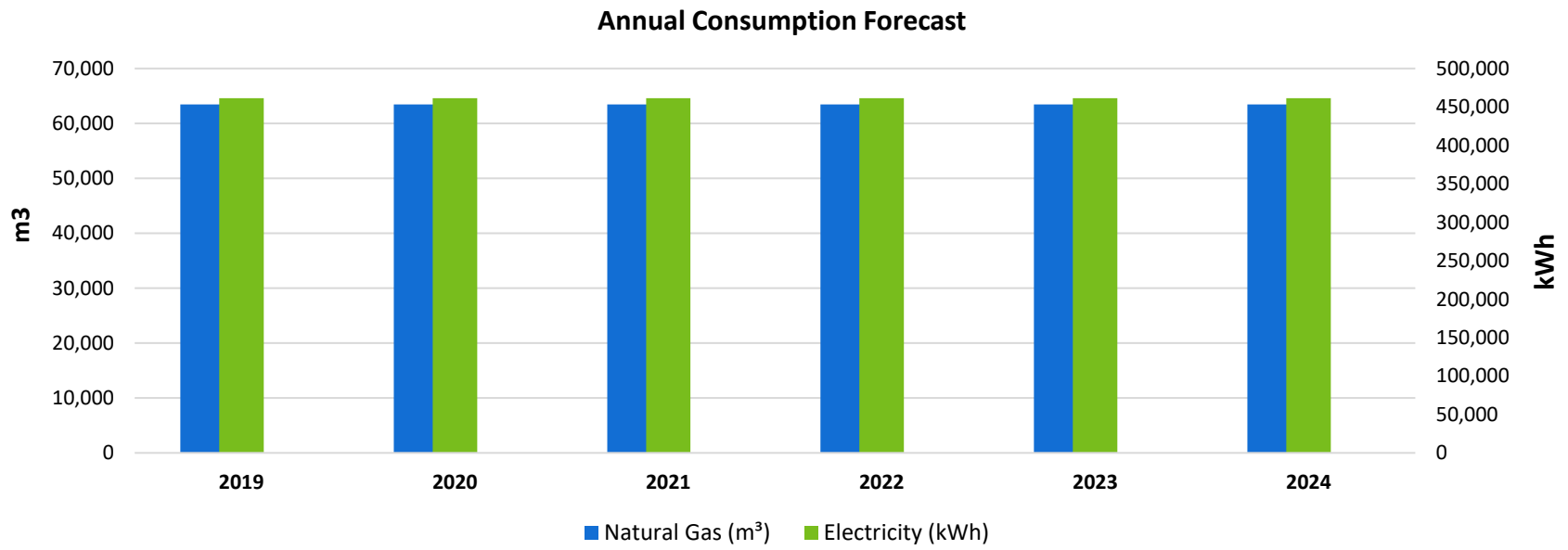
Table 33 Proposed Energy Conservation Initiatives

4.7.4 Utility Consumption Forecast

By implementing the energy conservation measure stated in the previous section, the forecasted electricity and natural gas use could be forecasted based on the utility savings generated from the lighting retrofit. The forecasted utility consumption is tabulated below. The percentage of change is based off the data from the baseline year of 2018. Since the measure is forecasted to be implemented in 2024, the savings will be seen in the year 2025.

	Annual Consumption Forecast (units)											
	2019		2020		2021		2022		2023		2024	
	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change
Electricity (kWh)	461,254	0%	461,254	0%	461,254	0%	461,254	0%	461,254	0%	461,254	0%
Natural Gas (m^3)	63,473	0%	63,473	0%	63,473	0%	63,473	0%	63,473	0%	63,473	0%

Table 34 Forecasted Annual Consumption

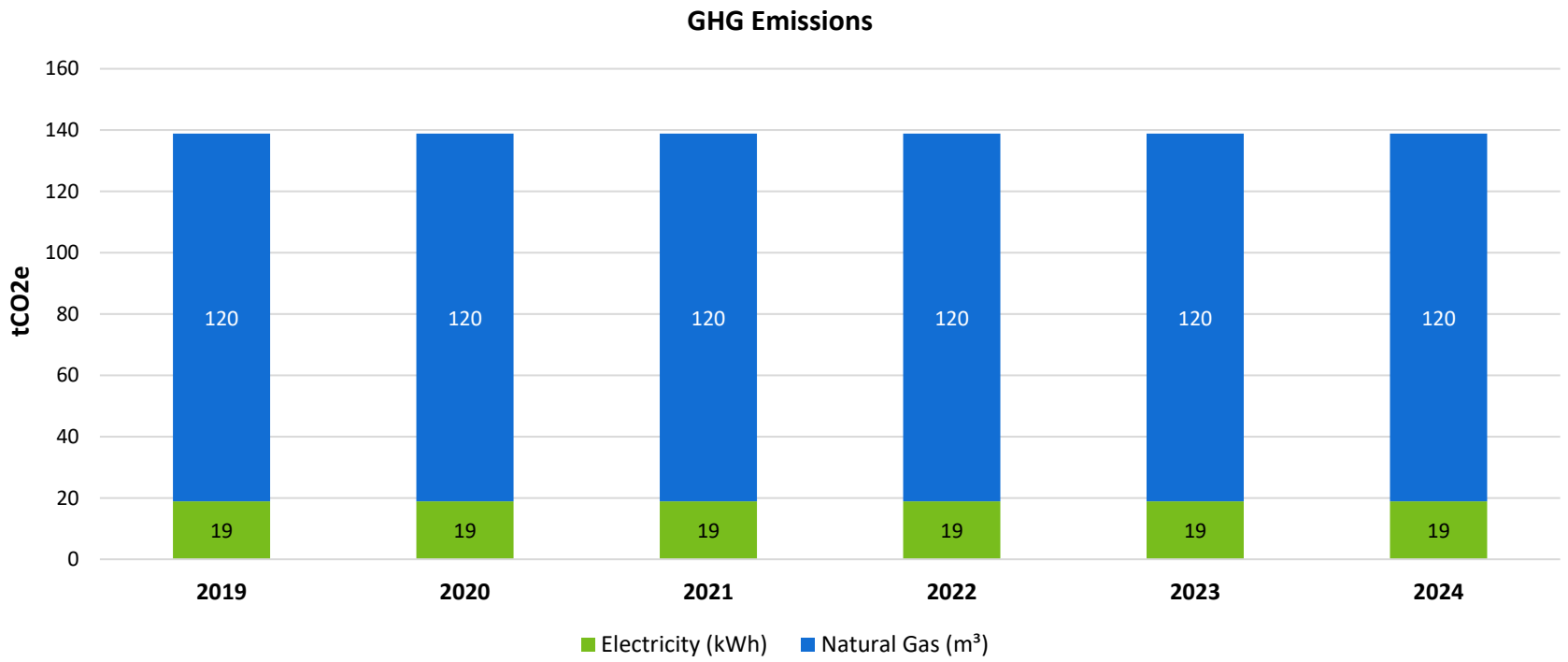


4.7.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	19	19	19	19	19	19
Natural Gas	120	120	120	120	120	120
Total Scope 1 & 2 Emissions	**139**	**139**	**139**	**139**	**139**	**139**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**

Table 35 Forecasted Annual GHG Emissions



4.8 Diane Hamre Recreation Complex

This center features a 25m/6-lane leisure pool, co-ed whirlpool, sauna, full size gymnasium and community meeting rooms.

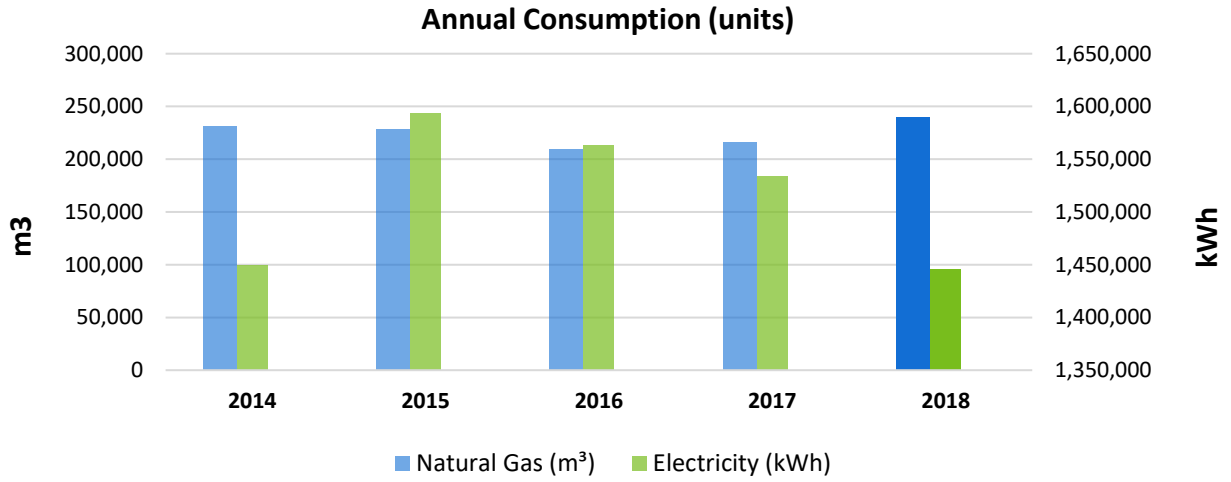
Facility Information	
Facility Name	**Diane Hamre Recreation Complex**
Address	1780 Rudell Road, Newcastle, ON
Gross Area (Sq. Ft)	61,900
Type of Operation	Indoor Recreation Facility
Average Operational Hours Per Week	101

4.8.1 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	1,449,108	1,593,712	1,562,830	1,533,472	1,445,267
Natural Gas (m^3)	231,429	228,702	209,807	215,900	239,775

Table 36 Annual Consumption Summary

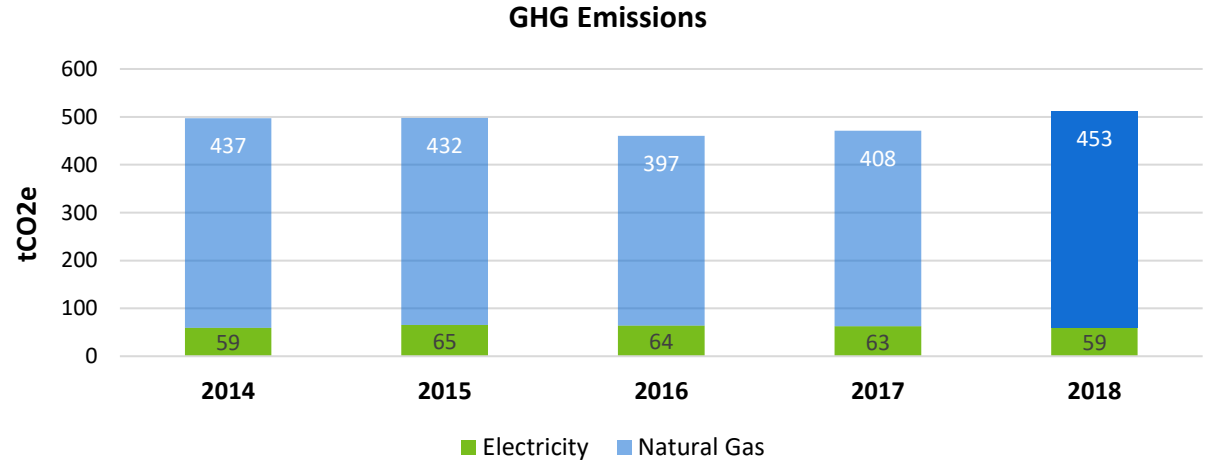


4.8.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	59	65	64	63	59
Natural Gas	437	432	397	408	453
Totals	**497**	**498**	**461**	**471**	**512**

Table 37 Annual GHG Emissions Analysis



4.8.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
Pool Liquid Thermal Blanket	Natural Gas	$10,000.00	0	11,989	3.82	2020
Waste Heat Recovery on Filtration System	Natural Gas	$20,000	0	3,000	30.52	2020
Install Air Curtains	Electricity & Natural Gas	$4,000	3,613	599	0.00	2023
Totals		**$34,000.00**	**3,613**	**15,588**		

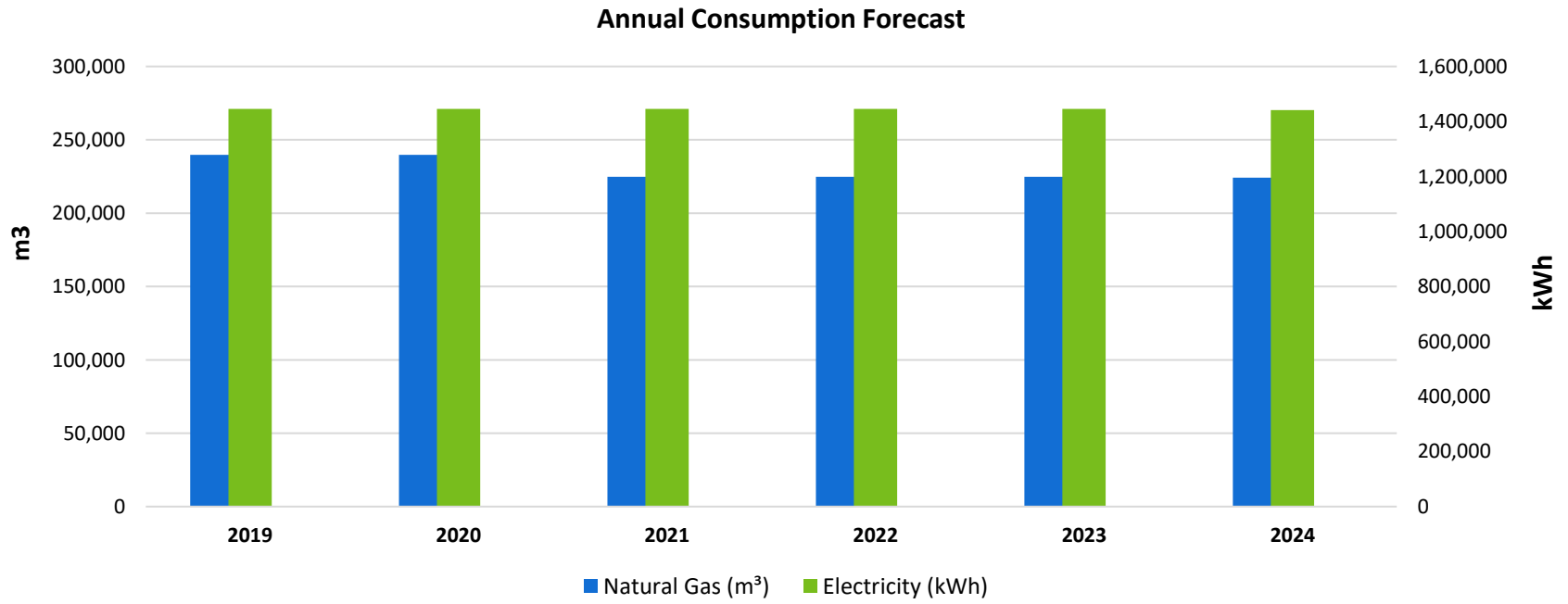
Table 38 Proposed Energy Conservation Initiatives

4.8.4 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)	1,445,267	0%	1,445,267	0%	1,445,267	0%	1,445,267	0%	1,445,267	0%	1,441,654	0%
Natural Gas (m^3)	239,775	0%	239,775	0%	224,786	6%	224,786	6%	224,786	6%	224,187	7%

Table 39 Forecasted Annual Consumption

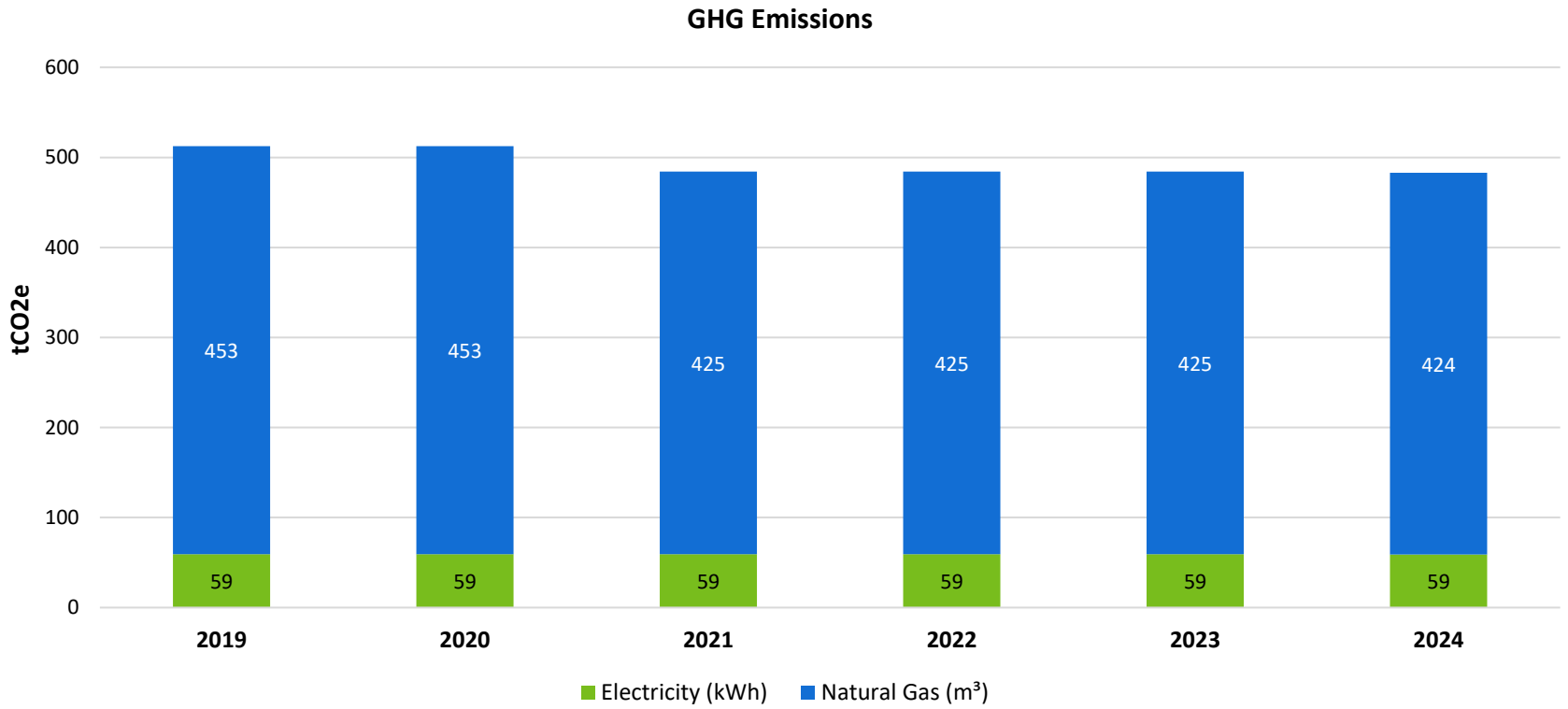


4.8.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	59	59	59	59	59	59
Natural Gas	453	453	425	425	425	424
Total Scope 1 & 2 Emissions	**512**	**512**	**484**	**484**	**484**	**483**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**6%**	**6%**	**6%**	**6%**

Table 40 Forecasted Annual GHG Emissions



4.9 Fire Station #1

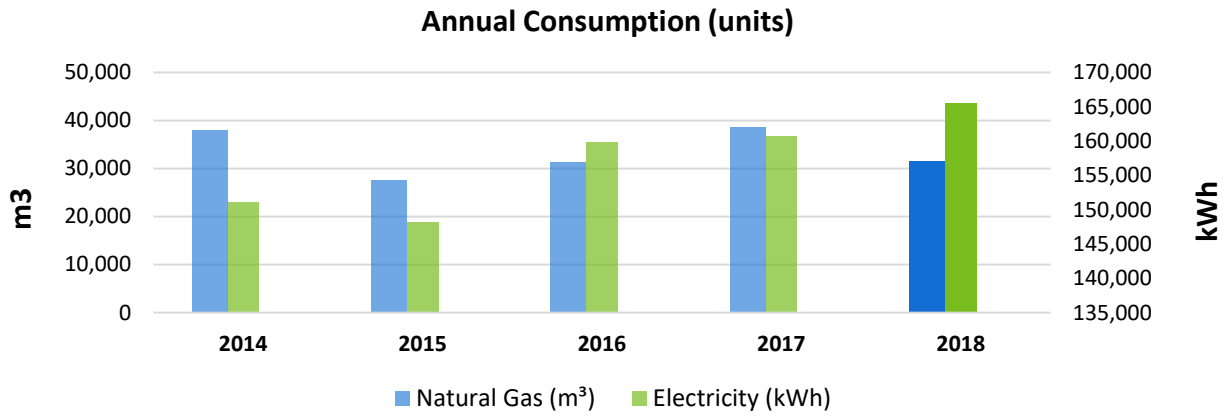
Facility Information	
Facility Name	**Fire Station #1**
Address	2430 Highway 2, Bowmanville, ON
Gross Area (Sq. Ft)	12,000
Type of Operation	Fire Station and associated offices and facilities
Average Operational Hours Per Week	168

4.9.1 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	151,136	148,202	159,797	160,733	165,496
Natural Gas (m³)	37,929	27,621	31,329	38,645	31,511

Table 41 Annual Consumption Summary

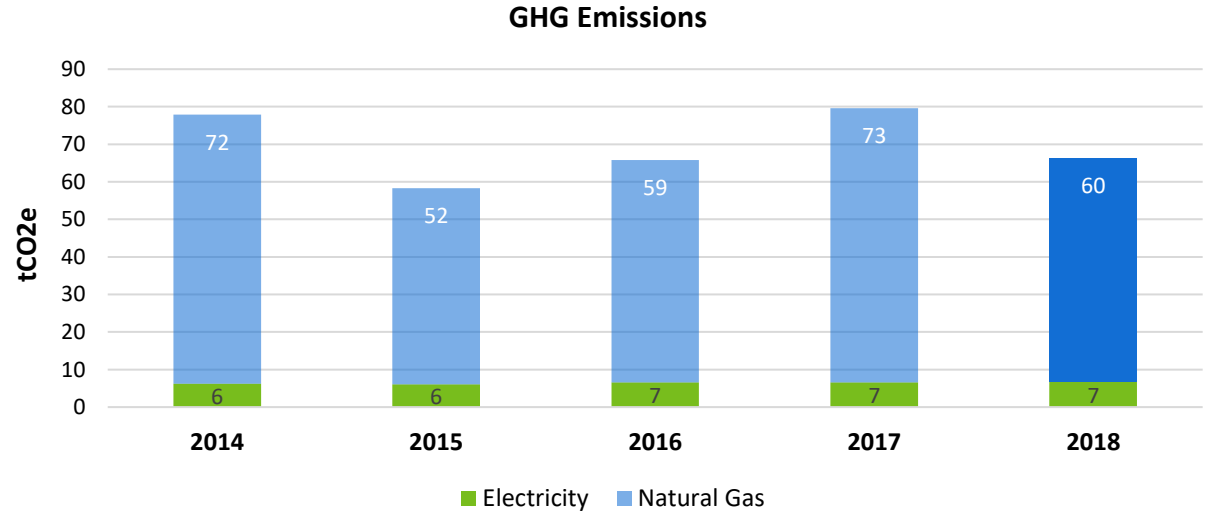


4.9.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	6	6	7	7	7
Natural Gas	72	52	59	73	60
Totals	**78**	**58**	**66**	**80**	**66**

Table 42 Annual GHG Emissions Analysis



4.9.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
Lighting Retrofit	Electricity	$7,200	8,600	0	6.75	2021
Heating, Ventilation, and Air Condition (HVAC) System - Scheduling / Setback	Electricity & Natural Gas	$2,000	2,782	1,286	3.22	2020
Totals		**$9,200**	**11,382**	**1,286**		

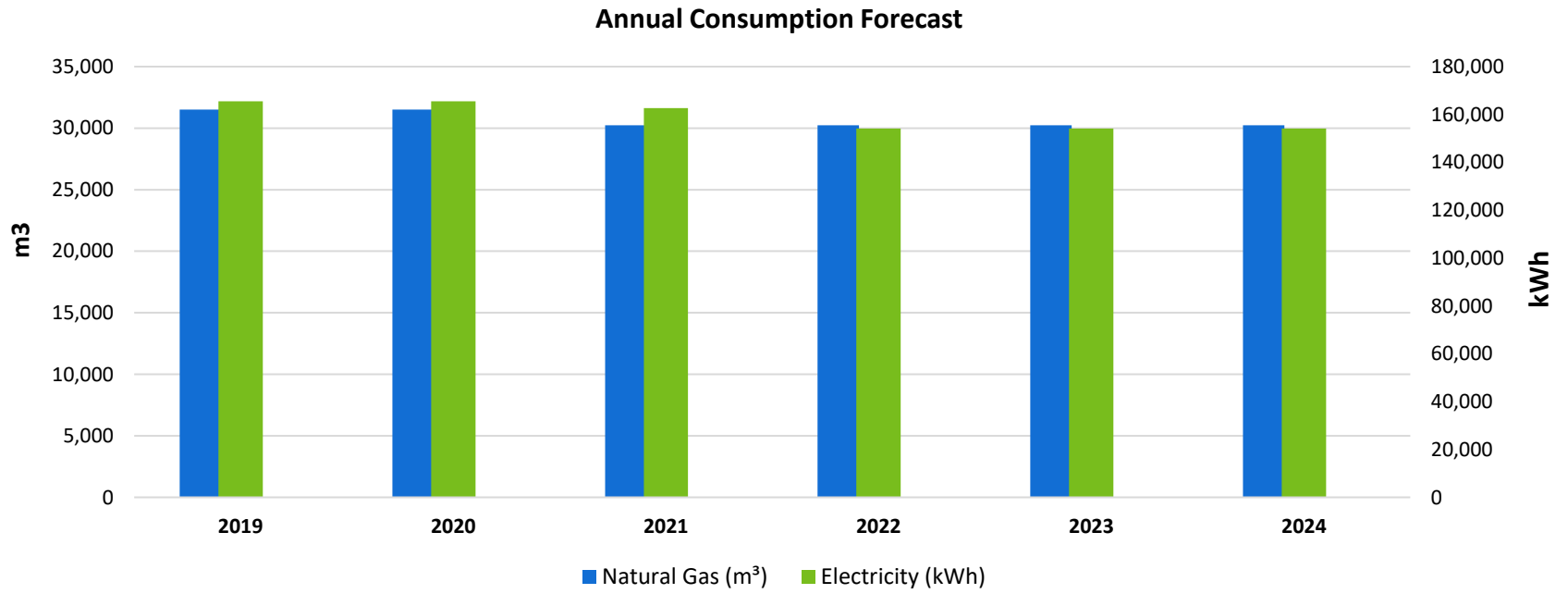
Table 43 Proposed Energy Conservation Initiatives

4.9.4 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)	165,496	0%	165,496	0%	162,714	2%	154,114	7%	154,114	7%	154,114	7%
Natural Gas (m^3)	31,511	0%	31,511	0%	30,225	4%	30,225	4%	30,225	4%	30,225	4%

Table 44 Forecasted Annual Consumption

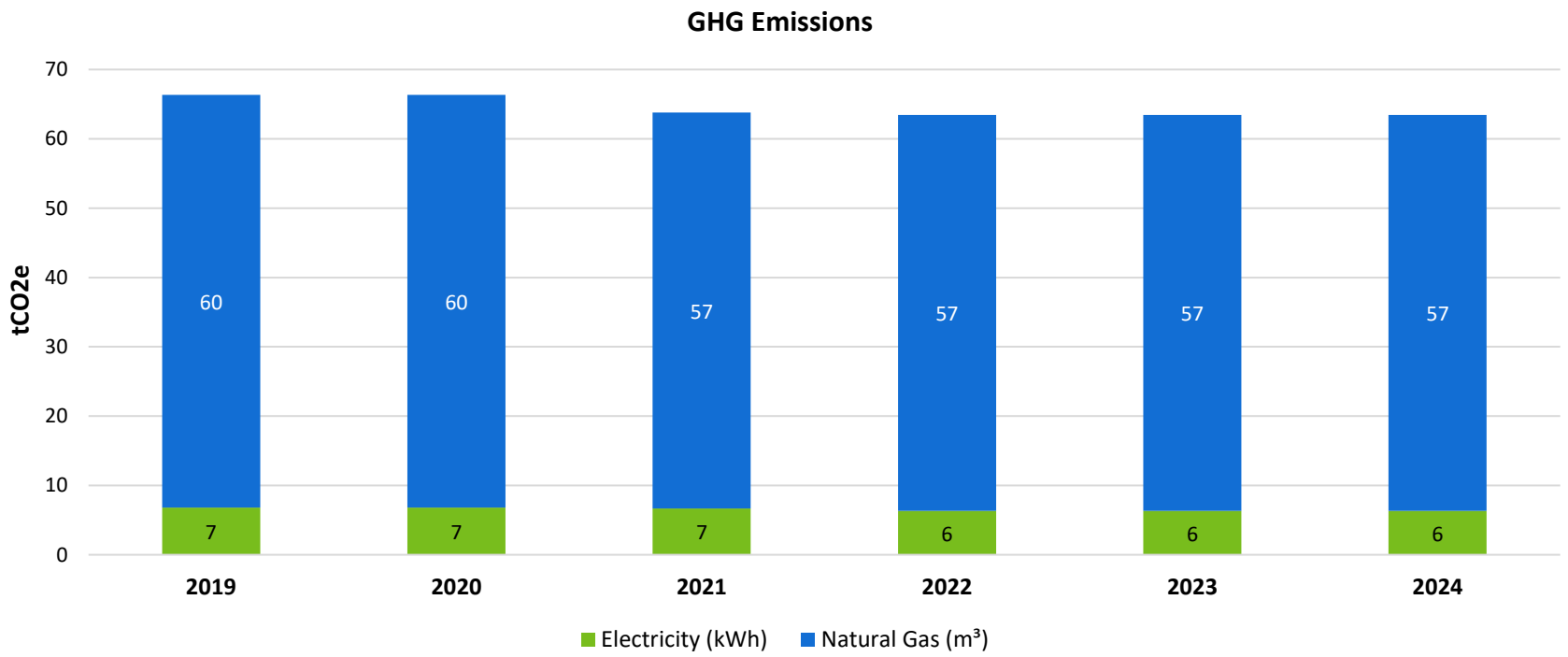


4.9.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	7	7	7	6	6	6
Natural Gas	60	60	57	57	57	57
Total Scope 1 & 2 Emissions	**66**	**66**	**64**	**63**	**63**	**63**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**4%**	**4%**	**4%**	**4%**

Table 45 Forecasted Annual GHG Emissions



4.10 Fire Station #2

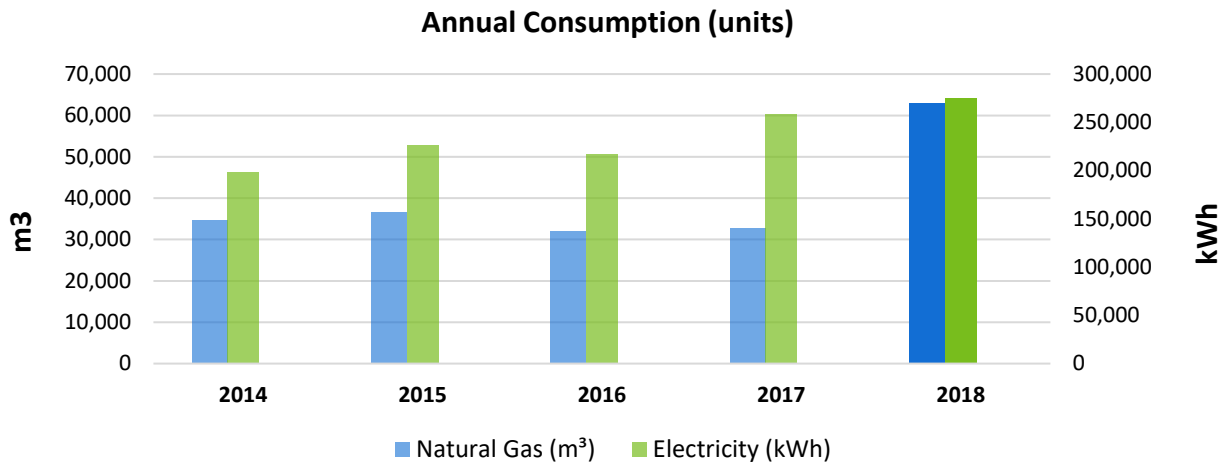
Facility Information	
Facility Name	**Fire Station #2**
Address	3333 Highway 2, Newcastle, ON
Gross Area (Sq. Ft)	12,486
Type of Operation	Fire Station and associated offices and facilities
Average Operational Hours Per Week	168

4.10.1 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	198,280	226,617	217,494	258,840	274,872
Natural Gas (m^3)	34,811	36,574	32,112	32,796	62,876

Table 46 Annual Consumption Summary

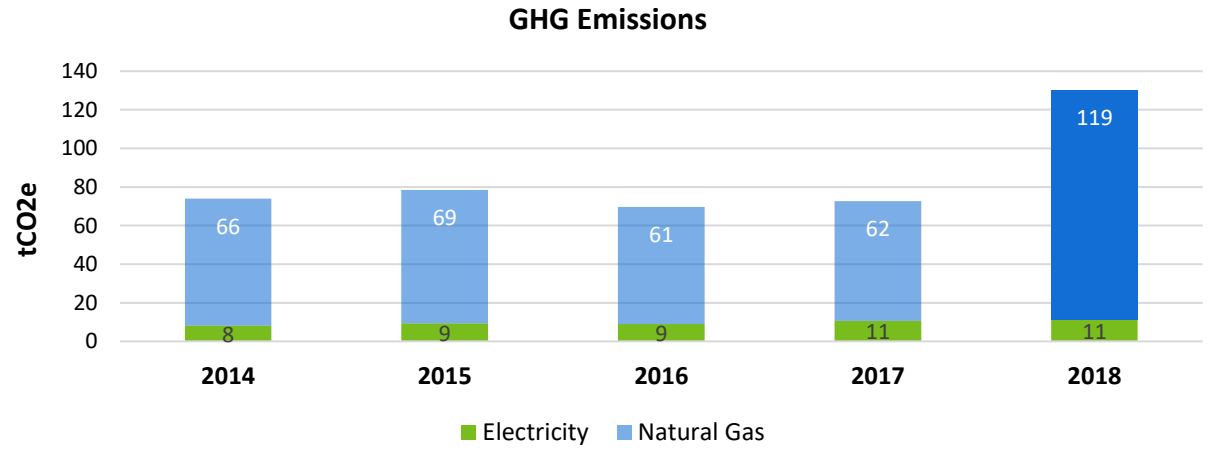


4.10.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	8	9	9	11	11
Natural Gas	66	69	61	62	119
Totals	**74**	**78**	**70**	**73**	**130**

Table 47 Annual GHG Emissions Analysis



4.10.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
Lighting Retrofit	Electricity	$37,458	27,487	0	10.98	2021
Heating, Ventilation, and Air Condition (HVAC) System - Scheduling / Setback	Electricity & Natural Gas	$2,000	9,162	2,704	1.17	2020
Natural Gas Pulse Meter	Electricity & Natural Gas	N/A	TBD	TBD	0.00	2019
Totals		**$39,458**	**36,649**	**2,704**		

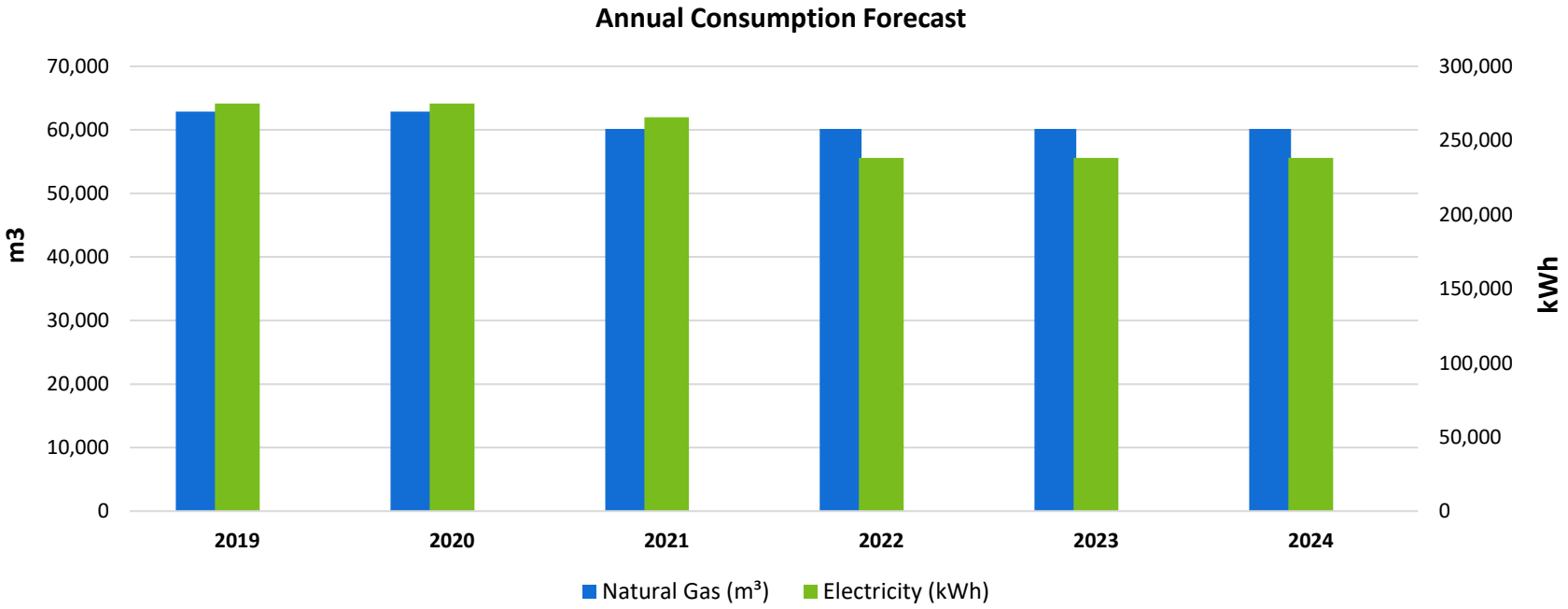
Table 48 Proposed Energy Conservation Initiatives

4.10.4 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)	274,872	0%	274,872	0%	265,710	3%	238,223	13%	238,223	13%	238,223	13%
Natural Gas (m^3)	62,876	0%	62,876	0%	60,172	4%	60,172	4%	60,172	4%	60,172	4%

Table 49 Forecasted Annual Consumption

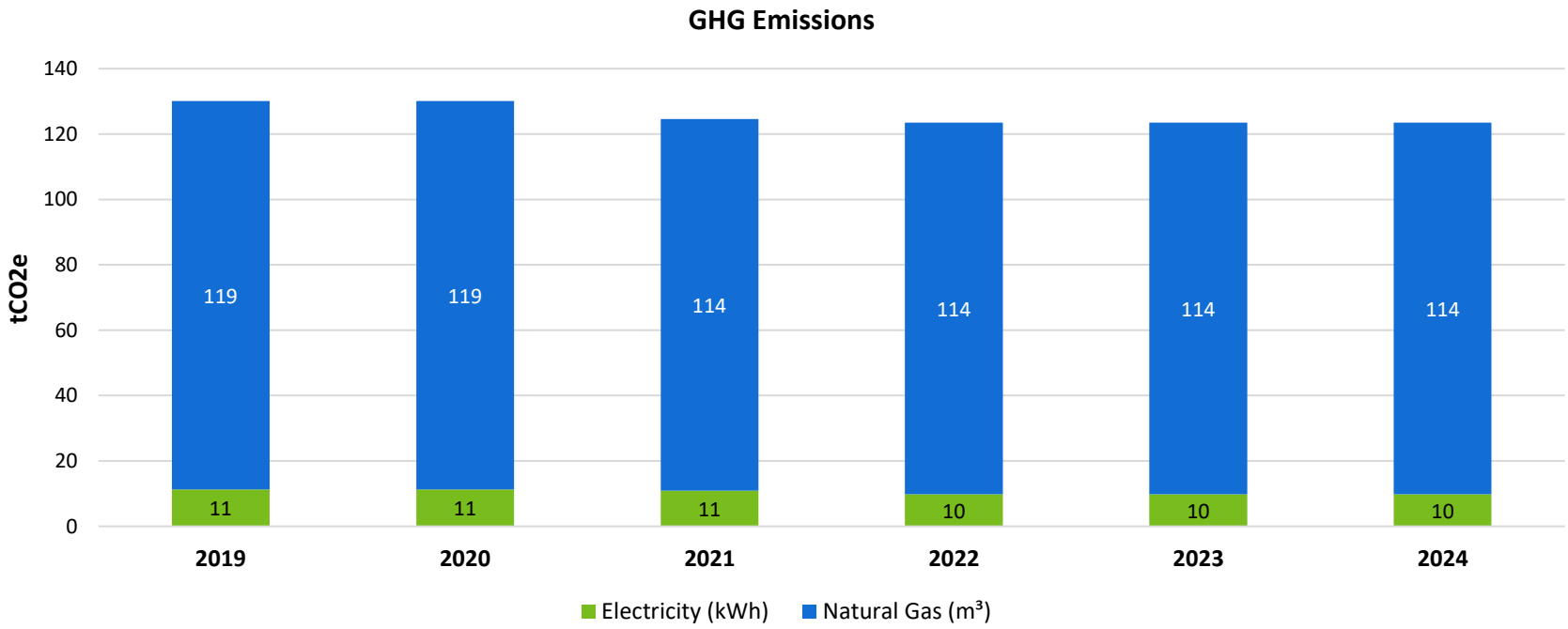


4.10.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	11	11	11	10	10	10
Natural Gas	119	119	114	114	114	114
Total Scope 1 & 2 Emissions	**130**	**130**	**125**	**123**	**123**	**123**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**4%**	**5%**	**5%**	**5%**

Table 50 Forecasted Annual GHG Emissions



4.11 Fire Station #3

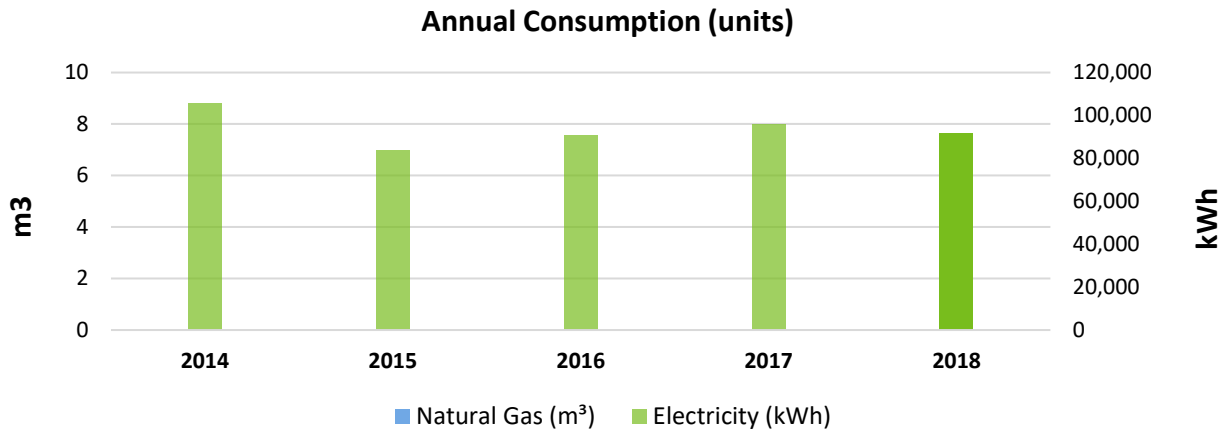
Facility Information	
Facility Name	**Fire Station #3**
Address	5708 Main Street, Orono, ON
Gross Area (Sq. Ft)	6,762
Type of Operation	Fire Station and associated offices and facilities
Average Operational Hours Per Week	168

4.11.1 Utility Consumption Analysis

Utilities to the site are electricity. 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	105,401	83,708	90,686	95,613	91,674
Natural Gas (m^3)	0	0	0	0	0

Table 51 Annual Consumption Summary

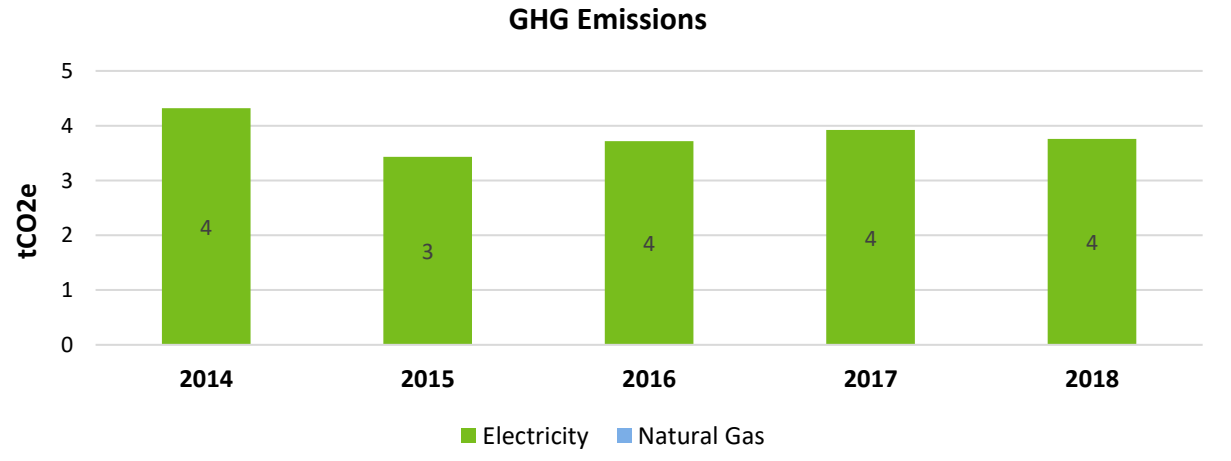


4.11.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	4	3	4	4	4
Natural Gas	0	0	0	0	0
Totals	**4**	**3**	**4**	**4**	**4**

Table 52 Annual GHG Emissions Analysis



4.11.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
Programmable Thermostat	Electricity	$750	5,348	0	0.58	2019
Replace Electric Hot Boiler	Electricity & Natural Gas	$65,000	44,564	-6,171	8.05	2019
Totals		**$65,750**	**49,912**	**-6,171**		

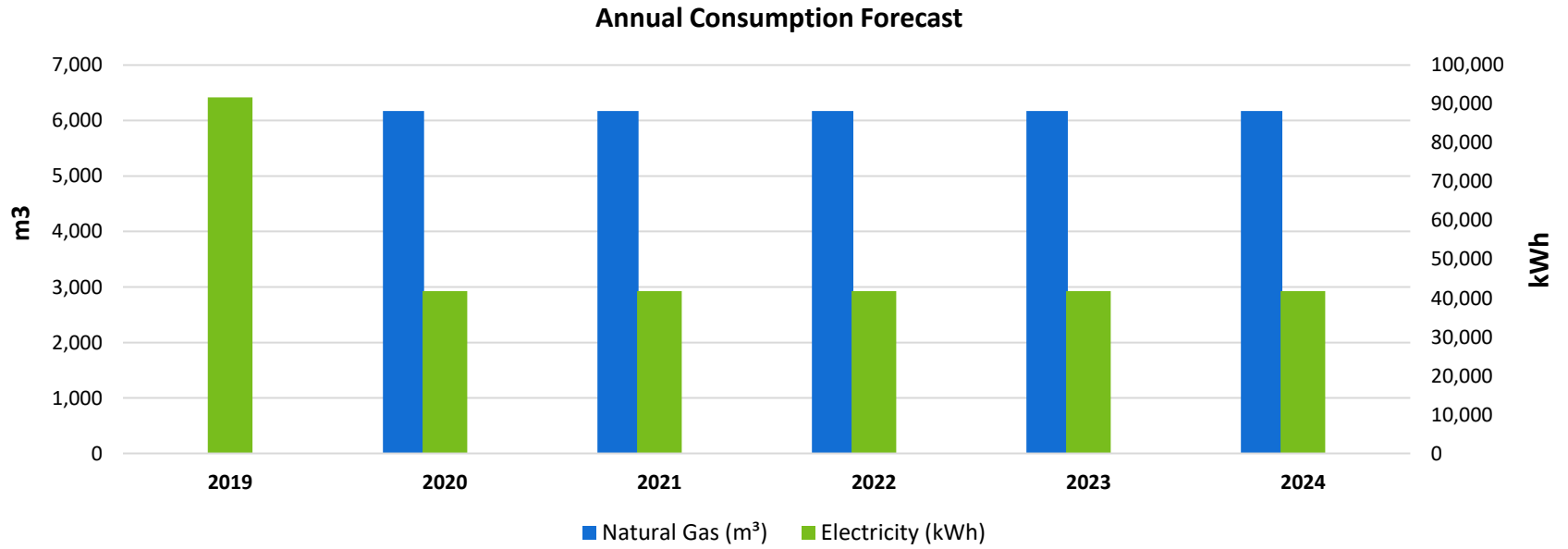
Table 53 Proposed Energy Conservation Initiatives

4.11.4 Utility Consumption Forecast

By implementing the energy conservation measures stated in the previous section, the forecasted electricity 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)	91,674	0%	41,763	54%	41,763	54%	41,763	54%	41,763	54%	41,763	54%
Natural Gas (m^3)	0	-%	6,171	-%	6,171	-%	6,171	-%	6,171	-%	6,171	-%

Table 54 Forecasted Annual Consumption

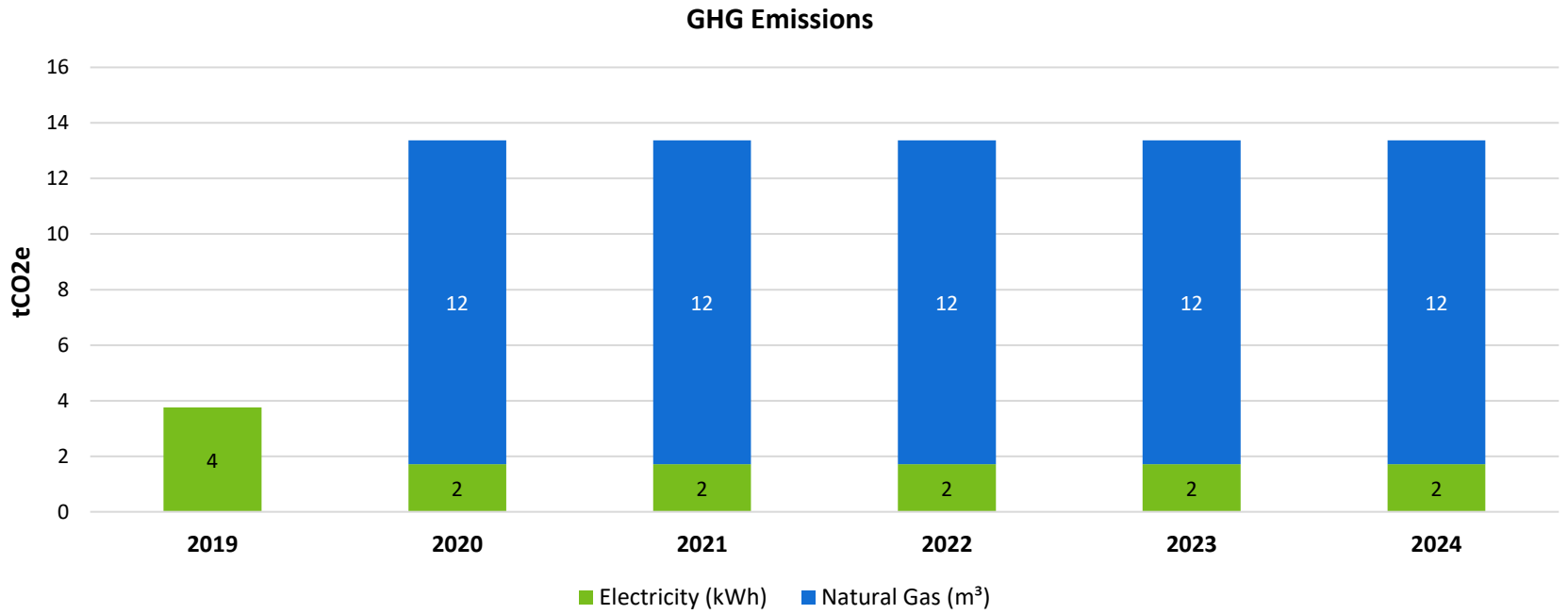


4.11.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	4	2	2	2	2	2
Natural Gas	0	12	12	12	12	12
Total Scope 1 & 2 Emissions	**4**	**13**	**13**	**13**	**13**	**13**
Reduction from the Baseline Year (2018)	**-%**	**-%**	**-%**	**-%**	**-%**	**-%**

Table 55 Forecasted Annual GHG Emissions



4.12 Fire Station #4

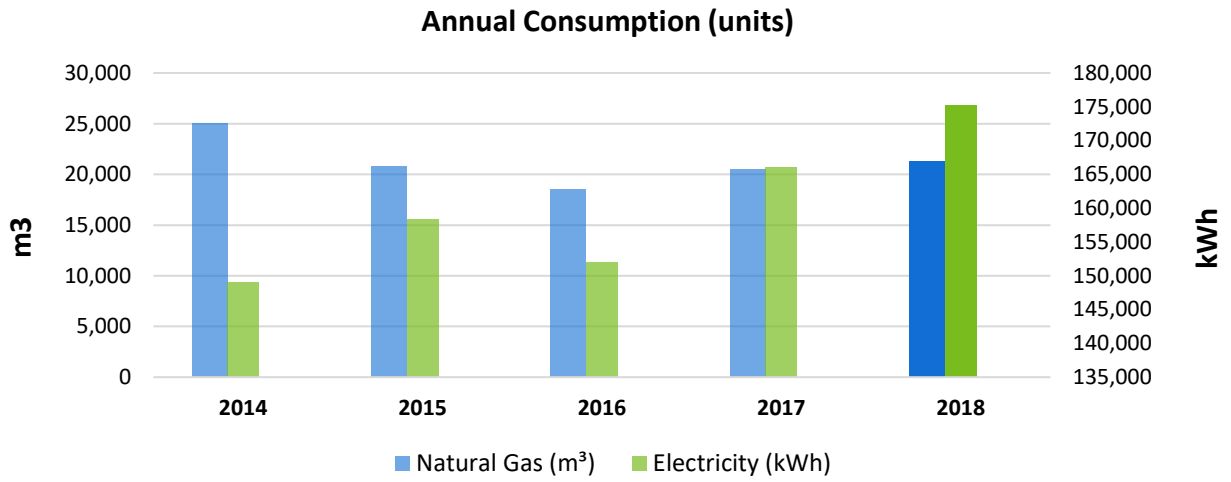
Facility Information	
Facility Name	**Fire Station #4 – Bylaw Office**
Address	2611 Trulls Road, Courtice, ON
Gross Area (Sq. Ft)	9,000
Type of Operation	Fire Station and associated offices and facilities, Bylaw Office
Average Operational Hours Per Week	168

4.12.1 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	149,023	158,336	151,939	166,019	175,175
Natural Gas (m^3)	25,078	20,823	18,528	20,547	21,337

Table 56 Annual Consumption Summary

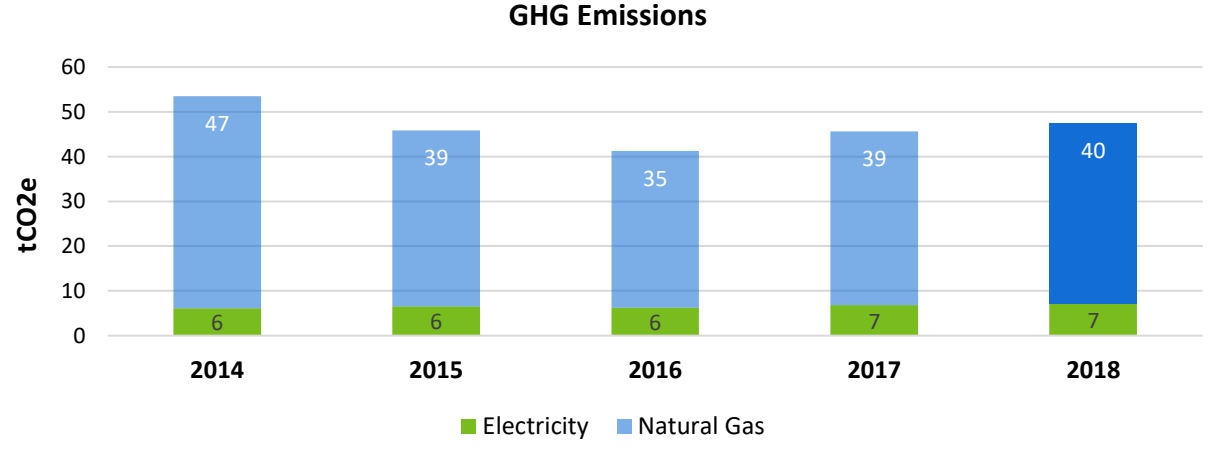


4.12.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	6	6	6	7	7
Natural Gas	47	39	35	39	40
Totals	**54**	**46**	**41**	**46**	**48**

Table 57 Annual GHG Emissions Analysis

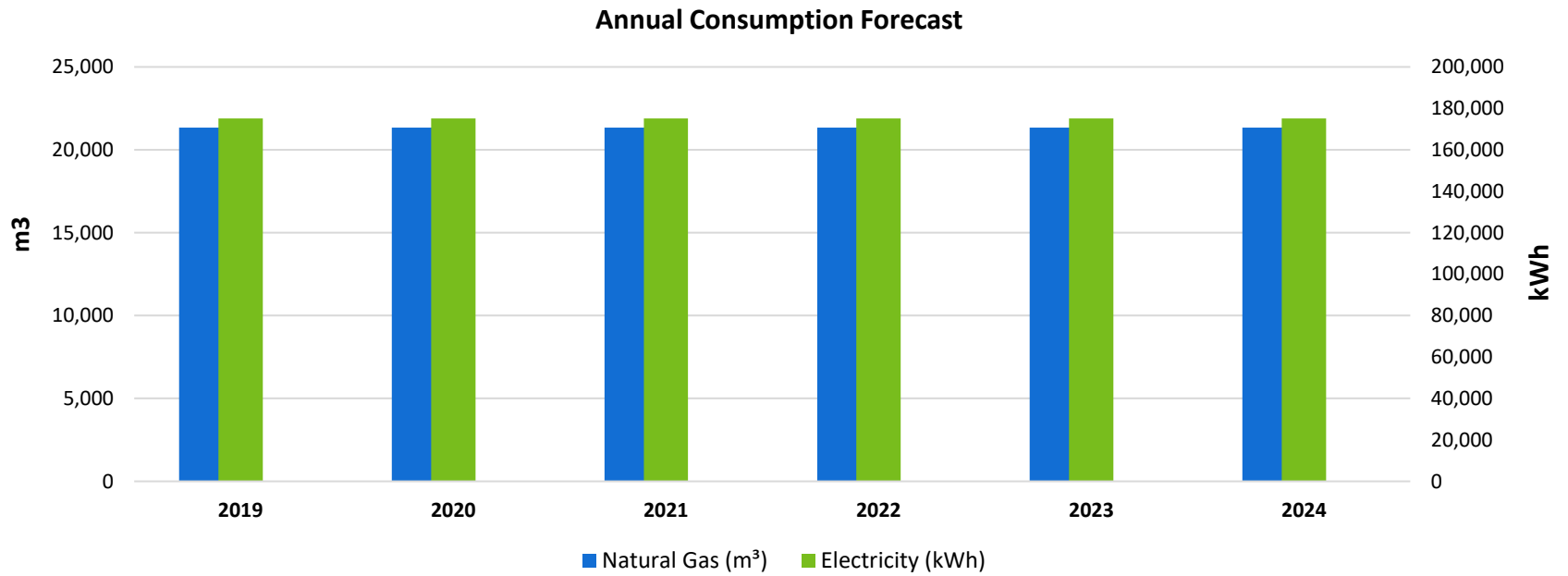


4.12.3 Utility Consumption Forecast

There are limited opportunities to reduce consumption at Fire Station #4. We have forecasted electricity and natural gas use based on the 2018 performance year. The forecasted utility consumption is tabulated below. Our goal will be to maintain 2018 consumption levels and review energy conservation opportunities as they present themselves.

	Annual Consumption Forecast (units)											
	2019		2020		2021		2022		2023		2024	
	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change
Electricity (kWh)	175,175	0%	175,175	0%	175,175	0%	175,175	0%	175,175	0%	175,175	0%
Natural Gas (m^3)	21,337	0%	21,337	0%	21,337	0%	21,337	0%	21,337	0%	21,337	0%

Table 58 Forecasted Annual Consumption

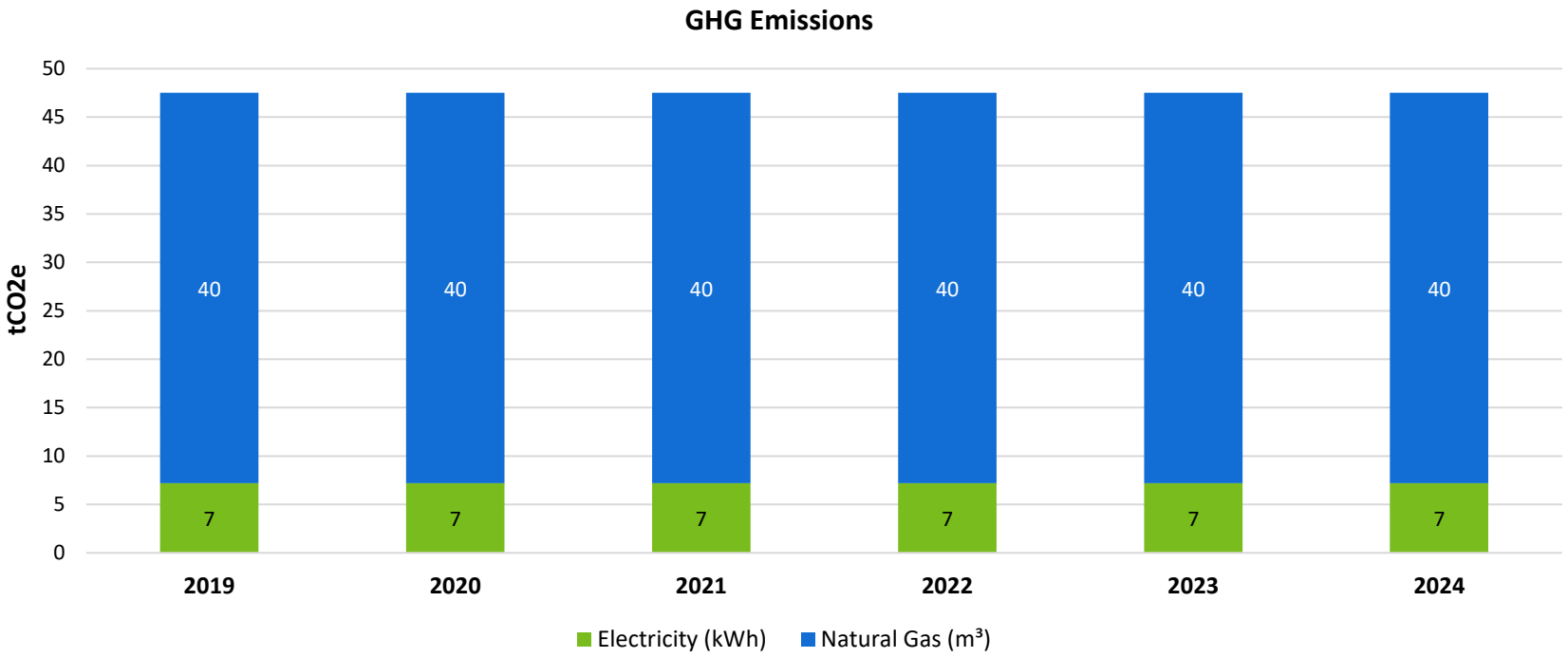


4.12.4 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	7	7	7	7	7	7
Natural Gas	40	40	40	40	40	40
Total Scope 1 & 2 Emissions	**48**	**48**	**48**	**48**	**48**	**48**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**

Table 59 Forecasted Annual GHG Emissions



4.13 Fire Station #5

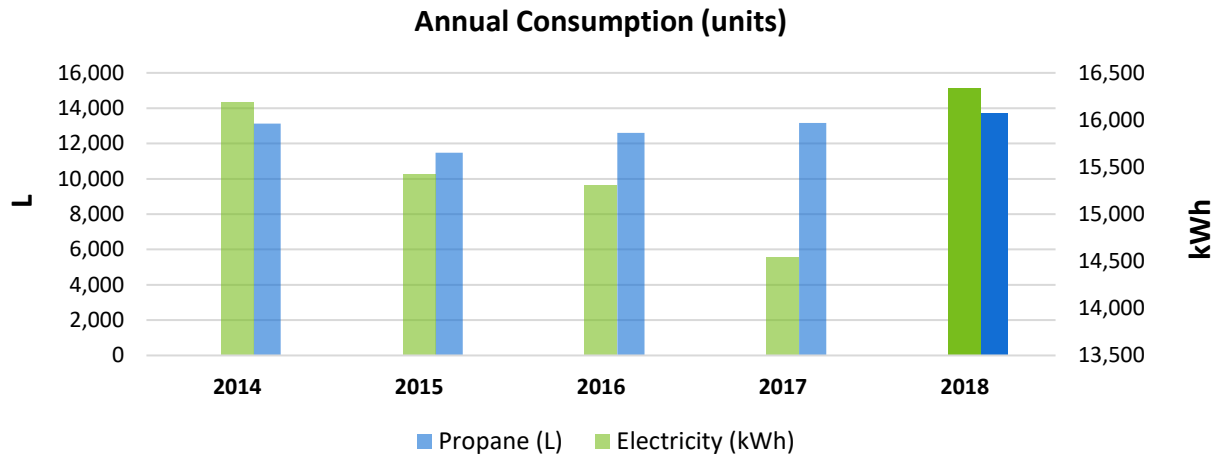
Facility Information	
Facility Name	**Fire Station #5**
Address	2354 Concession Road 8, Haydon, ON
Gross Area (Sq. Ft)	4,211
Type of Operation	Fire Station and associated offices and facilities
Average Operational Hours Per Week	168

4.13.1 Utility Consumption Analysis

Utilities to the site are electricity and propane. 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	16,195	15,426	15,313	14,549	16,344
Propane (L)	13,133	11,483	12,605	13,166	13,727

Table 60 Annual Consumption Summary

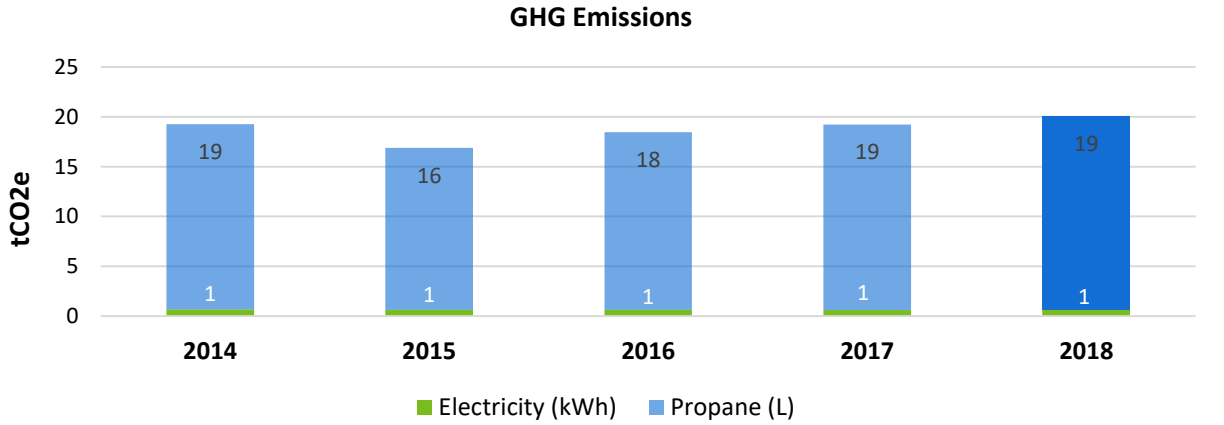


4.13.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	1	1	1	1	1
Propane	19	16	18	19	19
Totals	**19**	**17**	**18**	**19**	**20**

Table 61 Annual GHG Emissions Analysis

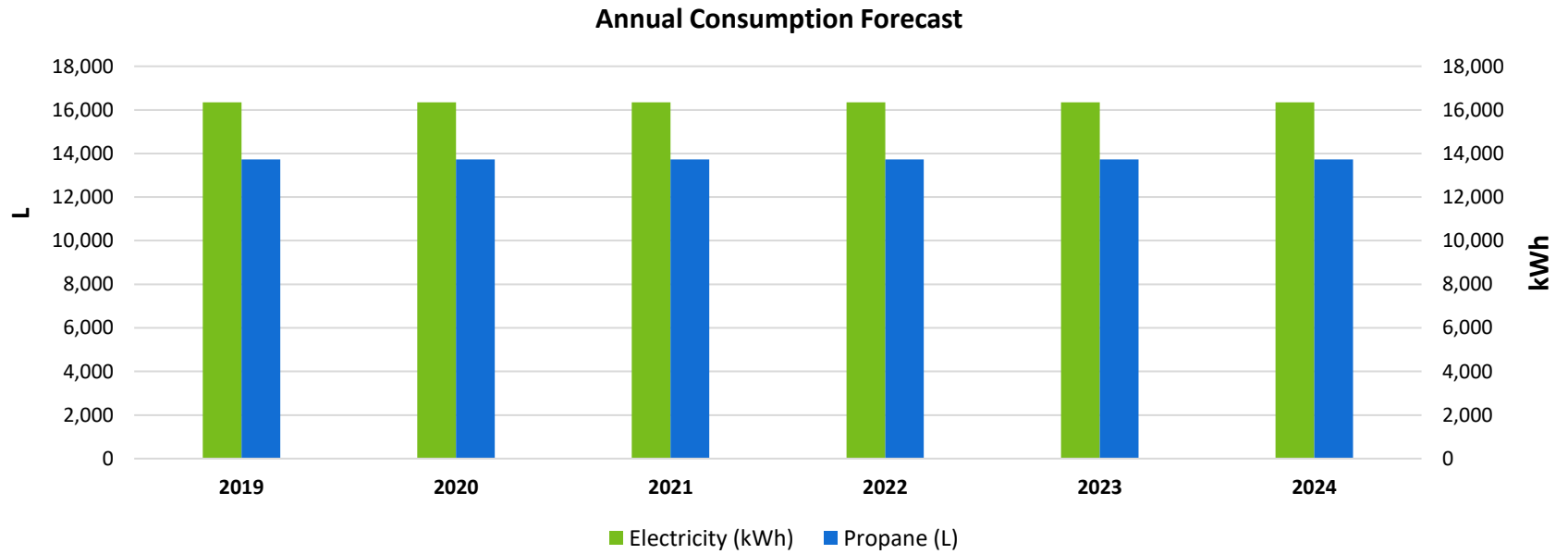


4.13.3 Utility Consumption Forecast

There are limited opportunities to reduce consumption at the Fire Station #5. We have forecasted electricity and natural gas use based on the 2018 performance year. The forecasted utility consumption is tabulated below. Our goal will be to maintain 2018 consumption levels and review energy conservation opportunities as they present themselves.

	Annual Consumption Forecast (units)											
	2019		2020		2021		2022		2023		2024	
	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change
Electricity (kWh)	16,344	0%	16,344	0%	16,344	0%	16,344	0%	16,344	0%	16,344	0%
Propane (L)	13,727	0%	13,727	0%	13,727	0%	13,727	0%	13,727	0%	13,727	0%

Table 62 Forecasted Annual Consumption

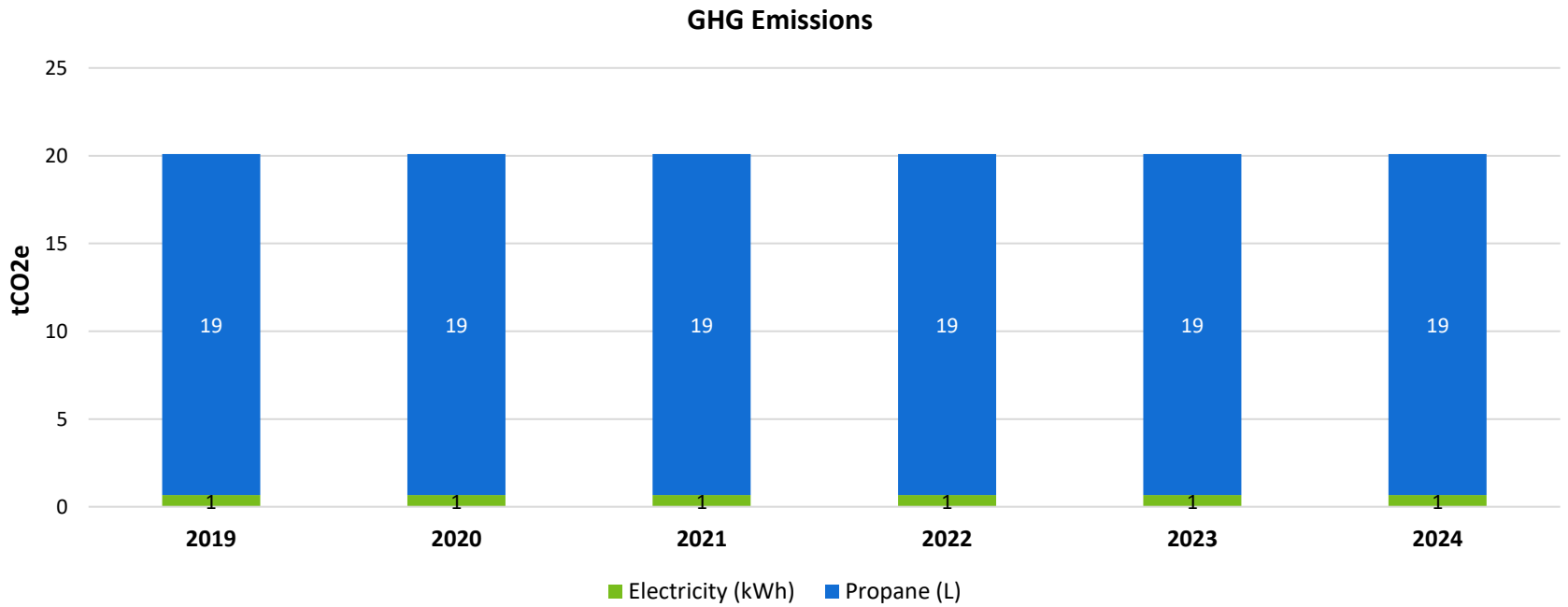


4.13.4 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	1	1	1	1	1	1
Propane	19	19	19	19	19	19
Total Scope 1 & 2 Emissions	**20**	**20**	**20**	**20**	**20**	**20**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**

Table 63 Forecasted Annual GHG Emissions



4.14 Garnet Rickard Recreation Complex

This center features two NHL ice pads, banquet hall and meeting facilities. Accommodates 350 people for dinner. This facility also includes an older adult care centre and administrative offices.

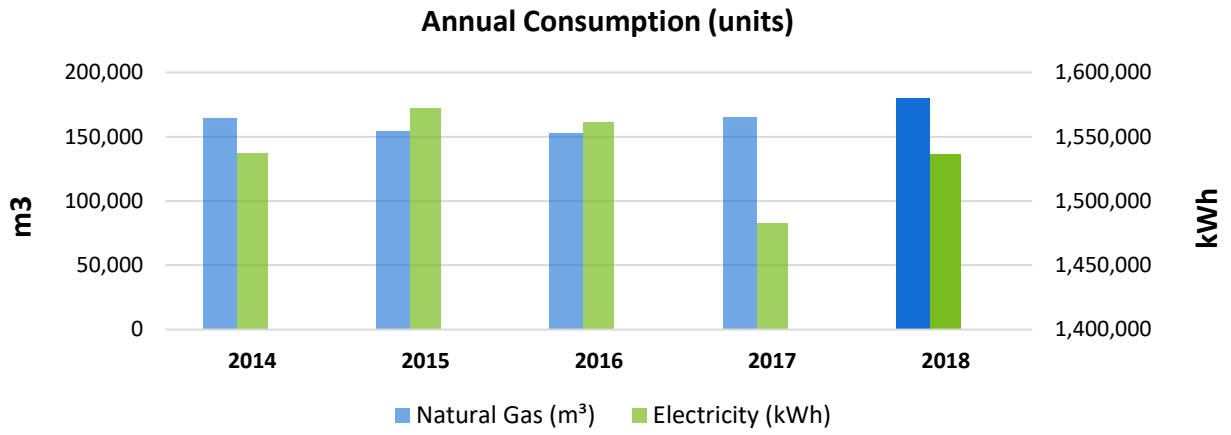
Facility Information	
Facility Name	**Garnet Rickard Recreation Complex**
Address	2440 Highway 2, Bowmanville, ON
Gross Area (Sq. Ft)	88,586
Type of Operation	Indoor Recreation Facility
Average Operational Hours Per Week	126

4.14.1 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).
*Ice resurfacers are fueled by natural gas and this is included in the consumption.

Annual Consumption (units)					
Utility	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	1,537,007	1,572,530	1,561,497	1,483,014	1,536,433
Natural Gas (m^3)	164,531	154,229	153,225	165,544	179,942

Table 64 Annual Consumption Summary

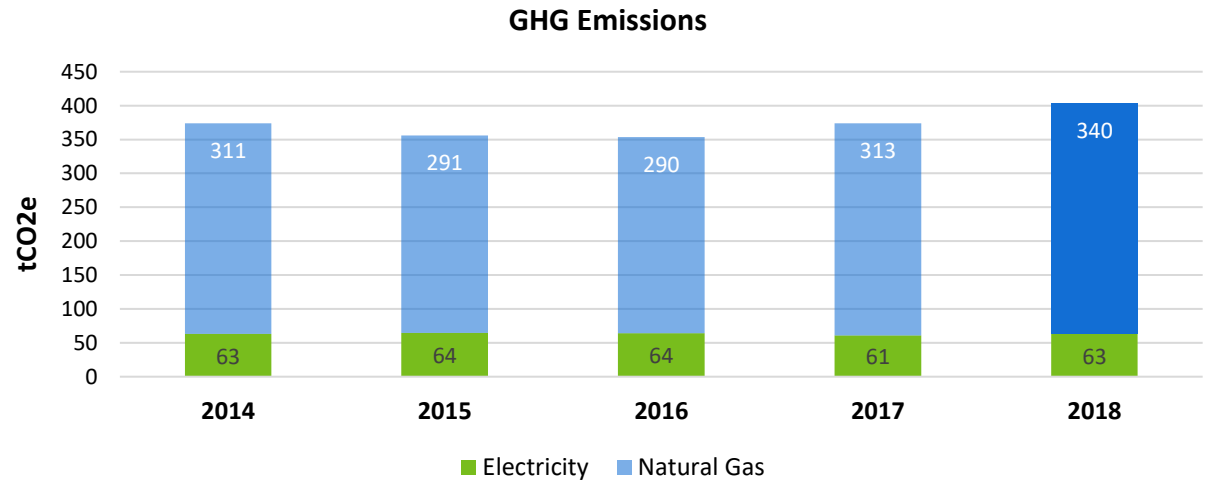


4.14.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	63	64	64	61	63
Natural Gas	311	291	290	313	340
Totals	**374**	**356**	**354**	**374**	**403**

Table 65 Annual GHG Emissions Analysis



4.14.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
Rink Lighting Upgrade	Electricity	$57,800	73,000	0	6.21	2023
Install Air Curtains	Electricity & Natural Gas	$20,000	3,841	3,599	18.31	2020
***LED Lighting Retrofit**	Electricity	$14,450	18,250	0	6.38	2021
Totals		**$92,250.00**	**95,091**	**3,599**		

*The community hall and parking lot have already been converted to LED. This measure is for the remaining areas.

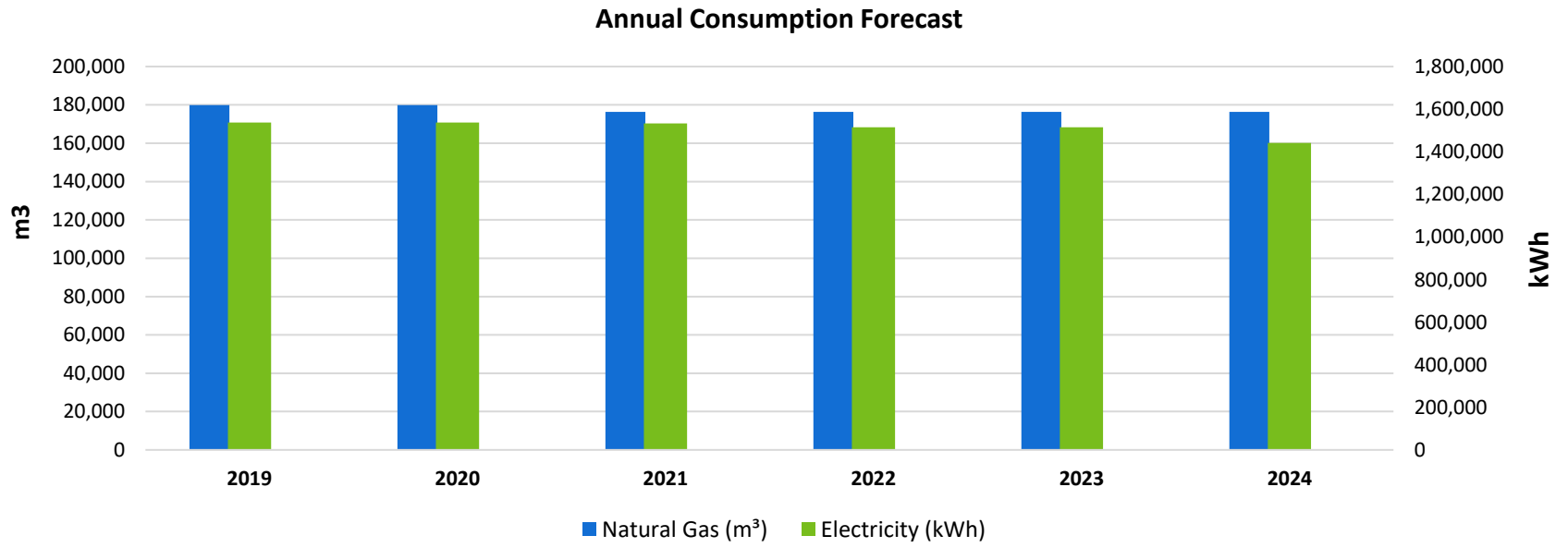
Table 66 Proposed Energy Conservation Initiatives

4.14.4 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)	1,536,433	0%	1,536,433	0%	1,532,592	0%	1,514,342	1%	1,514,342	1%	1,441,342	6%
Natural Gas (m^3)	179,942	0%	179,942	0%	176,343	2%	176,343	2%	176,343	2%	176,343	2%

Table 67 Forecasted Annual Consumption

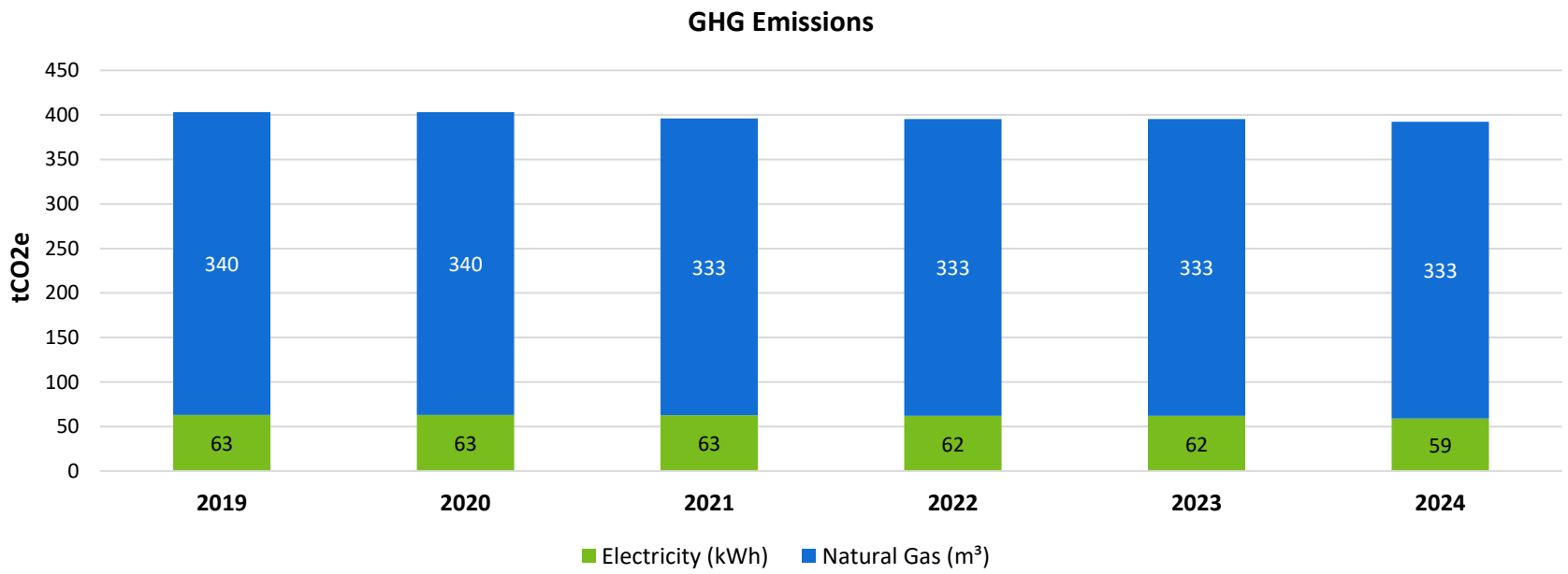


4.14.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	63	63	63	62	62	59
Natural Gas	340	340	333	333	333	333
Total Scope 1 & 2 Emissions	**403**	**403**	**396**	**395**	**395**	**392**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**2%**	**2%**	**2%**	**3%**

Table 68 Forecasted Annual GHG Emissions



4.15 Hampton Hall

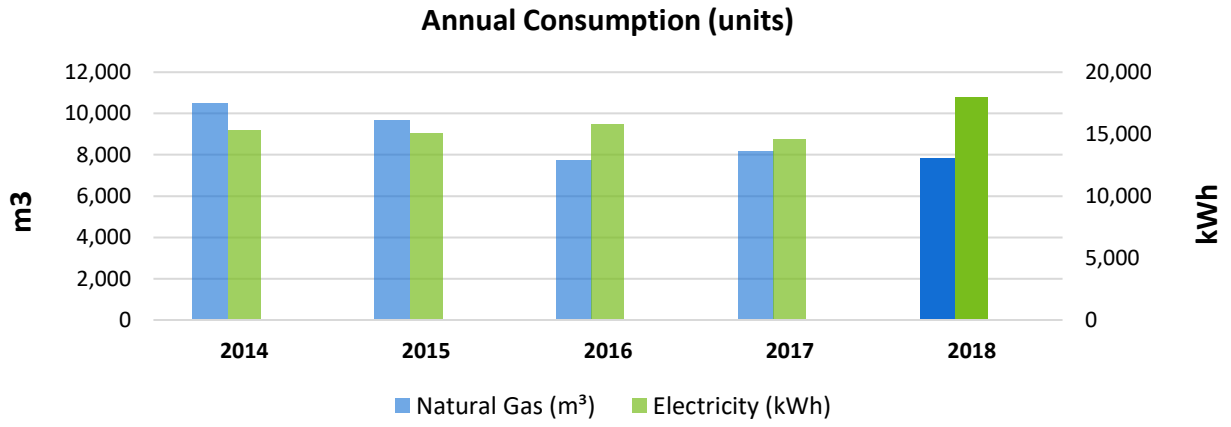
Facility Information	
Facility Name	**Hampton Hall**
Address	5360 Old Scugog Road, Hampton, ON
Gross Area (Sq. Ft)	3,059
Type of Operation	Community Centre
Average Operational Hours Per Week	20

4.15.1 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	15,287	15,072	15,746	14,532	17,961
Natural Gas (m^3)	10,483	9,674	7,701	8,144	7,823

Table 69 Annual Consumption Summary

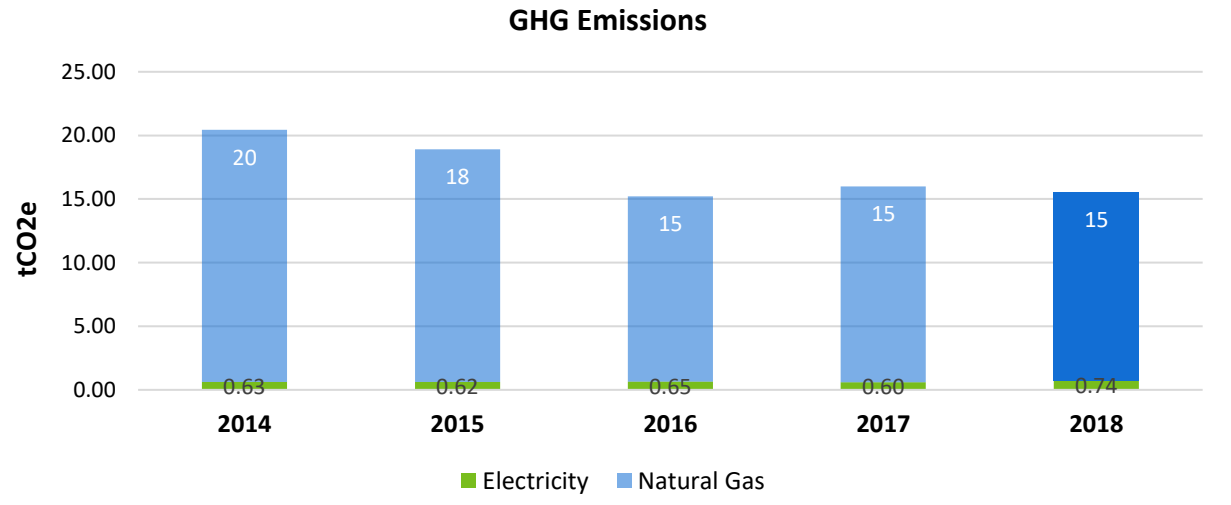


4.15.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	0.63	0.62	0.65	0.60	0.74
Natural Gas	20	18	15	15	15
Totals	**20**	**19**	**15**	**16**	**16**

Table 70 Annual GHG Emissions Analysis



4.15.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
***Lighting Retrofit / Controls**	Electricity	$9,177	1,796	0	41.76	2020
Totals		**$9,177**	**1,796**			

*The exterior lighting of the facility already has been converted to LED. This measure is for the remaining interior areas.

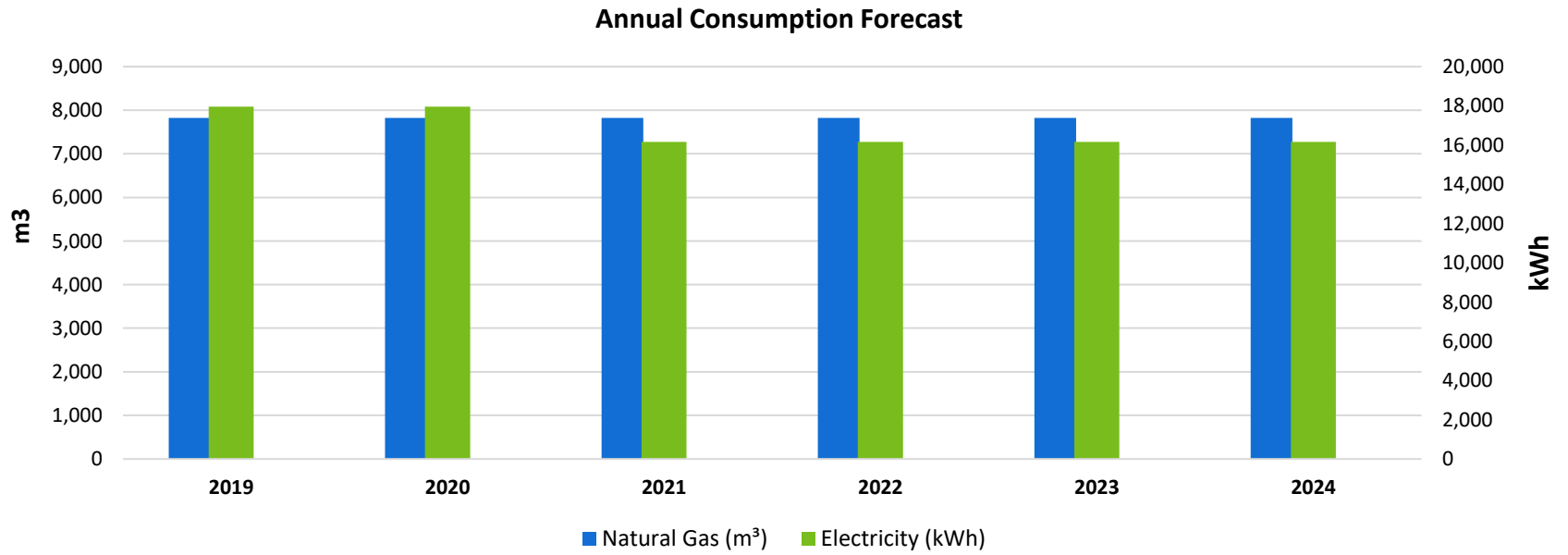
Table 71 Proposed Energy Conservation Initiatives

4.15.4 Utility Consumption Forecast

By implementing the energy conservation measure stated in the previous section, the forecasted electricity and natural gas use could be forecasted based on the utility savings generated from the lighting retrofit. 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)	17,961	0%	17,961	0%	16,165	10%	16,165	10%	16,165	10%	16,165	10%
Natural Gas (m^3)	7,823	0%	7,823	0%	7,823	0%	7,823	0%	7,823	0%	7,823	0%

Table 72 Forecasted Annual Consumption

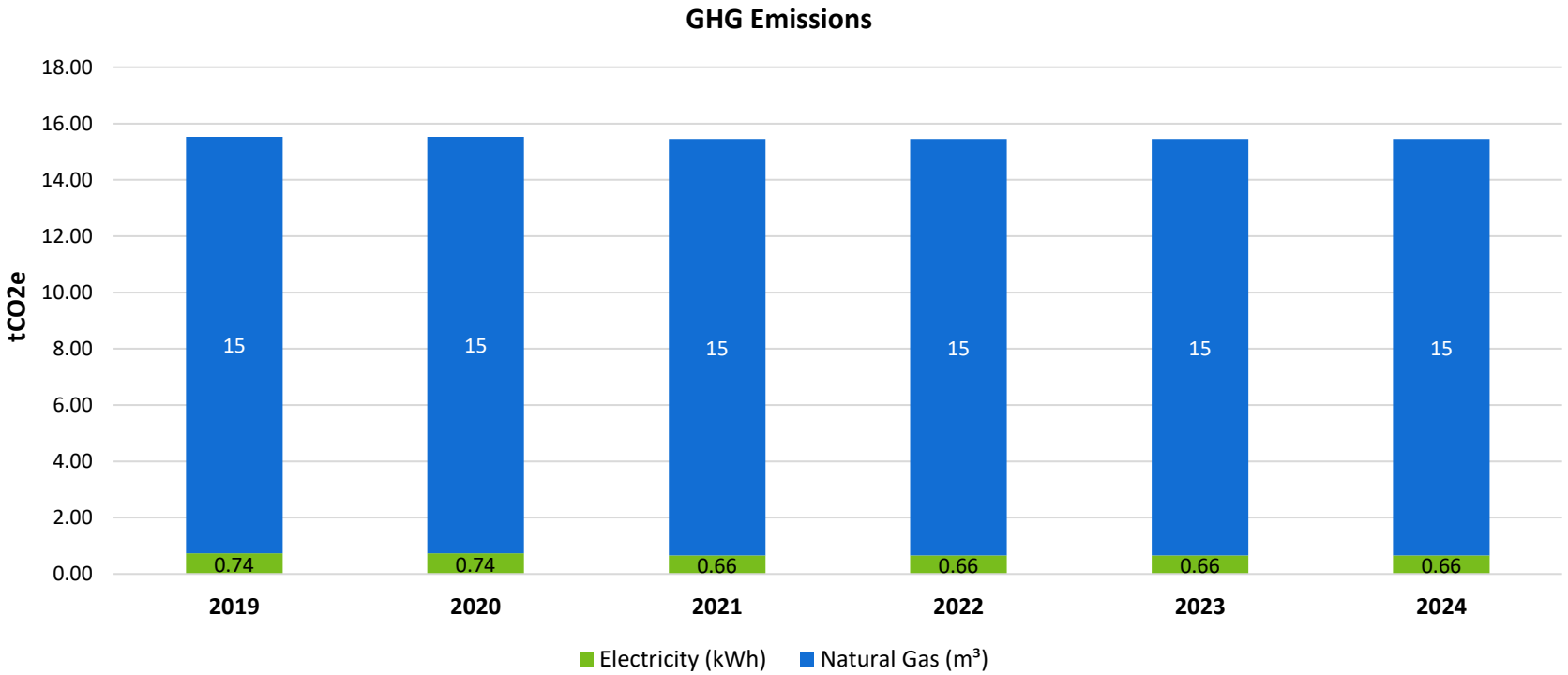


4.15.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	0.74	0.74	0.66	0.66	0.66	0.66
Natural Gas	15	15	15	15	15	15
Total Scope 1 & 2 Emissions	**15**	**15**	**15**	**15**	**15**	**15**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**

Table 73 Forecasted Annual GHG Emissions



4.16 Hampton Operations Depot

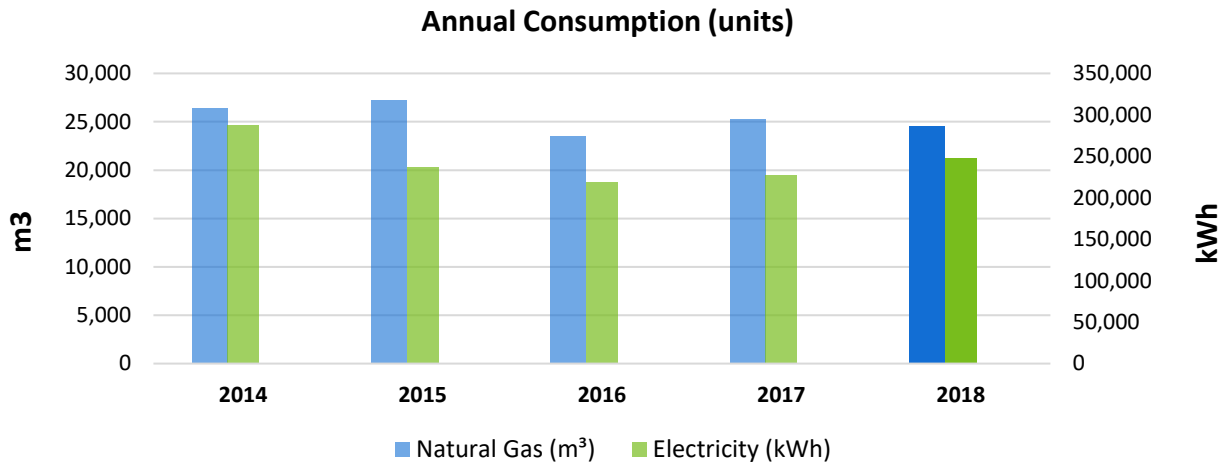
Facility Information	
Facility Name	**Hampton Operations Depot**
Address	2320 Taunton Road, Hampton, ON
Gross Area (Sq. Ft)	14,812
Type of Operation	Storage facilities where equipment or vehicles are maintained, repaired or stored
Average Operational Hours Per Week	37.5

4.16.1 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	288,160	236,640	219,146	227,040	247,600
Natural Gas (m³)	26,416	27,291	23,554	25,286	24,567

Table 74 Annual Consumption Summary

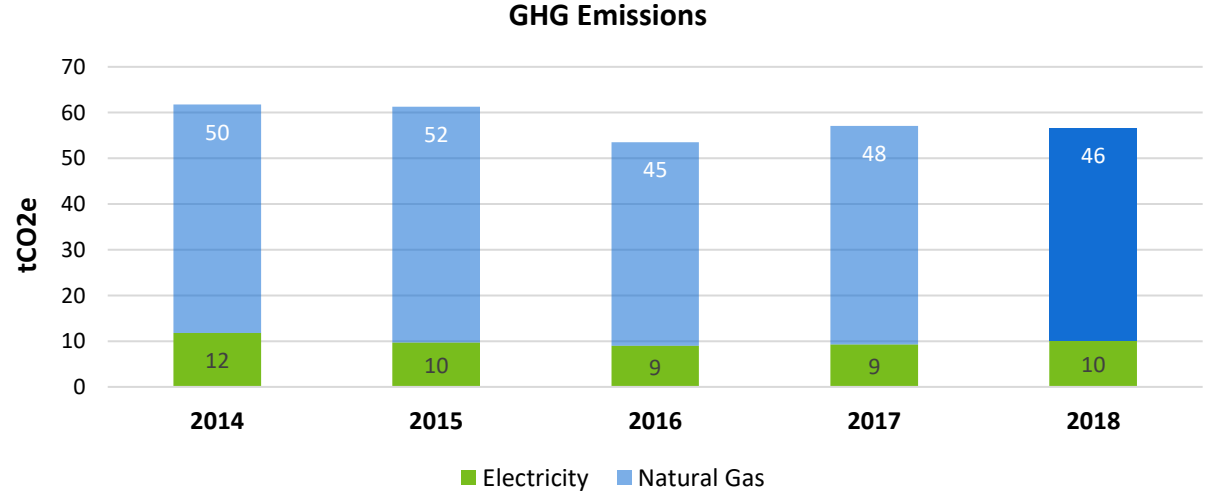


4.16.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	12	10	9	9	10
Natural Gas	50	52	45	48	46
Totals	**62**	**61**	**54**	**57**	**57**

Table 75 Annual GHG Emissions Analysis



4.16.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
Motion Sensors	Electricity	$500	1,306	0	3.13	2020
*** Other Lighting Upgrades**	Electricity	$22,642	15,456	0	11.97	2020
Totals		**$23,142**	**16,762**	**0**		

*The high bay shop has already been converted to LED. This measure is for the remaining interior areas.

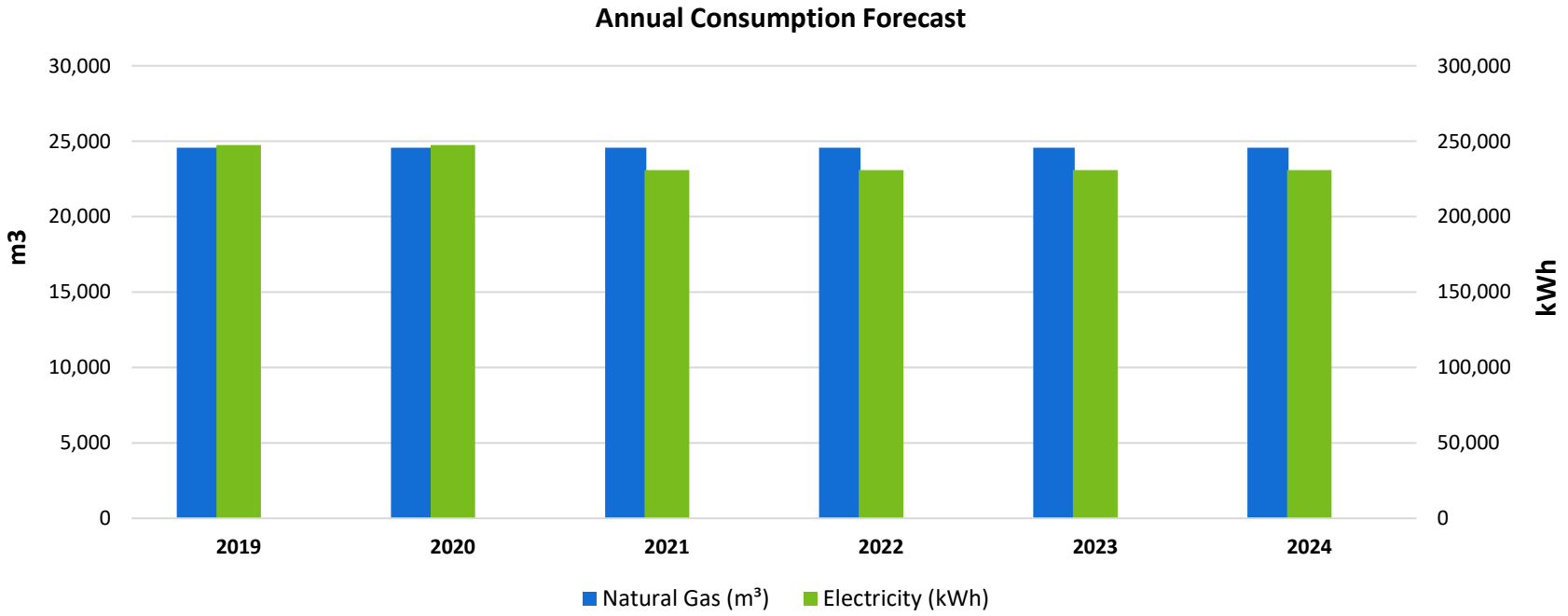
Table 76 Proposed Energy Conservation Initiatives

4.16.4 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)	247,600	0%	247,600	0%	230,838	7%	230,838	7%	230,838	7%	230,838	7%
Natural Gas (m^3)	24,567	0%	24,567	0%	24,567	0%	24,567	0%	24,567	0%	24,567	0%

Table 77 Forecasted Annual Consumption

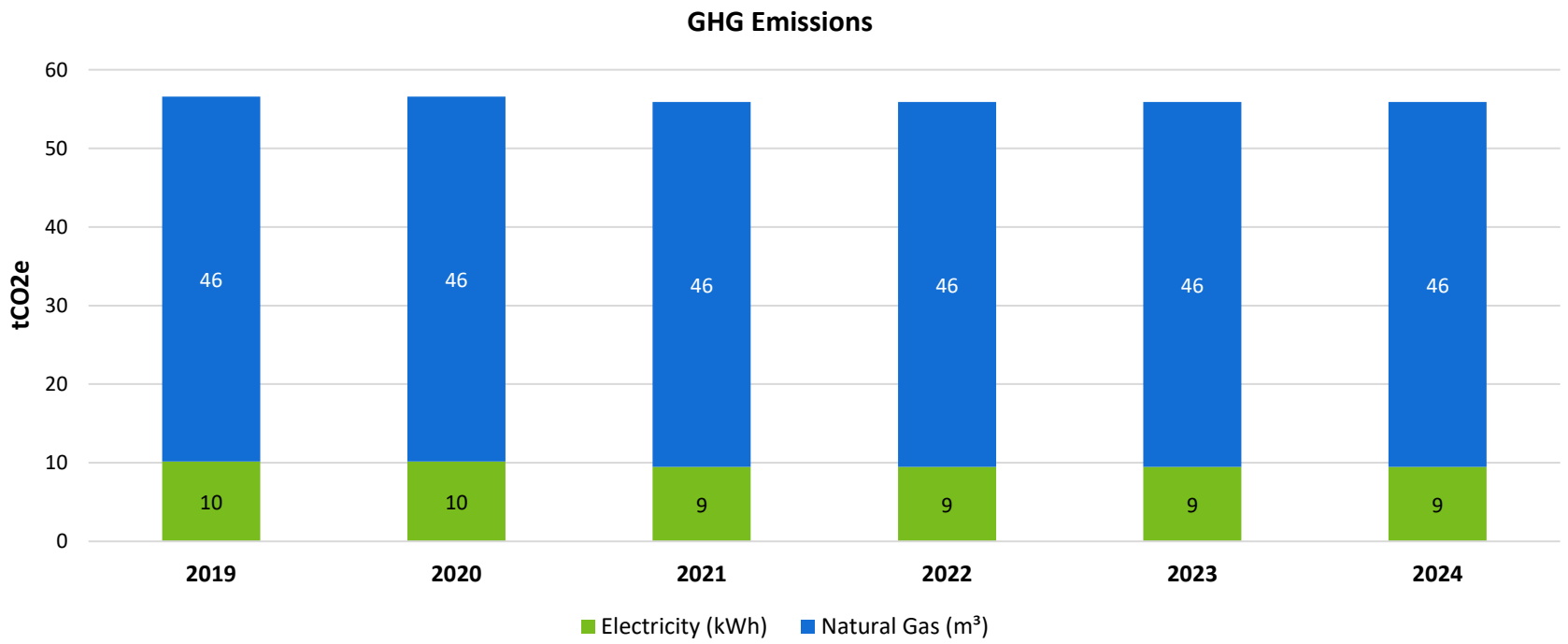


4.16.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	10	10	9	9	9	9
Natural Gas	46	46	46	46	46	46
Total Scope 1 & 2 Emissions	**57**	**57**	**56**	**56**	**56**	**56**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**1%**	**1%**	**1%**	**1%**

Table 78 Forecasted Annual GHG Emissions



4.17 Kendal Community Centre

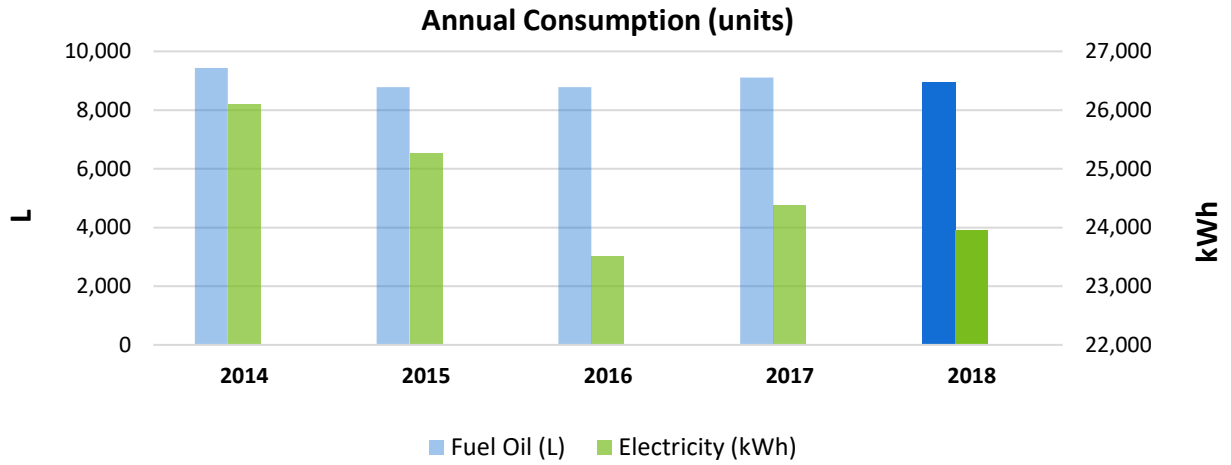
Facility Information	
Facility Name	**Kendal Community Centre**
Address	6742 Newtonville Road, Orono, ON
Gross Area (Sq. Ft)	9,495
Type of Operation	Community Centre
Average Operational Hours Per Week	40

4.17.1 Utility Consumption Analysis

Utilities to the site are electricity and fuel oil. 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	26,097	25,256	23,509	24,383	23,946
Fuel Oil (L)	9,437	8,784	8,783	9,110	8,947

Table 79 Annual Consumption Summary

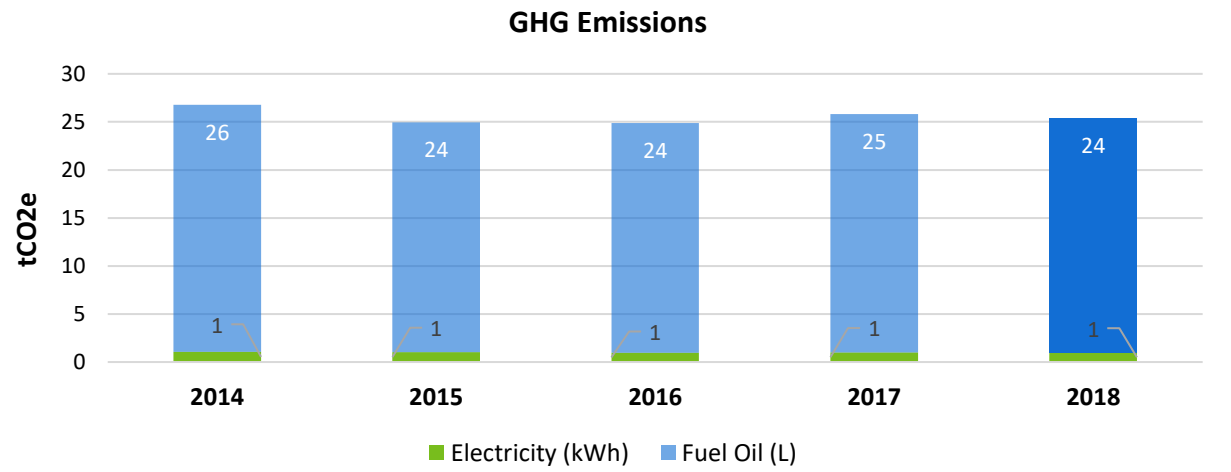


4.17.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	1	1	1	1	1
Fuel Oil	26	24	24	25	24
Totals	**27**	**25**	**25**	**26**	**25**

Table 80 Annual GHG Emissions Analysis

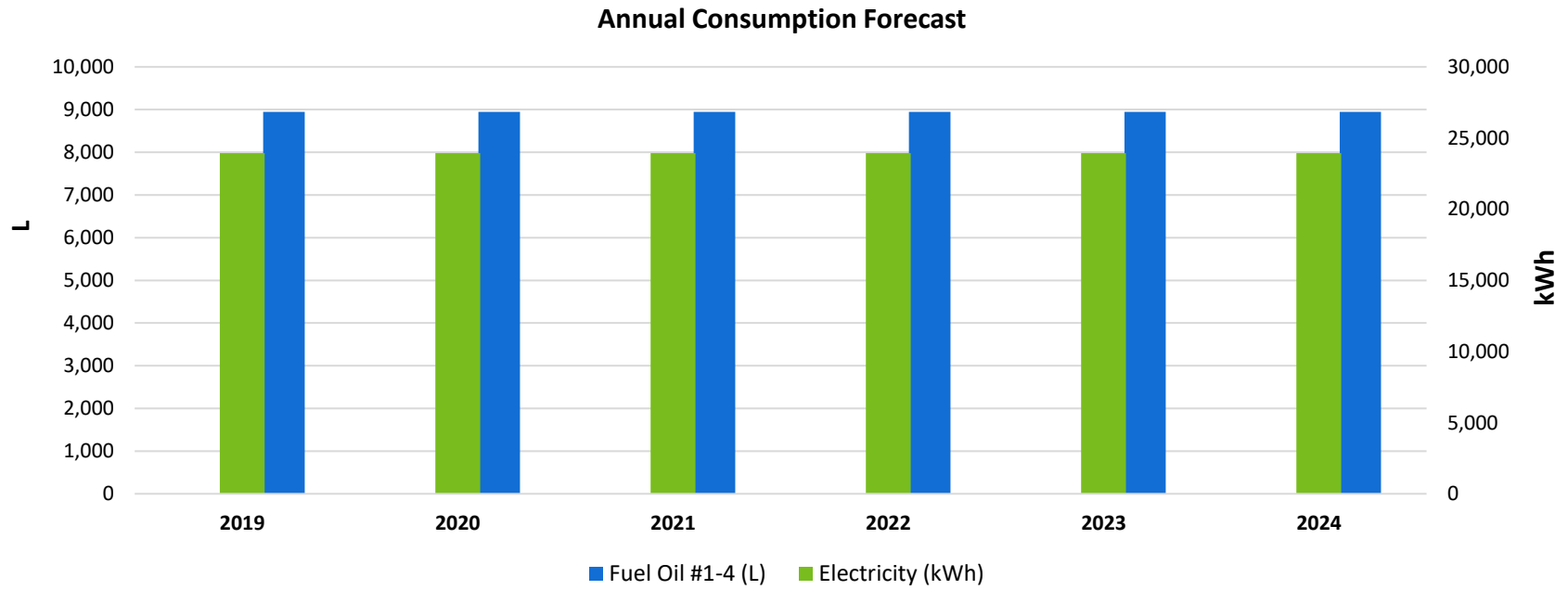


4.17.3 Utility Consumption Forecast

There are limited opportunities to reduce consumption at the Kendal Community Centre. We have forecasted electricity and natural gas use based on the 2018 performance year. The forecasted utility consumption is tabulated below. Our goal will be to maintain 2018 consumption levels and review energy conservation opportunities as they present themselves.

	Annual Consumption Forecast (units)											
	2019		2020		2021		2022		2023		2024	
	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change
Electricity (kWh)	23,946	0%	23,946	0%	23,946	0%	23,946	0%	23,946	0%	23,946	0%
Fuel Oil (L)	8,947	0%	8,947	0%	8,947	0%	8,947	0%	8,947	0%	8,947	0%

Table 81 Forecasted Annual Consumption

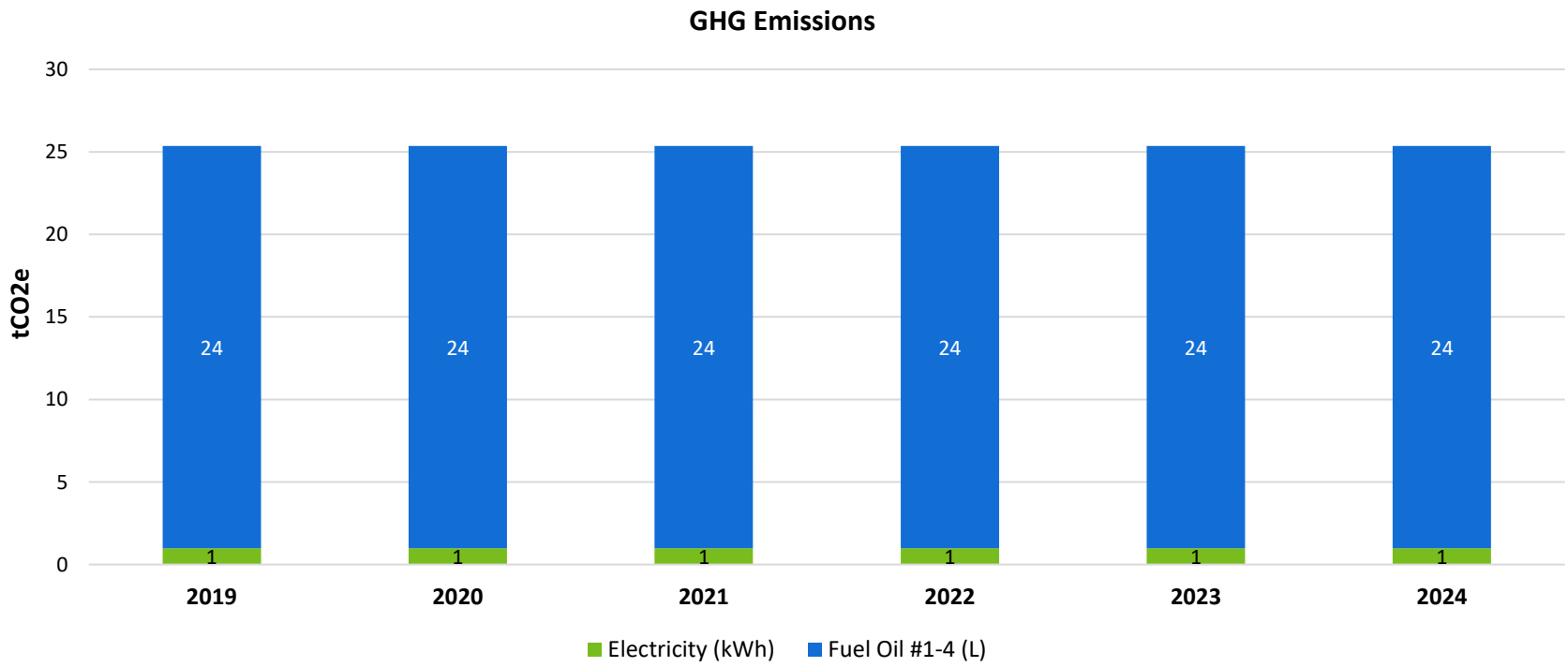


4.17.4 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	1	1	1	1	1	1
Fuel Oil	24	24	24	24	24	24
Total Scope 1 & 2 Emissions	**25**	**25**	**25**	**25**	**25**	**25**
Reduction from the Baseline Year (2018)	0%	0%	0%	0%	0%	0%

Table 82 Forecasted Annual GHG Emissions



4.18 Municipal Administrative Centre

This centre is considered Clarington's Town Hall and houses meeting rooms, administrative offices and municipal council chambers. Facility also includes a public library.

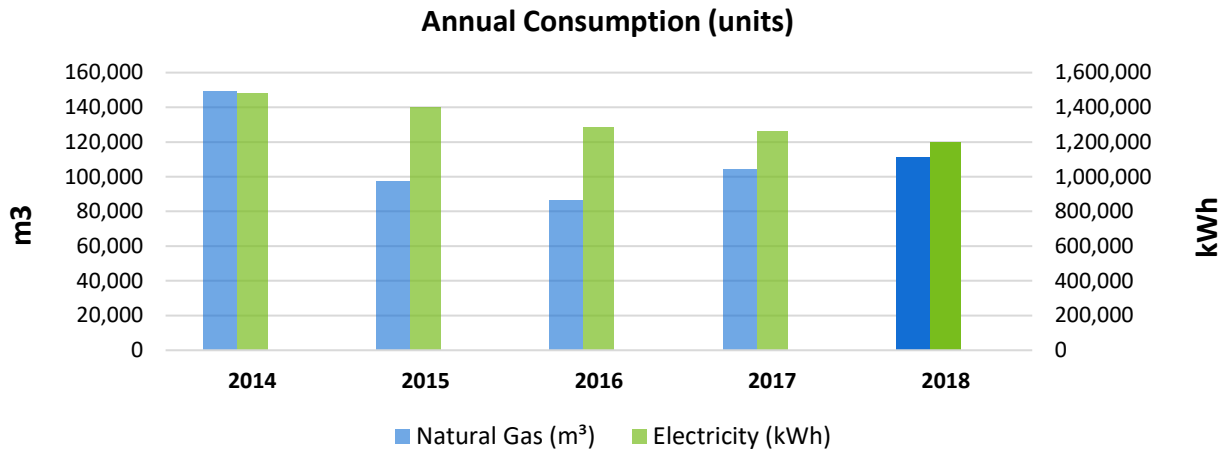
Facility Information	
Facility Name	**Municipal Administrative Centre**
Address	40 Temperance Street, Bowmanville, ON
Gross Area (Sq. Ft)	88,000
Type of Operation	Administrative offices and related facilities, including municipal council chambers
Average Operational Hours Per Week	40

4.18.1 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	1,483,483	1,402,826	1,283,109	1,260,508	1,199,920
Natural Gas (m³)	149,546	97,293	86,284	104,564	111,071

Table 83 Annual Consumption Summary

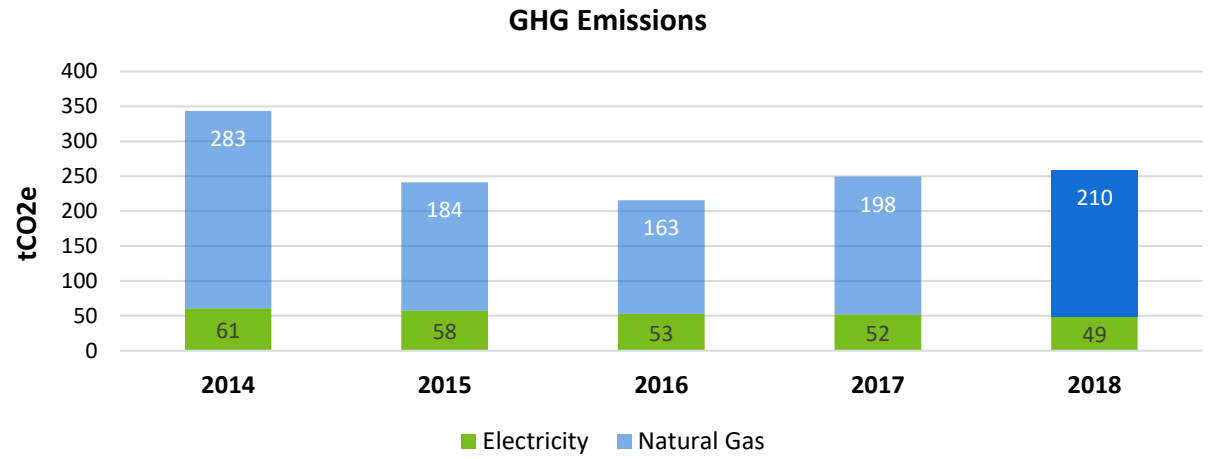


4.18.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	61	58	53	52	49
Natural Gas	283	184	163	198	210
Totals	**343**	**241**	**216**	**249**	**259**

Table 84 Annual GHG Emissions Analysis



4.18.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
Lighting Retrofit	Electricity	$12,800	155,500	0	0.68	2019
Totals		**$12,800**	**155,500**	**0**		

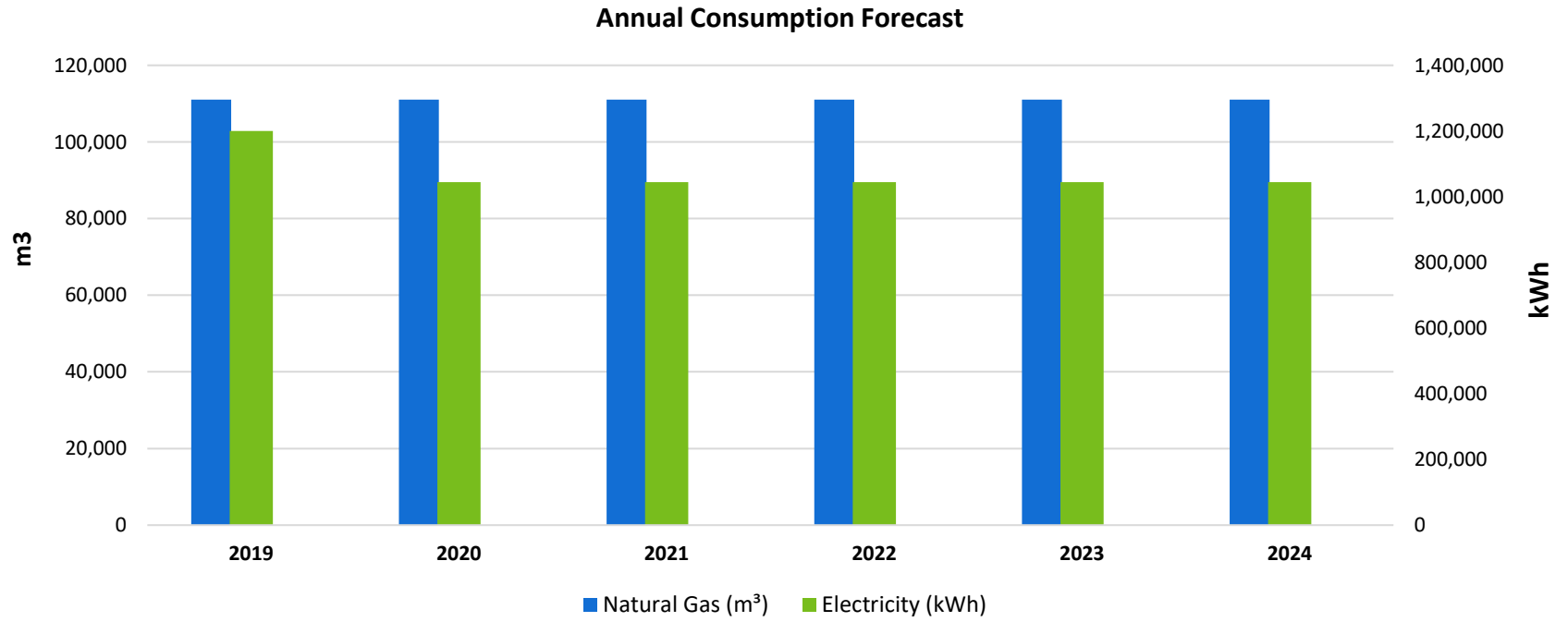
Table 85 Proposed Energy Conservation Initiatives

4.18.4 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)	1,199,920	0%	1,044,420	13%	1,044,420	13%	1,044,420	13%	1,044,420	13%	1,044,420	13%
Natural Gas (m^3)	111,071	0%	111,071	0%	111,071	0%	111,071	0%	111,071	0%	111,071	0%

Table 86 Forecasted Annual Consumption

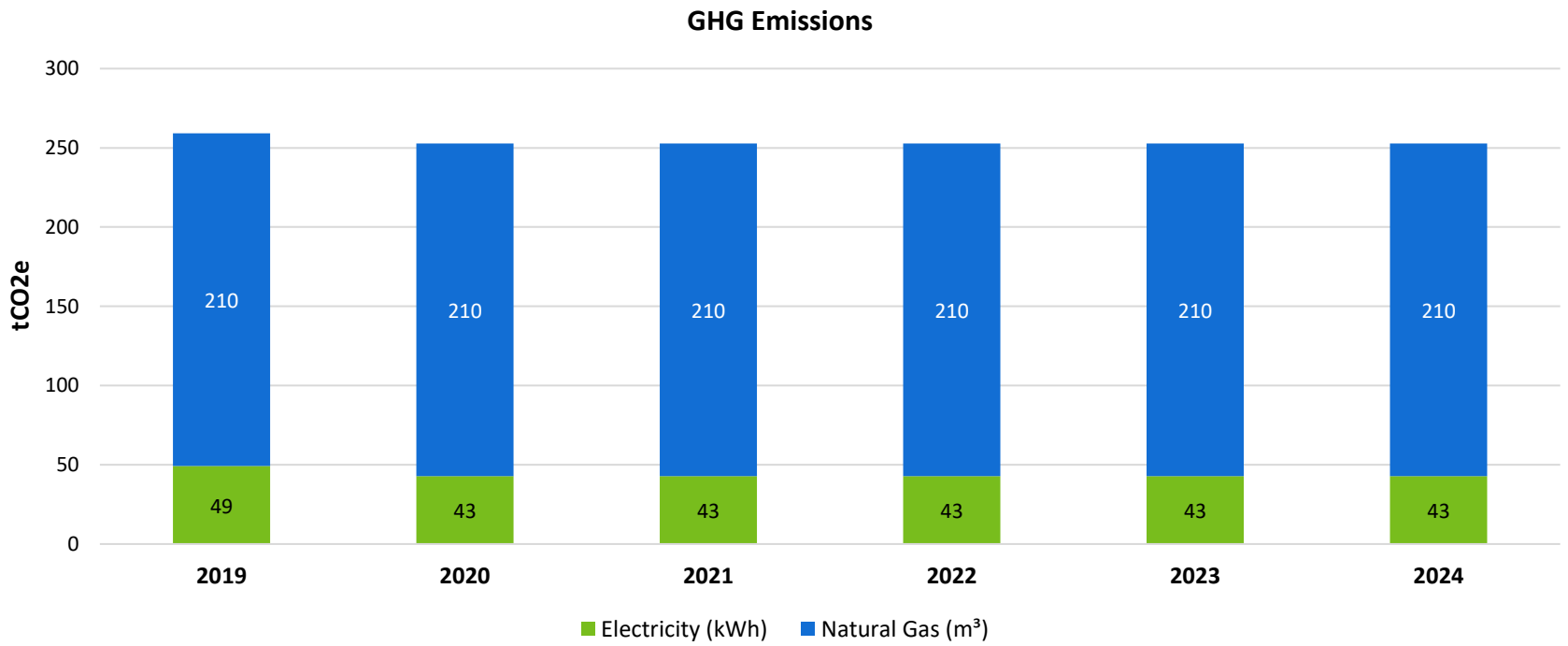


4.18.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	49	43	43	43	43	43
Natural Gas	210	210	210	210	210	210
Total Scope 1 & 2 Emissions	**259**	**253**	**253**	**253**	**253**	**253**
Reduction from the Baseline Year (2018)	**0%**	**2%**	**2%**	**2%**	**2%**	**2%**

Table 87 Forecasted Annual GHG Emissions



4.19 Newcastle Branch Library

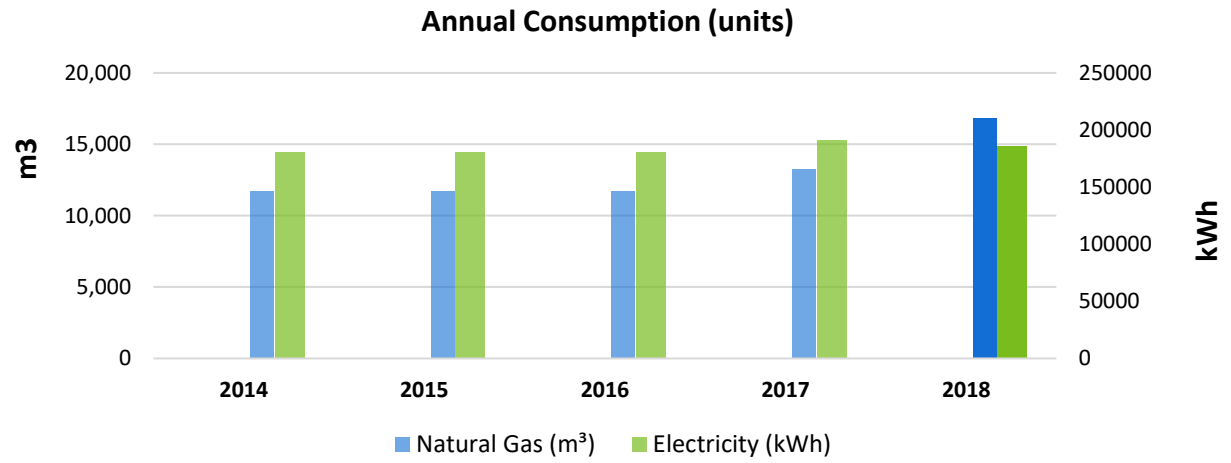
Facility Information	
Facility Name	**Newcastle Branch Library**
Address	150 King Avenue East, Newcastle, ON
Gross Area (Sq. Ft)	9,710
Type of Operation	Library
Average Operational Hours Per Week	60

4.19.1 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	181,037	181,037	181,037	191,203	186,241
Natural Gas (m³)	11,718	11,718	11,718	13,252	16,871

Table 88 Annual Consumption Summary

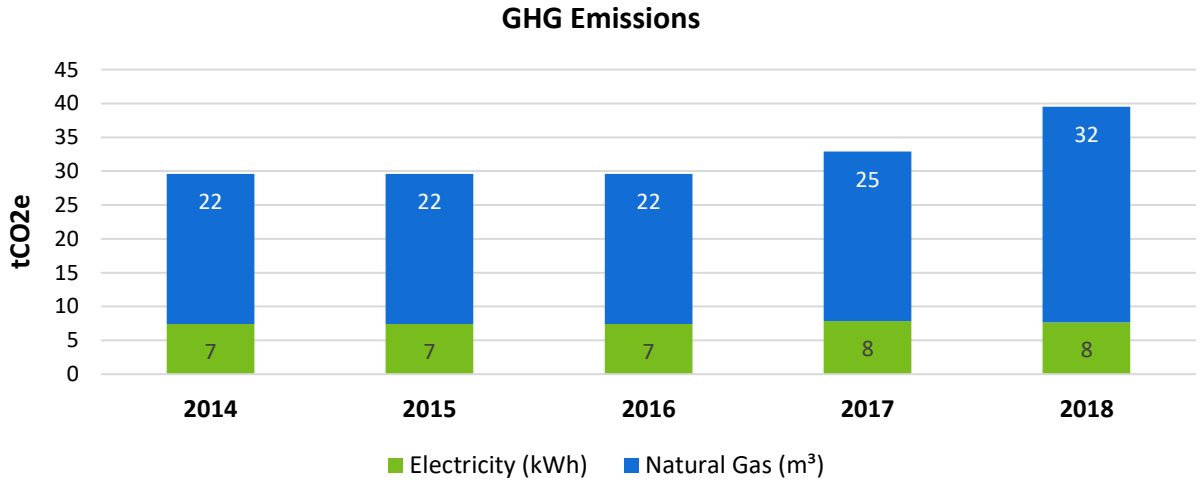


4.19.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	7	7	7	8	8
Natural Gas	22	22	22	25	32
Totals	**30**	**30**	**30**	**33**	**40**

Table 89 Annual GHG Emissions Analysis



4.19.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
LED Lighting Retrofit	Electricity	$29,130	18,624	0	12.26	2023
Heating, Ventilation, and Air Condition (HVAC) System - Scheduling / Setback	Electricity & Natural Gas	$10,000	6,208	1,350	9.05	2024
Totals		**$39,130**	**24,832**	**1,350**		

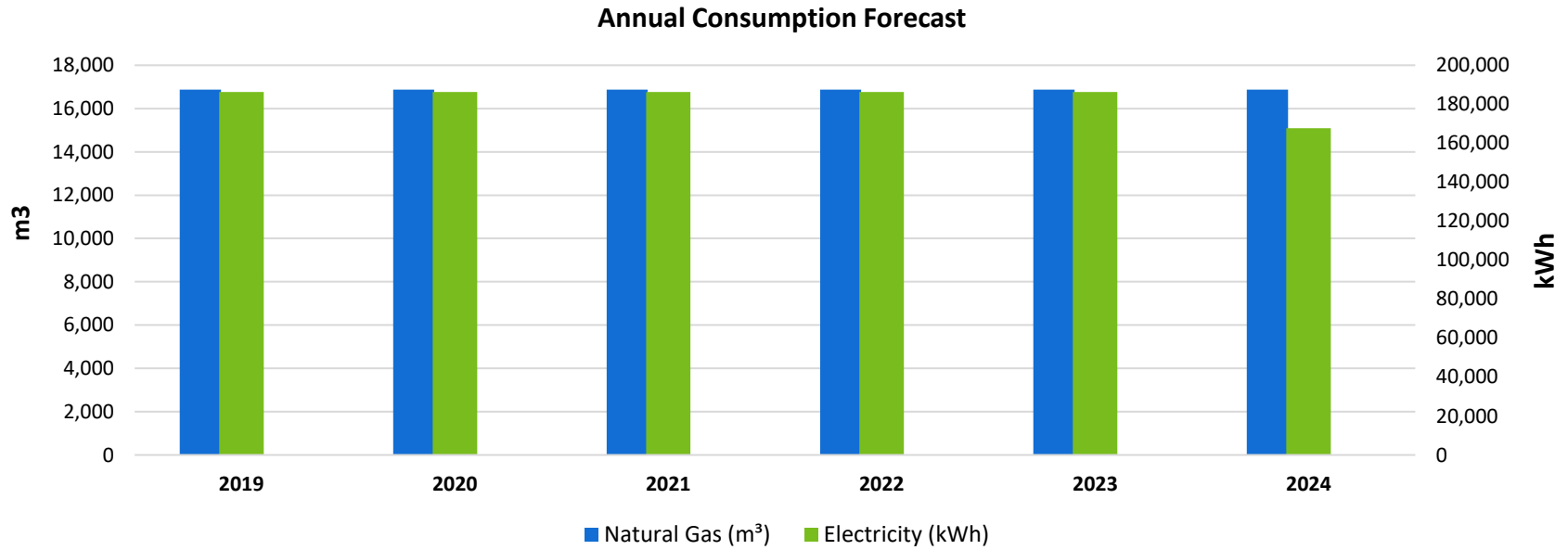
Table 90 Proposed Energy Conservation Initiatives

4.19.4 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)	186,241	0%	186,241	0%	186,241	0%	186,241	0%	186,241	0%	167,617	10%
Natural Gas (m^3)	16,871	0%	16,871	0%	16,871	0%	16,871	0%	16,871	0%	16,871	0%

Table 91 Forecasted Annual Consumption

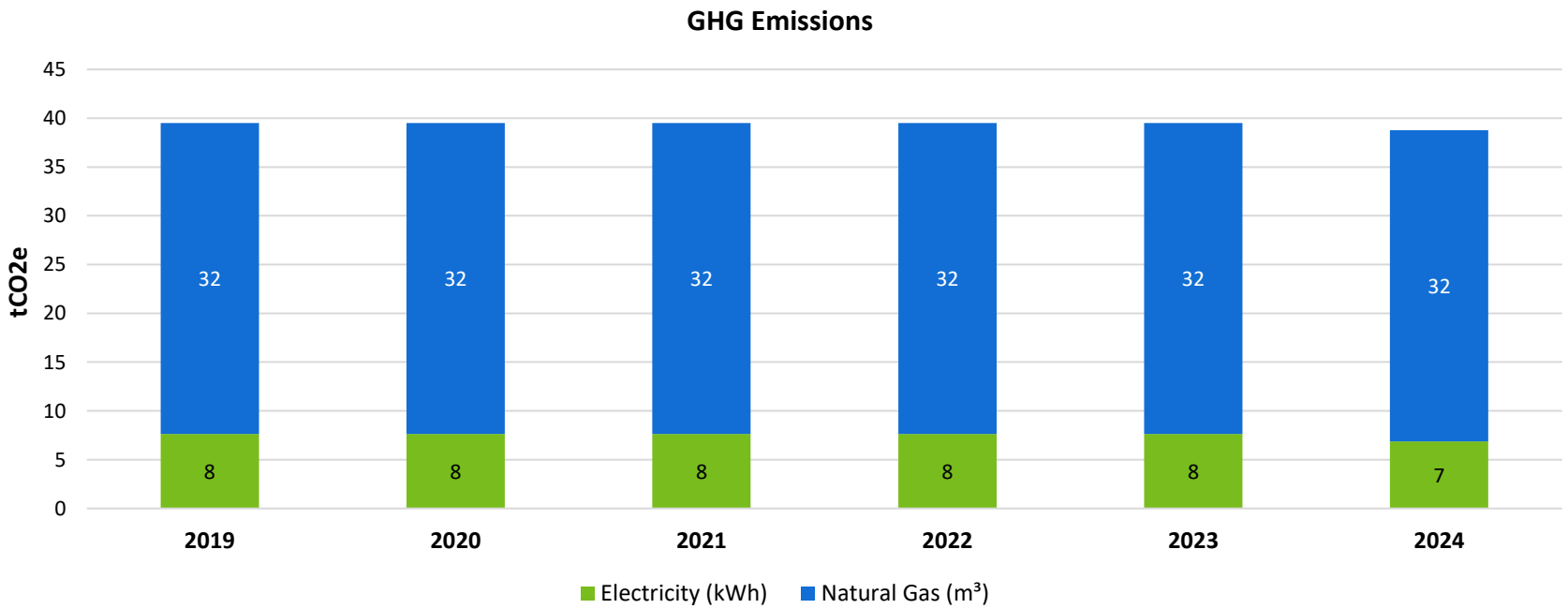


4.19.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	8	8	8	8	8	7
Natural Gas	32	32	32	32	32	32
Total Scope 1 & 2 Emissions	**40**	**40**	**40**	**40**	**40**	**39**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**0%**	**0%**	**0%**	**2%**

Table 92 Forecasted Annual GHG Emissions



4.20 Newcastle Storage (prev. FS#2)

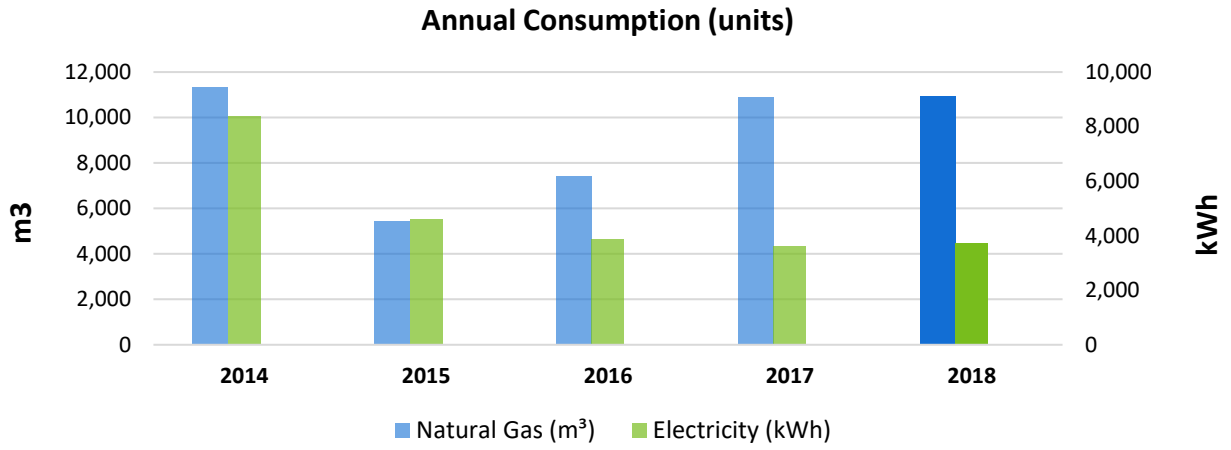
Facility Information	
Facility Name	**Newcastle Storage (prev. FS#2)**
Address	247 King Avenue, Newcastle, ON
Gross Area (Sq. Ft)	6,847
Type of Operation	Storage Facility
Average Operational Hours Per Week	5

4.20.1 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	8,384	4,597	3,865	3,625	3,714
Natural Gas (m^3)	11,338	5,442	7,411	10,910	10,935

Table 93 Annual Consumption Summary

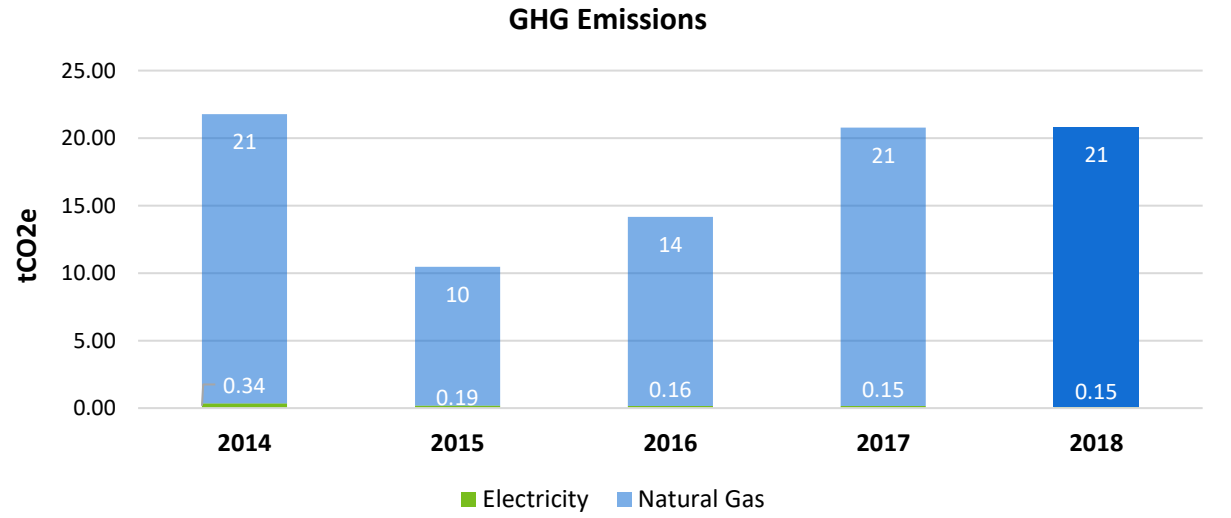


4.20.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	0.34	0.19	0.16	0.15	0.15
Natural Gas	21	10	14	21	21
Totals	**22**	**10**	**14**	**21**	**21**

Table 94 Annual GHG Emissions Analysis

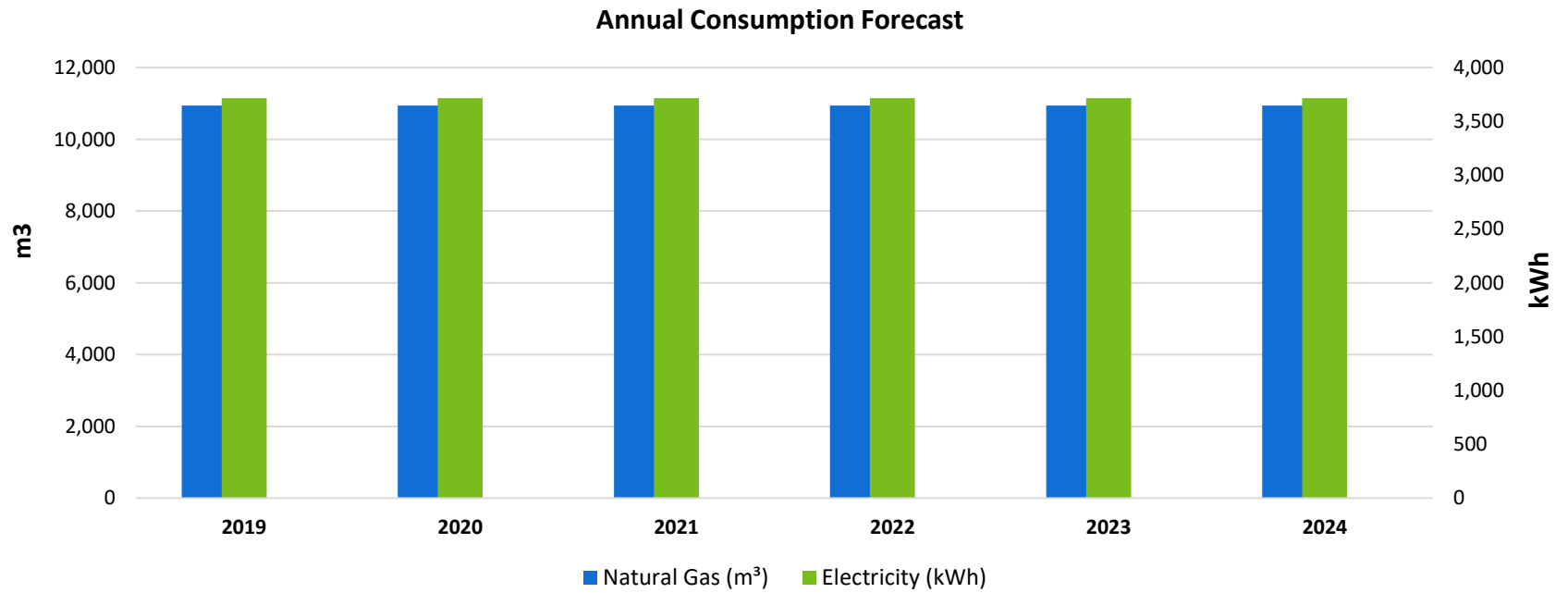


4.20.3 Utility Consumption Forecast

There are limited opportunities to reduce consumption at the Newcastle Storage Depot. We have forecasted electricity and natural gas use based on the 2018 performance year. The forecasted utility consumption is tabulated below. Our goal will be to maintain 2018 consumption levels and review energy conservation opportunities as they present themselves.

	Annual Consumption Forecast (units)											
	2019		2020		2021		2022		2023		2024	
	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change
Electricity (kWh)	3,714	0%	3,714	0%	3,714	0%	3,714	0%	3,714	0%	3,714	0%
Natural Gas (m^3)	10,935	0%	10,935	0%	10,935	0%	10,935	0%	10,935	0%	10,935	0%

Table 95 Forecasted Annual Consumption

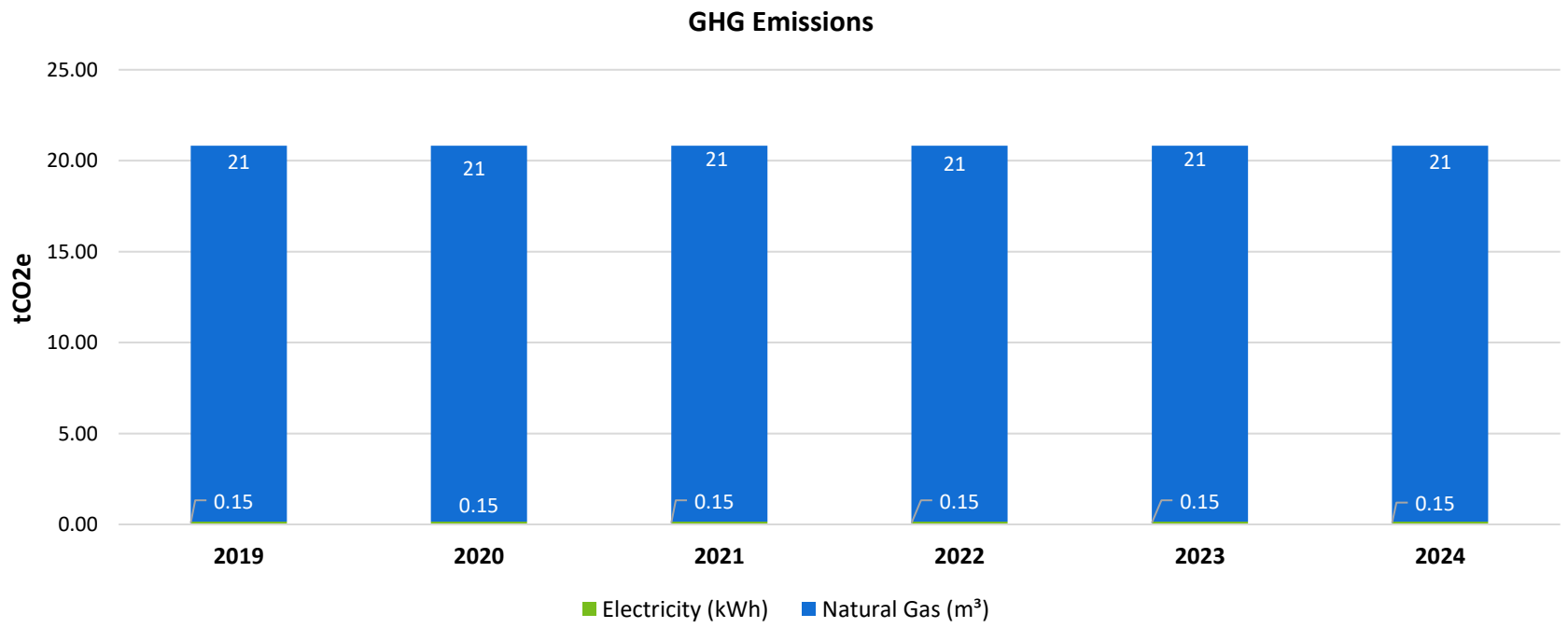


4.20.4 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	0.15	0.15	0.15	0.15	0.15	0.15
Natural Gas	21	21	21	21	21	21
Total Scope 1 & 2 Emissions	**21**	**21**	**21**	**21**	**21**	**21**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**

Table 96 Forecasted Annual GHG Emissions



4.21 Orono Library

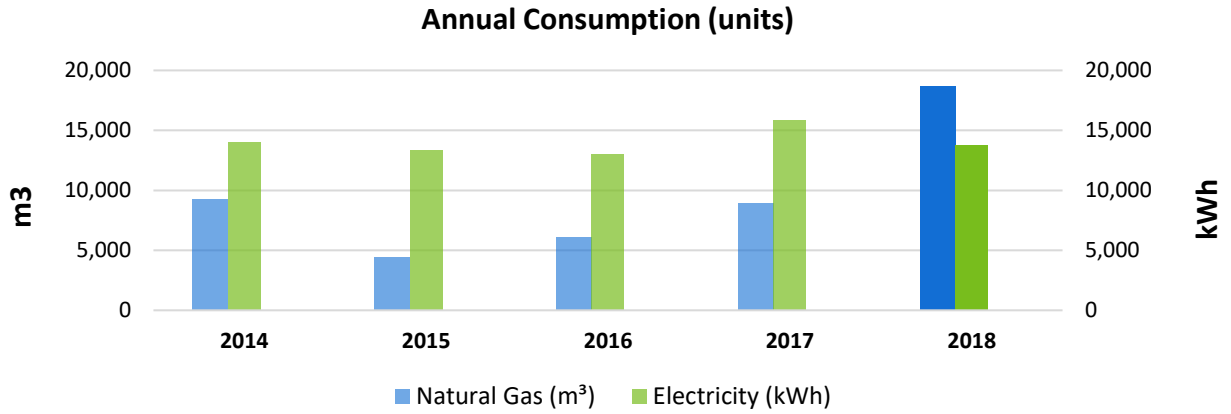
Facility Information	
Facility Name	**Orono Library**
Address	127 Church Street, Orono, ON
Gross Area (Sq. Ft)	3,958
Type of Operation	Library
Average Operational Hours Per Week	36

4.21.1 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	13,987	13,361	13,003	15,825	13,805
Natural Gas (m^3)	9,278	4,453	6,065	8,928	18,677

Table 97 Annual Consumption Summary

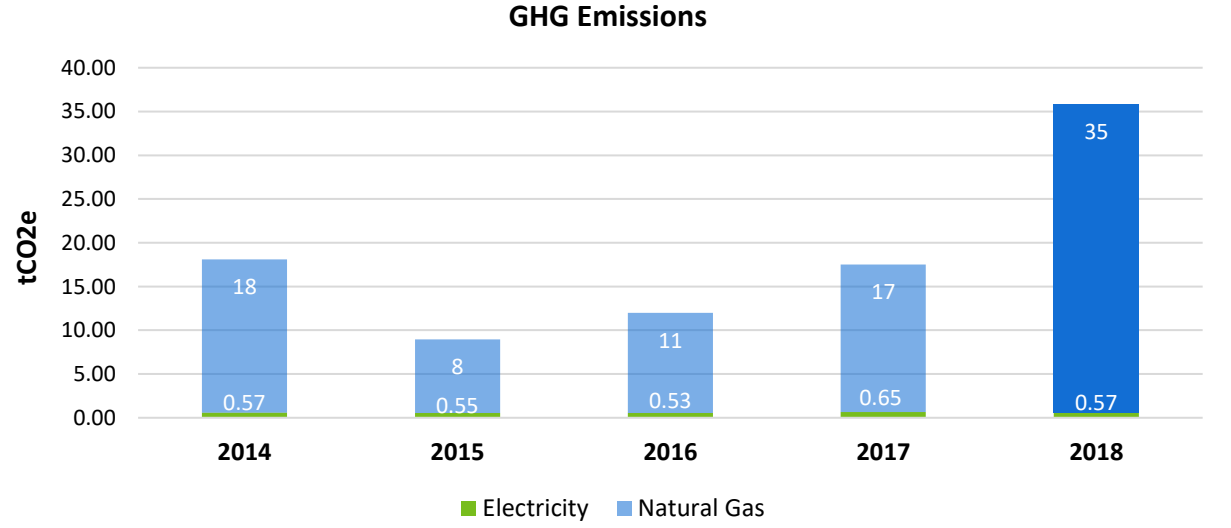


4.21.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	0.57	0.55	0.53	0.65	0.57
Natural Gas	18	8	11	17	35
Totals	**18**	**9**	**12**	**18**	**36**

Table 98 Annual GHG Emissions Analysis



4.21.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
Heating, Ventilation, and Air Condition (HVAC) System - Scheduling / Setback	Natural Gas	$750	0	587	5.88	2019
Insulate Hot Water / Domestic Hot Water (DWH) Piping	Natural Gas	$1,183	0	530	10.28	2019
Totals		**$1,933**	**0**	**1,117**		

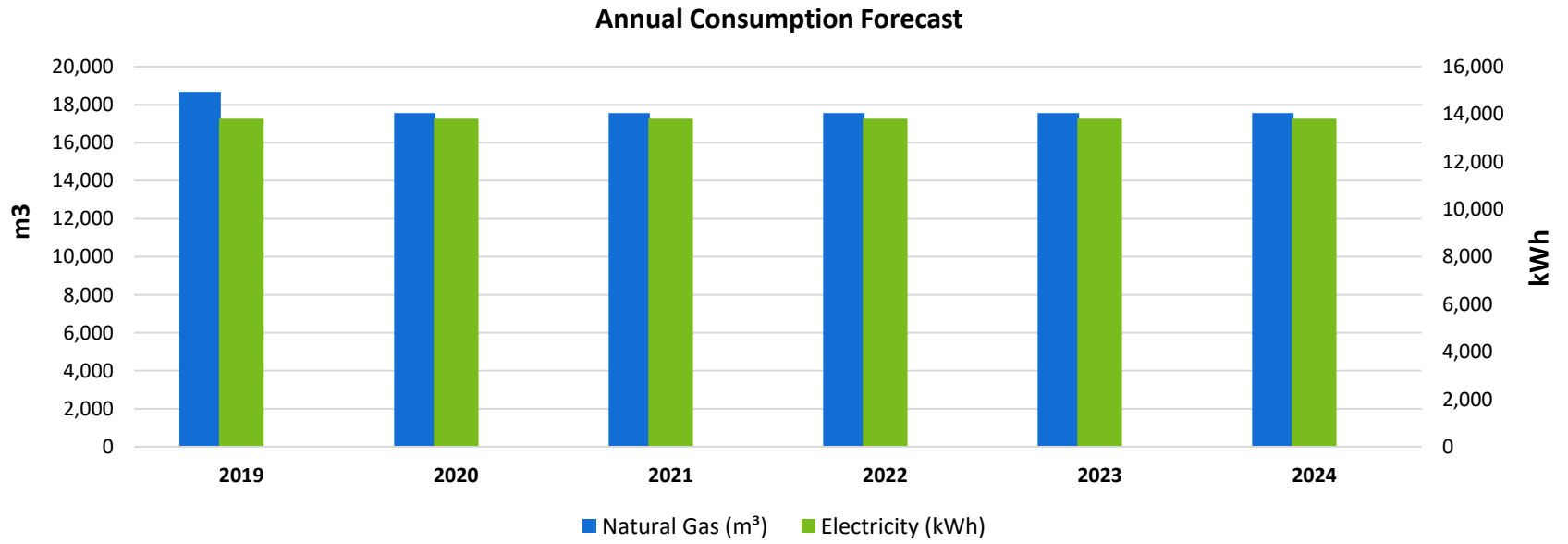
Table 99 Proposed Energy Conservation Initiatives

4.21.4 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)	13,805	0%	13,805	0%	13,805	0%	13,805	0%	13,805	0%	13,805	0%
Natural Gas (m^3)	18,677	0%	17,560	6%	17,560	6%	17,560	6%	17,560	6%	17,560	6%

Table 100 Forecasted Annual Consumption

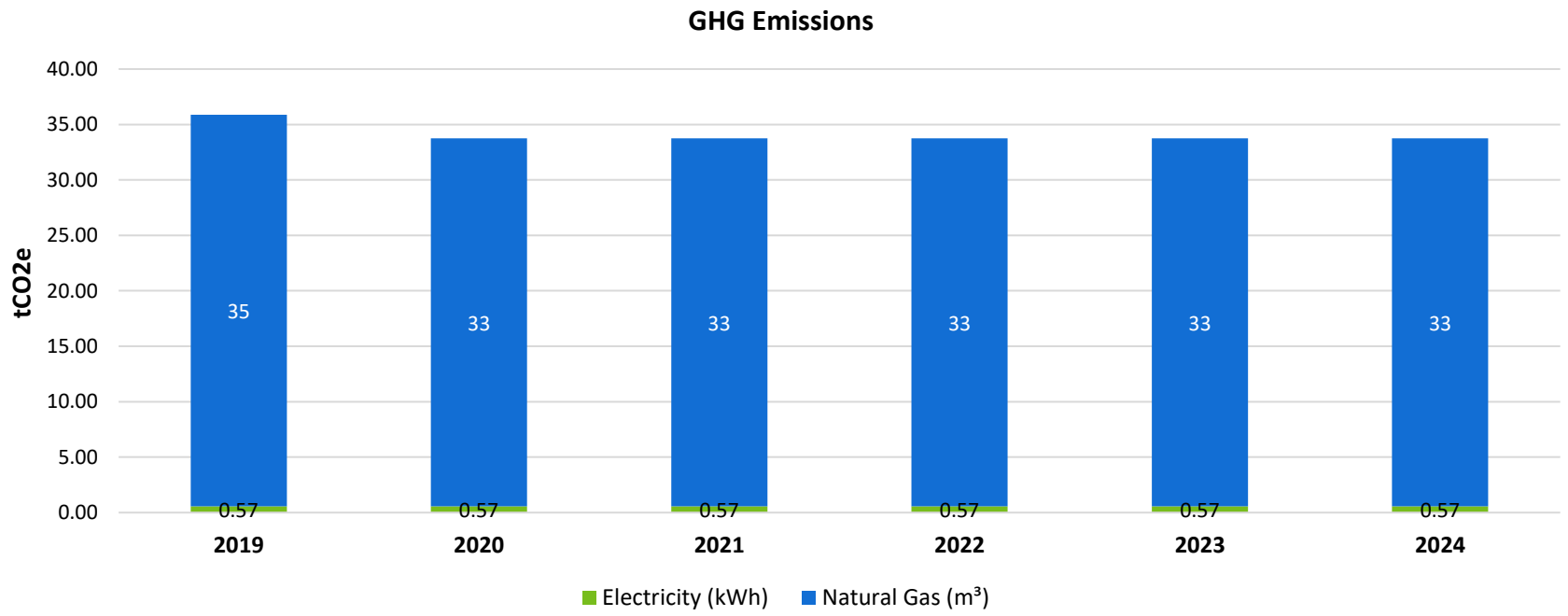


4.21.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	0.57	0.57	0.57	0.57	0.57	0.57
Natural Gas	35	33	33	33	33	33
Total Scope 1 & 2 Emissions	**36**	**34**	**34**	**34**	**34**	**34**
Reduction from the Baseline Year (2018)	**0%**	**6%**	**6%**	**6%**	**6%**	**6%**

Table 101 Forecasted Annual GHG Emissions



4.22 Orono Operations Depot

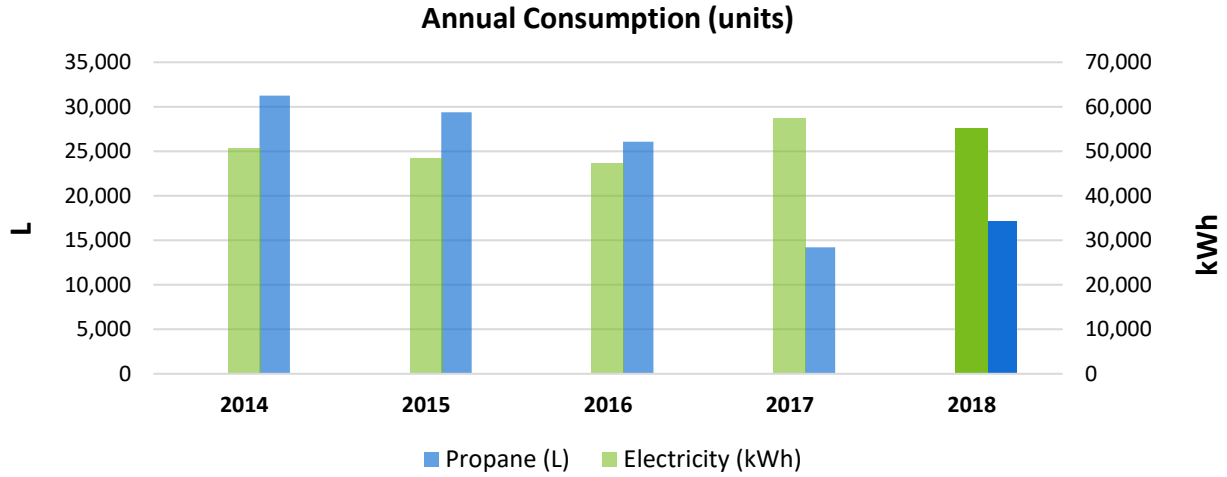
Facility Information	
Facility Name	**Orono Operations Depot**
Address	3585 Taunton Road, Clarington, ON
Gross Area (Sq. Ft)	5,122
Type of Operation	Storage facilities where equipment or vehicles are maintained, repaired or stored
Average Operational Hours Per Week	40

4.22.1 Utility Consumption Analysis

Utilities to the site are electricity and propane. 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	50,768	48,495	47,196	57,440	55,240
Propane (L)	31,250	29,365	26,085	14,209	17,082

Table 102 Annual Consumption Summary

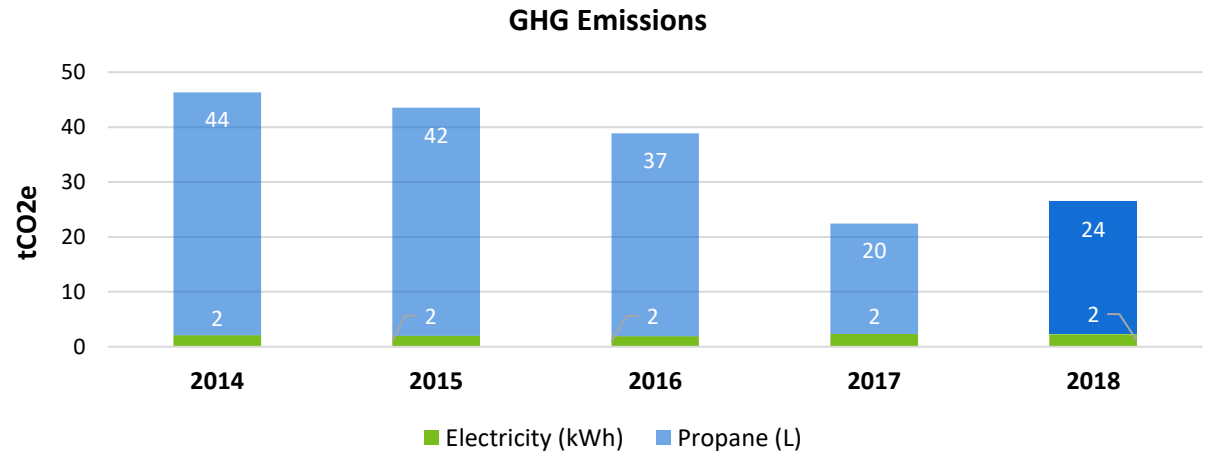


4.22.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	2	2	2	2	2
Propane	44	42	37	20	24
Totals	**46**	**44**	**39**	**22**	**26**

Table 103 Annual GHG Emissions Analysis

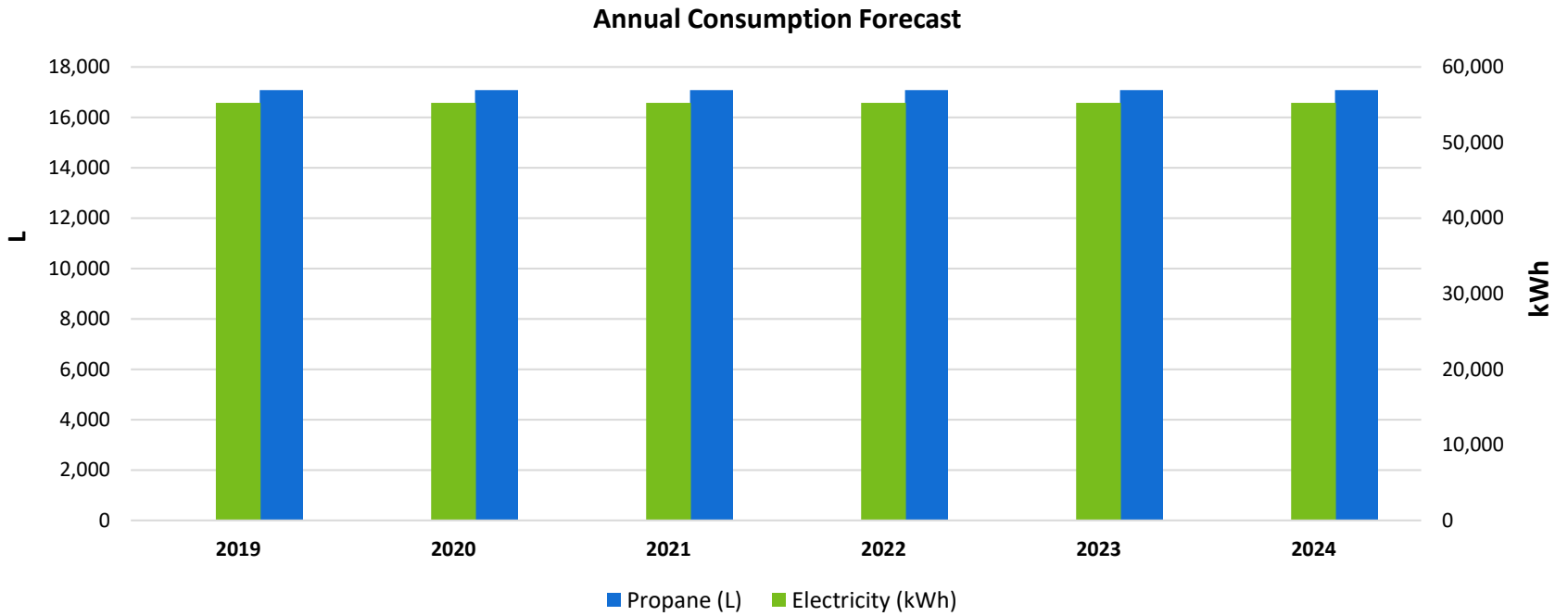


4.22.3 Utility Consumption Forecast

There are limited opportunities to reduce consumption at the Orono Operations Depot. We have forecasted electricity and natural gas use based on the 2018 performance year. The forecasted utility consumption is tabulated below. Our goal will be to maintain 2018 consumption levels and review energy conservation opportunities as they present themselves.

	Annual Consumption Forecast (units)											
	2019		2020		2021		2022		2023		2024	
	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change
Electricity (kWh)	55,240	0%	55,240	0%	55,240	0%	55,240	0%	55,240	0%	55,240	0%
Propane (L)	17,082	0%	17,082	0%	17,082	0%	17,082	0%	17,082	0%	17,082	0%

Table 104 Forecasted Annual Consumption

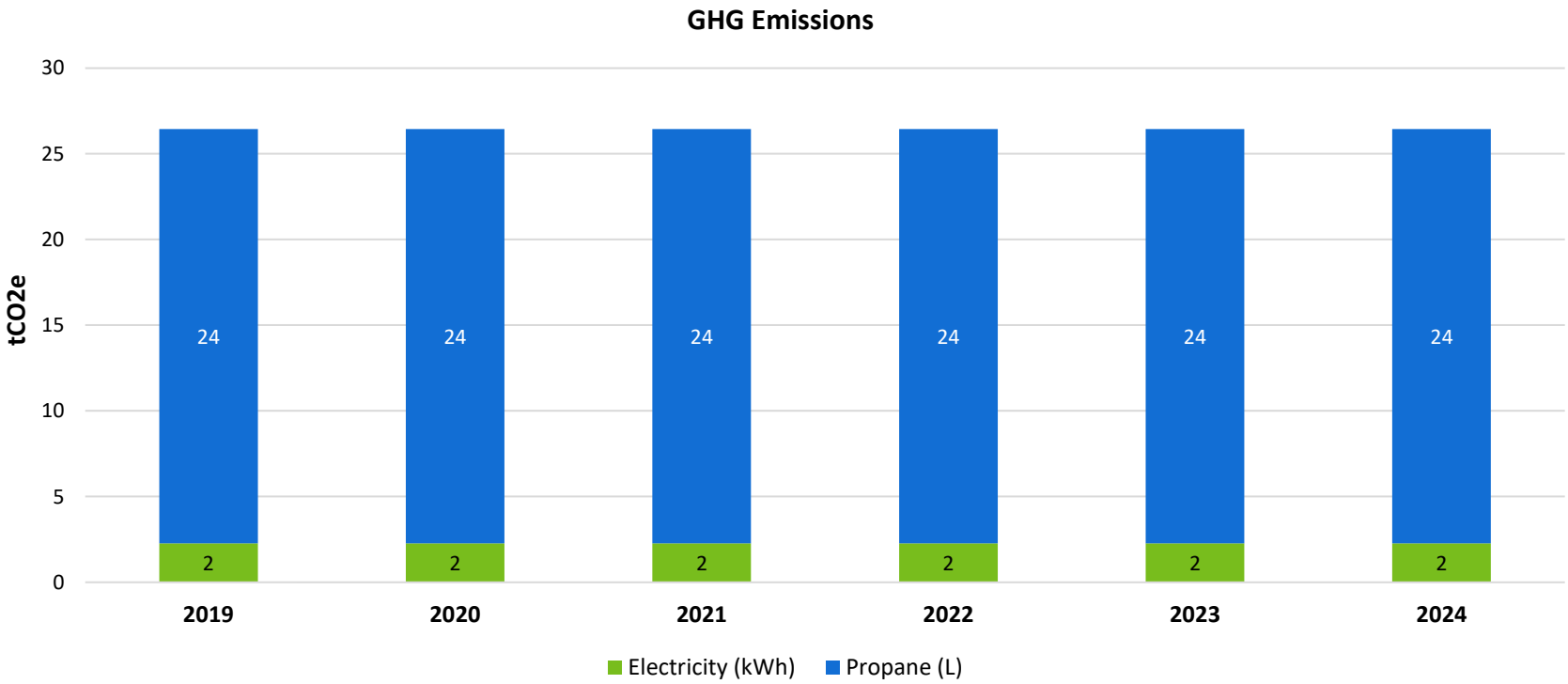


4.22.4 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	2	2	2	2	2	2
Propane	24	24	24	24	24	24
Total Scope 1 & 2 Emissions	**26**	**26**	**26**	**26**	**26**	**26**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**

Table 105 Forecasted Annual GHG Emissions



4.23 Sarah Jane Williams Heritage Centre

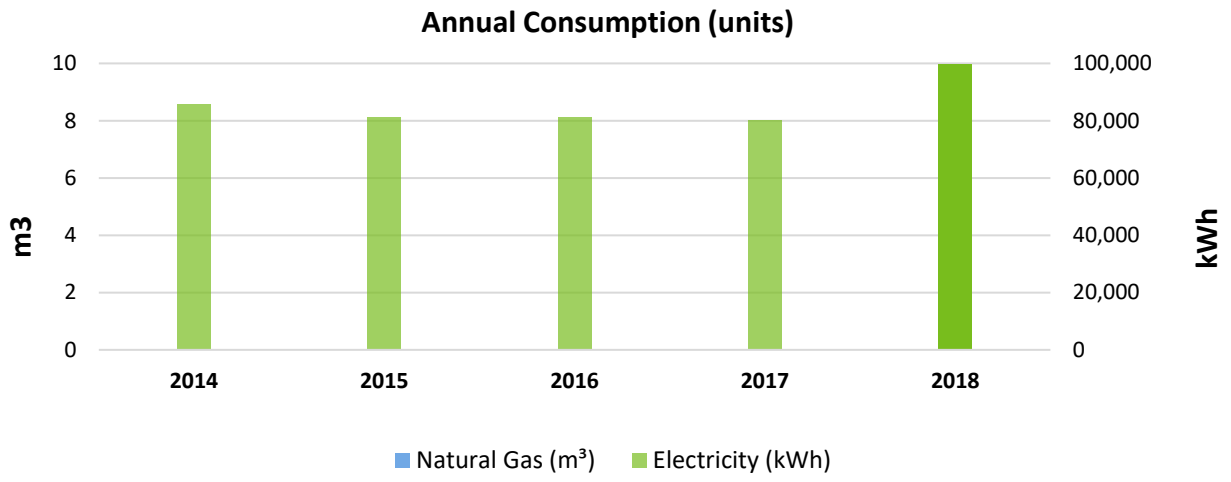
Facility Information	
Facility Name	**Sarah Jane Williams Heritage Centre**
Address	62 Temperance Street, Bowmanville, ON
Gross Area (Sq. Ft)	12,392
Type of Operation	Cultural Facility
Average Operational Hours Per Week	40

4.23.1 Utility Consumption Analysis

Utilities to the site are electricity. 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). Natural gas data for this site is currently not available and has been excluded from the report at this time.

Annual Consumption (units)					
Utility	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	85,649	81,313	81,005	80,010	99,516
Natural Gas (m³)	0	0	0	0	0

Table 106 Annual Consumption Summary

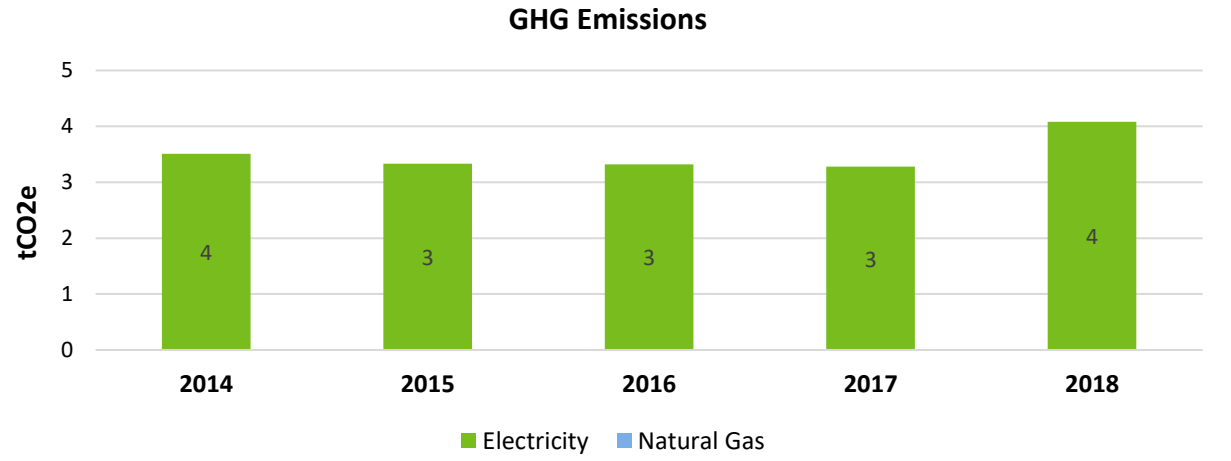


4.23.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	4	3	3	3	4
Natural Gas	0	0	0	0	0
Totals	**4**	**3**	**3**	**3**	**4**

Table 107 Annual GHG Emissions Analysis



4.23.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
***Motion Sensor Lighting Controls**	Electricity	$1,800	4,896	0	2.96	2021
Totals		**$1,800**	**4,896**	**0**		

*Lighting at this facility has already been converted to LED.

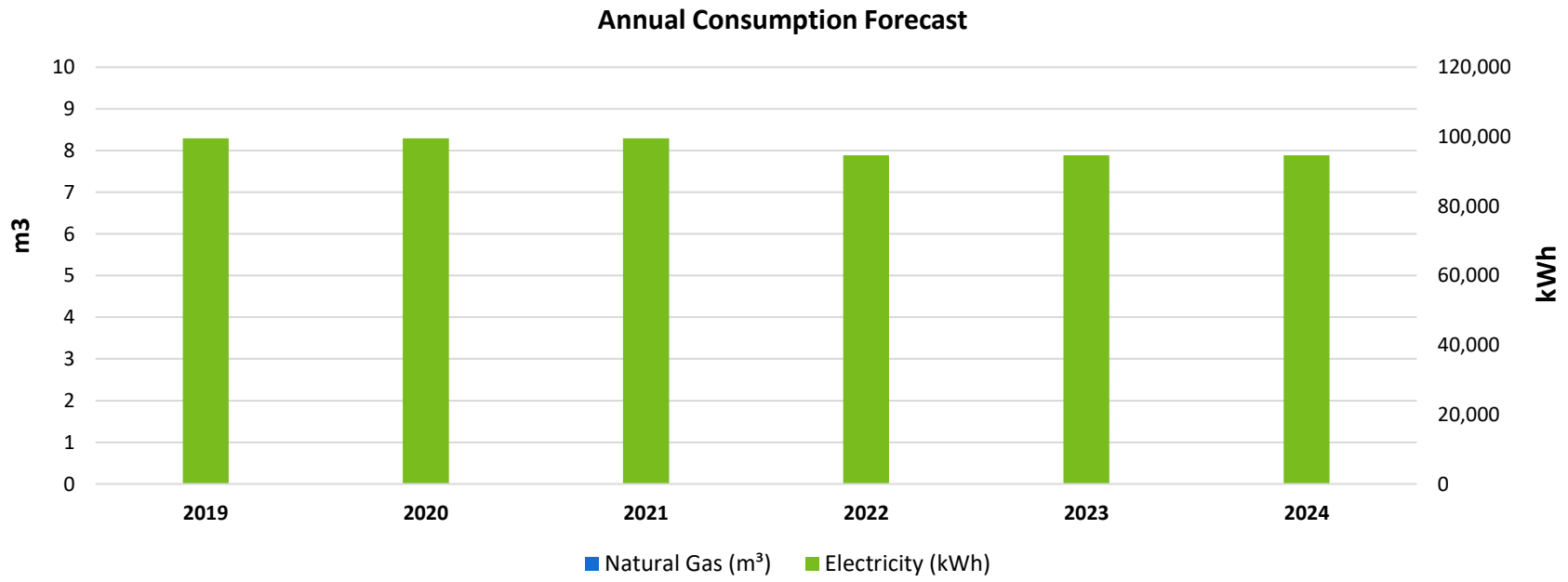
Table 108 Proposed Energy Conservation Initiatives

4.23.4 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)	99,516	0%	99,516	0%	99,516	0%	94,620	5%	94,620	5%	94,620	5%
Natural Gas (m^3)	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%

Table 109 Forecasted Annual Consumption

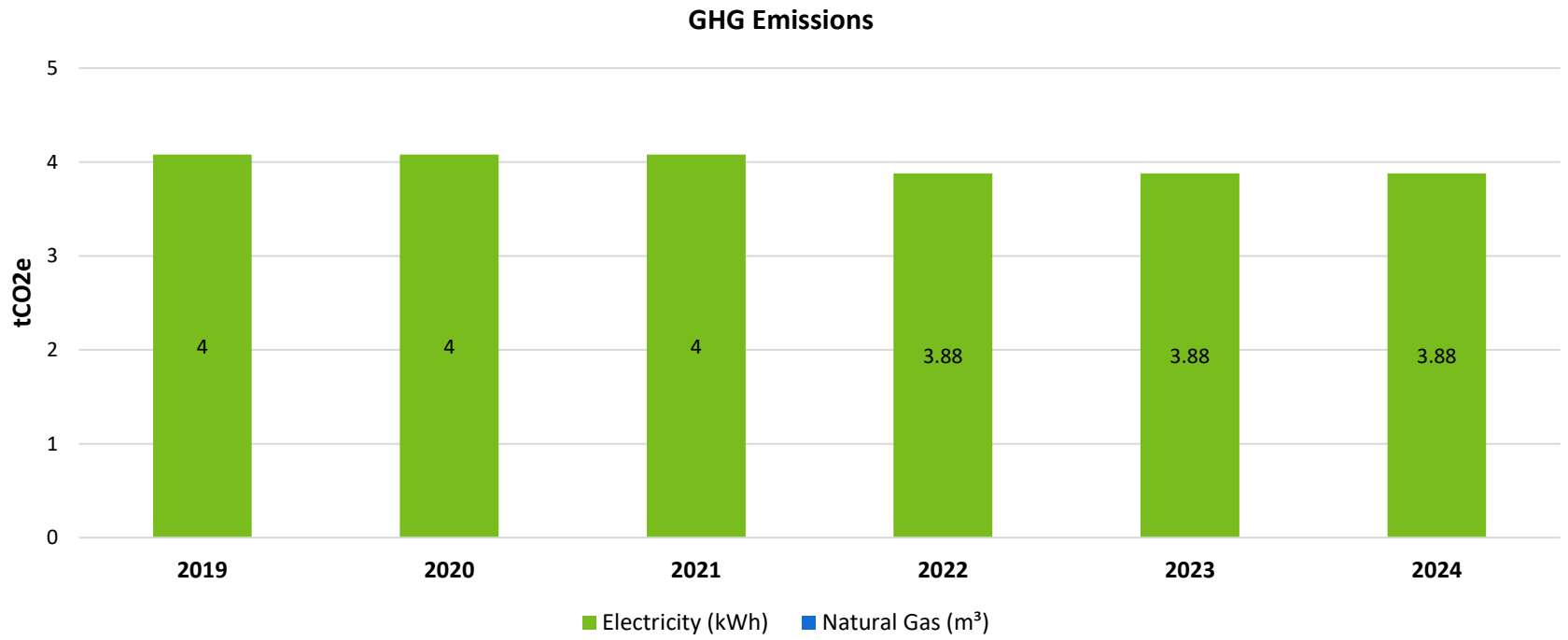


4.23.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	4	4	4	3.88	3.88	3.88
Natural Gas	0	0	0	0	0	0
Total Scope 1 & 2 Emissions	**4**	**4**	**4**	**3.88**	**3.88**	**3.88**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**0%**	**5%**	**5%**	**5%**

Table 110 Forecasted Annual GHG Emissions



4.24 South Courtice Arena

This center features a one NHL size ice pad, one Olympic size ice pad, heated viewing area, ProShop, small gymnasium and community meeting rooms.

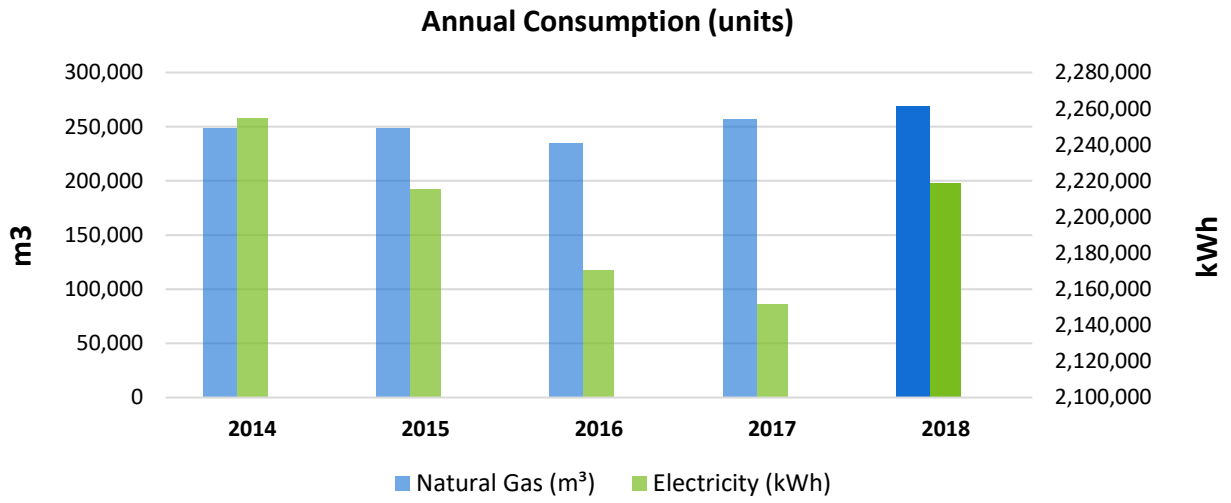
Facility Information	
Facility Name	**South Courtice Arena**
Address	1595 Prestonvale Road, Courtice, ON
Gross Area (Sq. Ft)	77,000
Type of Operation	Indoor Recreation Facility
Average Operational Hours Per Week	126

4.24.1 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).
*Ice resurfacers are fueled by natural gas and this is included in the consumption.

Annual Consumption (units)					
Utility	2014	2015	2016	2017	2018
Electricity (kWh)	2,254,591	2,215,760	2,170,842	2,151,673	2,219,040
Natural Gas (m^3)	248,790	249,219	234,719	257,506	269,460

Table 111 Annual Consumption Summary

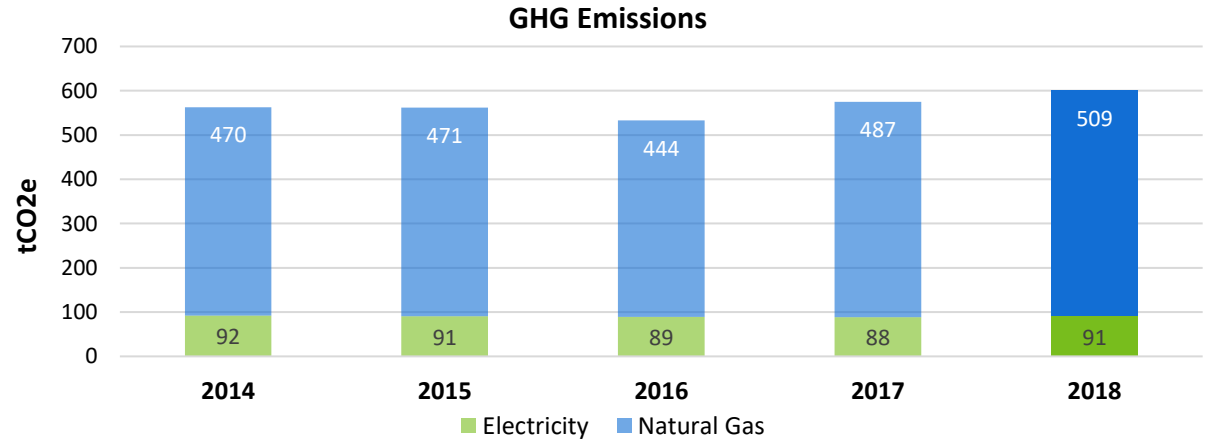


4.24.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	2014	2015	2016	2017	2018
Electricity	92	91	89	88	91
Natural Gas	470	471	444	487	509
Totals	**563**	**562**	**533**	**575**	**600**

Table 112 Annual GHG Emissions Analysis



4.24.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
Building System Recommissioning	Electricity & Natural Gas	$15,000	33,175	4,042	2.95	2022
***LED Lighting Retrofit**	Electricity	$24,000	42,500	0	4.49	2022
Totals		**$39,000**	**75,675**	**4,042**		

* The arena and interior lighting have already has been converted to LED. This measure is for the remaining areas.

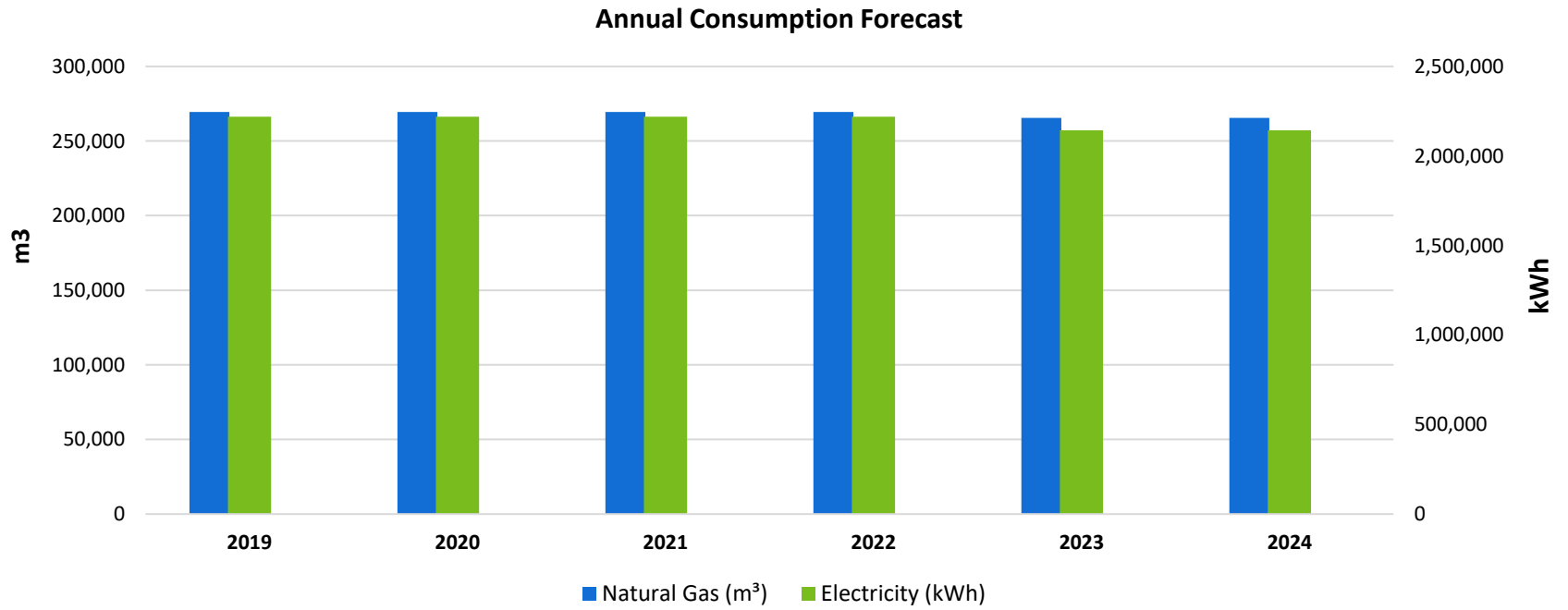
Table 113 Proposed Energy Conservation Initiatives

4.24.4 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)	2,219,040	0%	2,219,040	0%	2,219,040	0%	2,219,040	0%	2,143,143	3%	2,143,143	3%
Natural Gas (m^3)	269,460	0%	269,460	0%	269,460	0%	269,460	0%	265,418	2%	265,418	2%

Table 114 Forecasted Annual Consumption

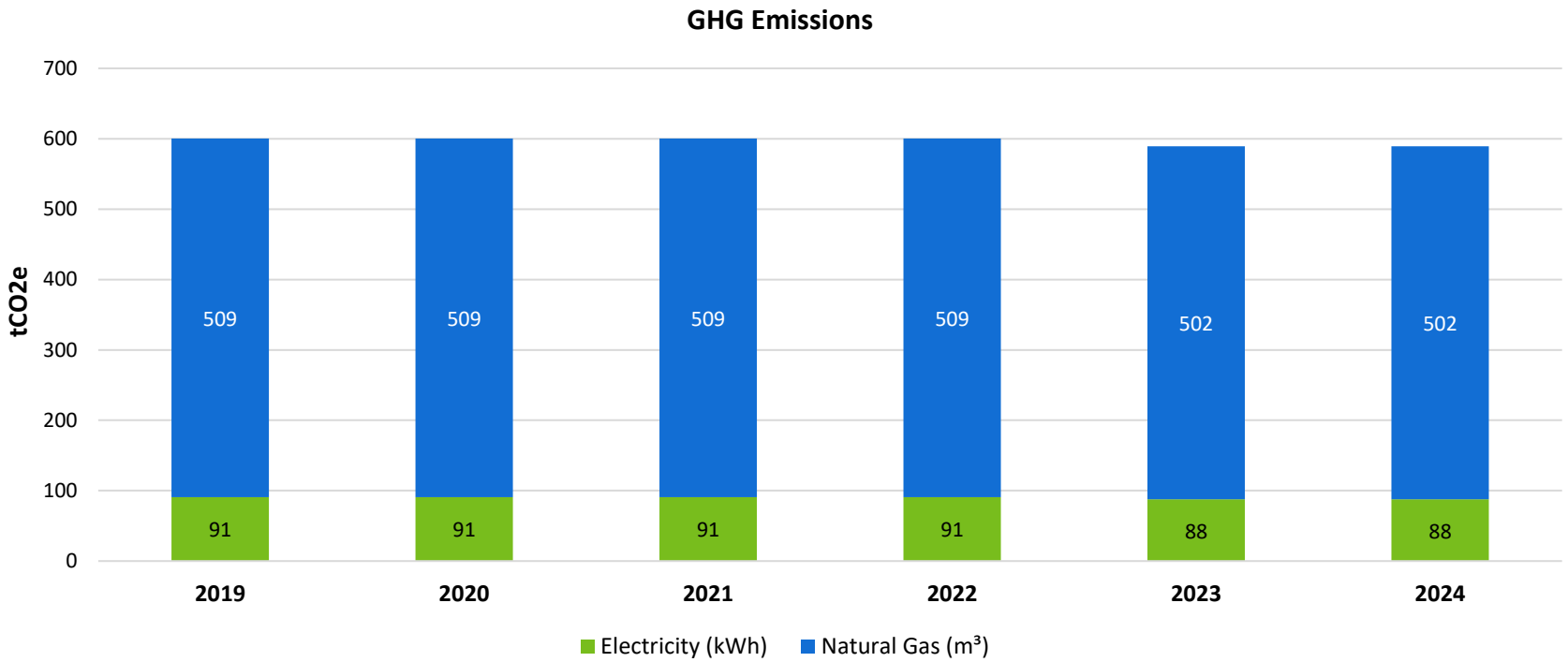


4.24.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	91	91	91	91	88	88
Natural Gas	509	509	509	509	502	502
Total Scope 1 & 2 Emissions	**600**	**600**	**600**	**600**	**590**	**590**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**0%**	**0%**	**2%**	**2%**

Table 115 Forecasted Annual GHG Emissions



4.25 Tourism Centre

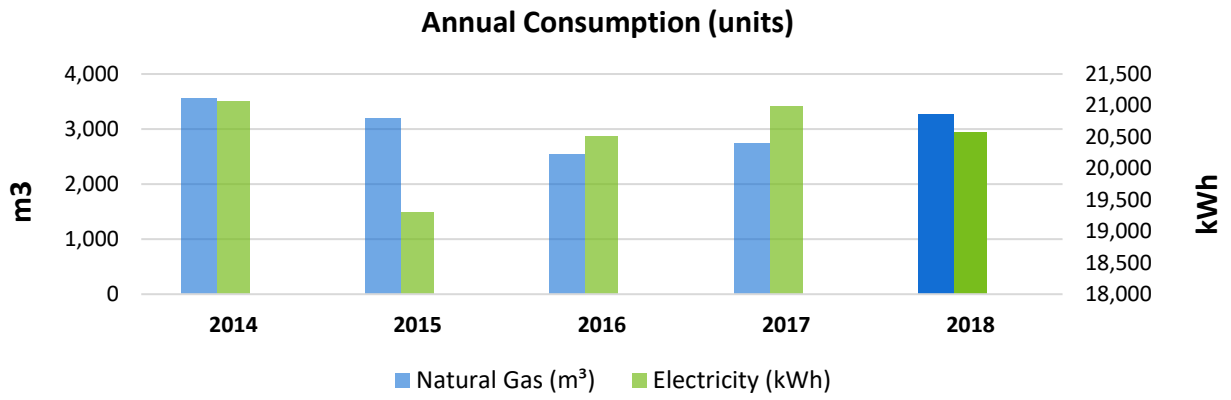
Facility Information	
Facility Name	**Tourism Centre**
Address	181 Liberty Street S, Bowmanville, ON
Gross Area (Sq. Ft)	1,097
Type of Operation	Administrative offices and related facilities
Average Operational Hours Per Week	45

4.25.1 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	21,059	19,301	20,510	20,979	20,574
Natural Gas (m³)	3,564	3,194	2,537	2,735	3,267

Table 116 Annual Consumption Summary

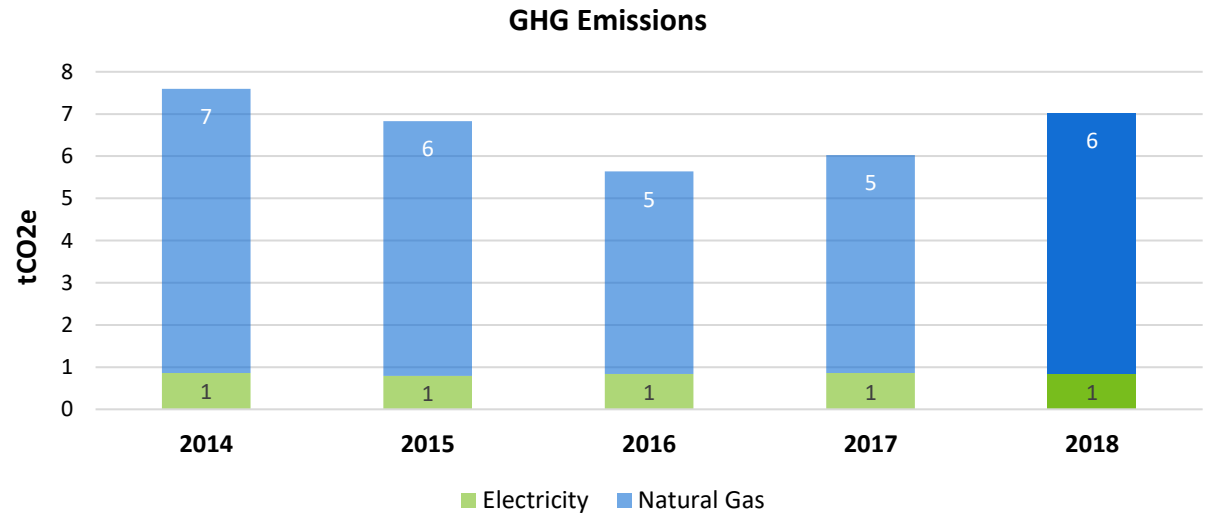


4.25.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	1	1	1	1	1
Natural Gas	7	6	5	5	6
Totals	**8**	**7**	**6**	**6**	**7**

Table 117 Annual GHG Emissions Analysis



4.25.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
Programmable Thermostat for Electric Baseboard Heaters	Electricity	$460	288	0	13.05	2020
Lighting Upgrade	Electricity	$3,291	728	0	36.44	2021
Totals		**$3,751**	**1,016**	**0**		

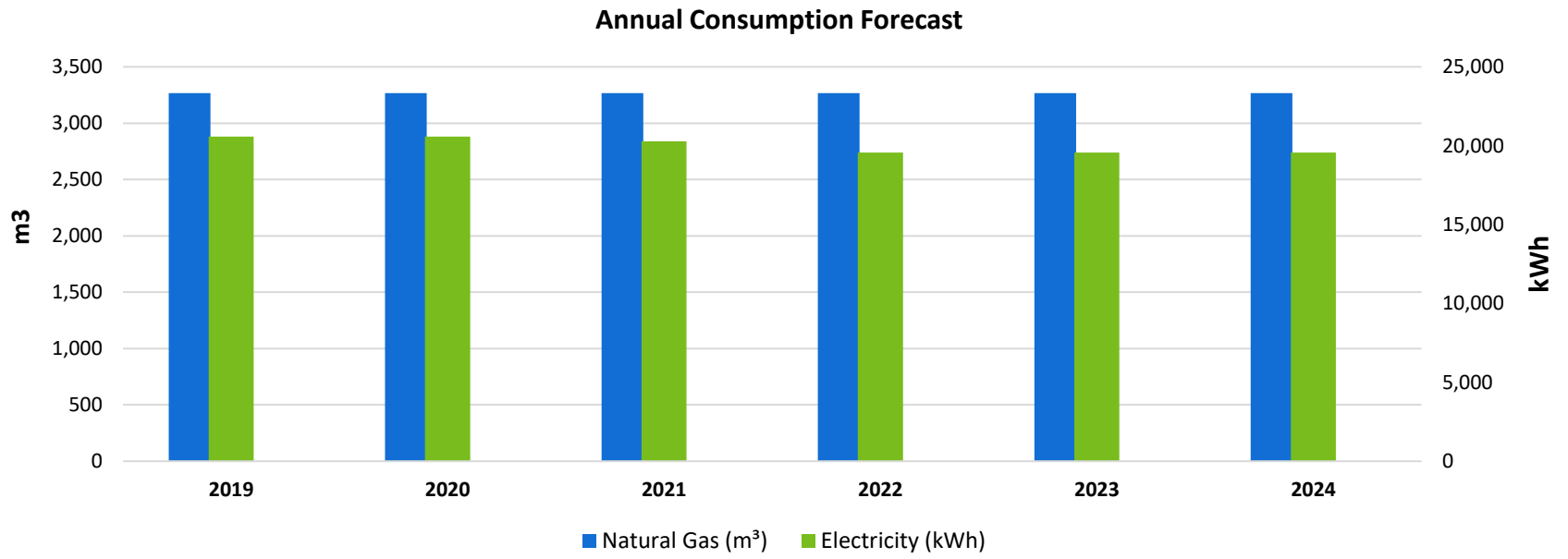
Table 118 Proposed Energy Conservation Initiatives

4.25.4 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)	20,574	0%	20,574	0%	20,286	1%	19,558	5%	19,558	5%	19,558	5%
Natural Gas (m^3)	3,267	0%	3,267	0%	3,267	0%	3,267	0%	3,267	0%	3,267	0%

Table 119 Forecasted Annual Consumption

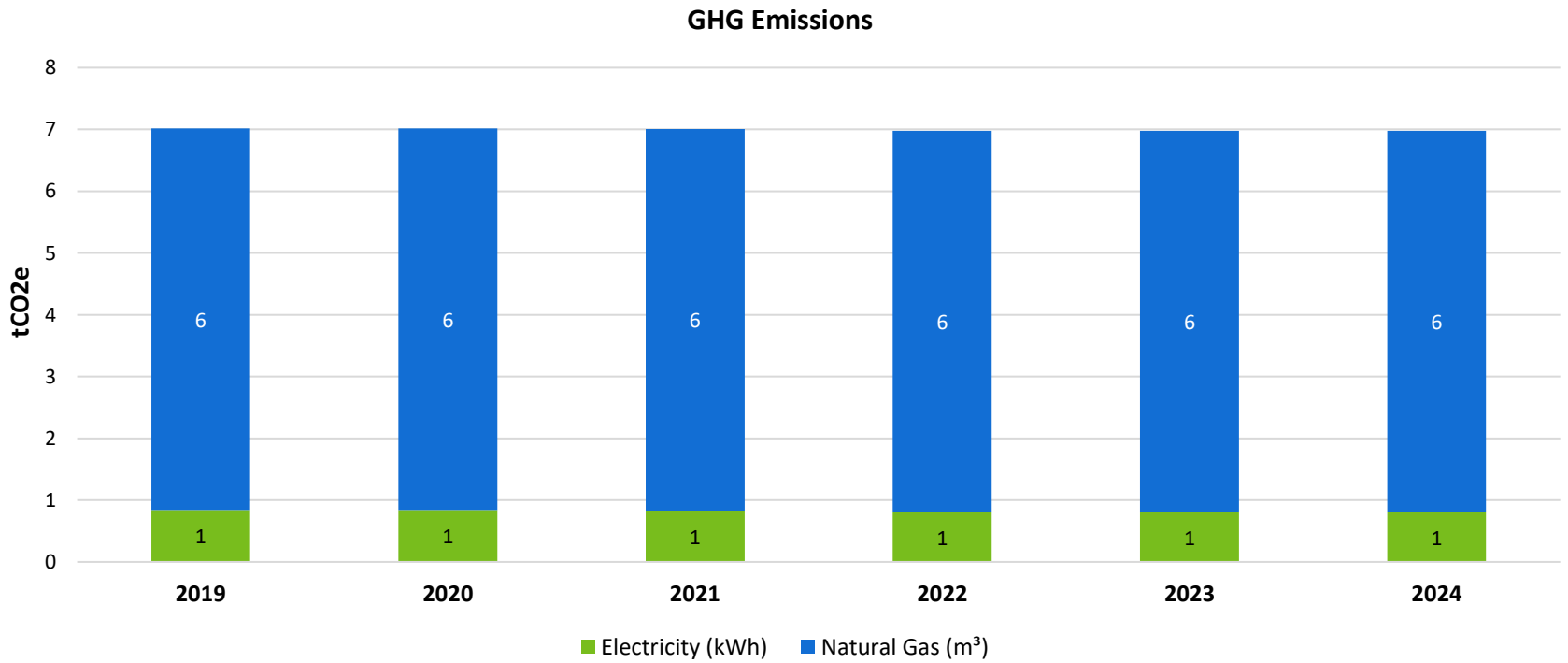


4.25.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	1	1	1	1	1	1
Natural Gas	6	6	6	6	6	6
Total Scope 1 & 2 Emissions	**7**	**7**	**7**	**7**	**7**	**7**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**0%**	**1%**	**1%**	**1%**

Table 120 Forecasted Annual GHG Emissions



4.26 Visual Arts Centre

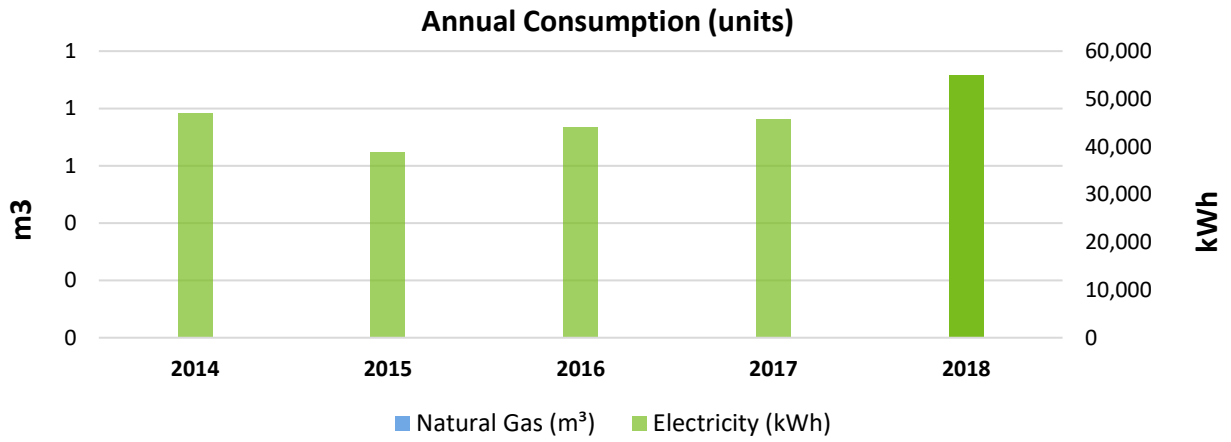
Facility Information	
Facility Name	**Visual Arts Centre**
Address	143 Simpson Avenue, Bowmanville, ON
Gross Area (Sq. Ft)	7,920
Type of Operation	Art Gallery
Average Operational Hours Per Week	51

4.26.1 Utility Consumption Analysis

Utilities to the site are electricity. 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). The natural gas consumption data for this site is currently unavailable and therefore has been excluded.

Annual Consumption (units)					
Utility	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	47,034	38,794	44,164	45,717	55,006
Natural Gas (m³)	0	0	0	0	0

Table 121 Annual Consumption Summary

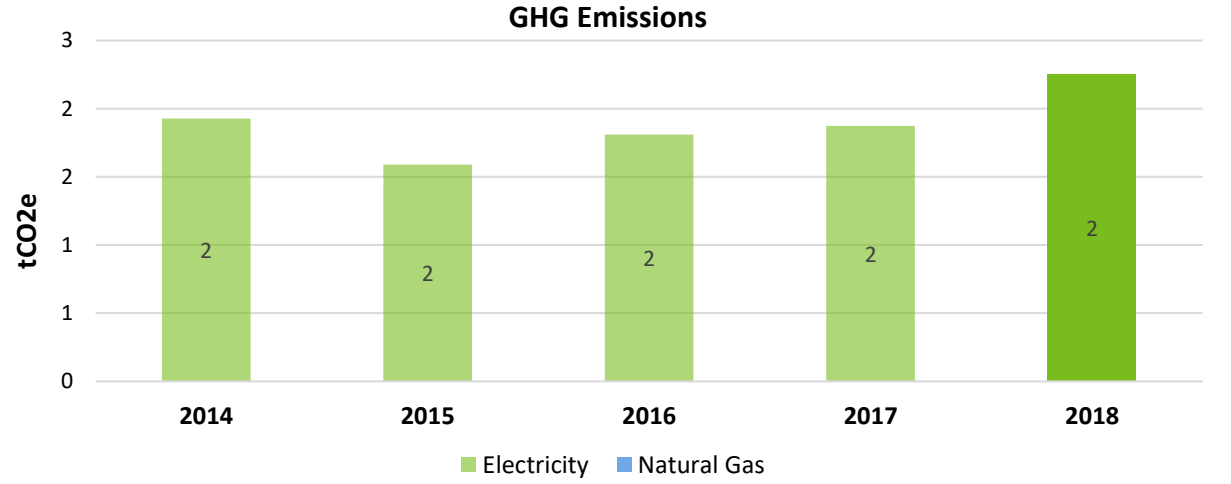


4.26.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	2	2	2	2	2
Natural Gas	0	0	0	0	0
Totals	**2**	**2**	**2**	**2**	**2**

Table 122 Annual GHG Emissions Analysis



4.26.3 Proposed Conservation Measures

The proposed energy conservation initiatives for this site are summarized in the table below along with their high-level savings. The implementation of these measures is dependent on the availability of finances, operational decisions and government incentives.

Measure	Impacted Utility	Estimated Cost	Estimated Annual Savings		Simple Payback (Years)	Year of Implementation
			kWh	m3		
Lighting Upgrade	Electricity	$2,850	2,592	0	8.86	2021
Window Upgrade	Electricity	$9,600	1,079	647	8.08	2021
Totals		**$12,450**	**3,671**	**647**		

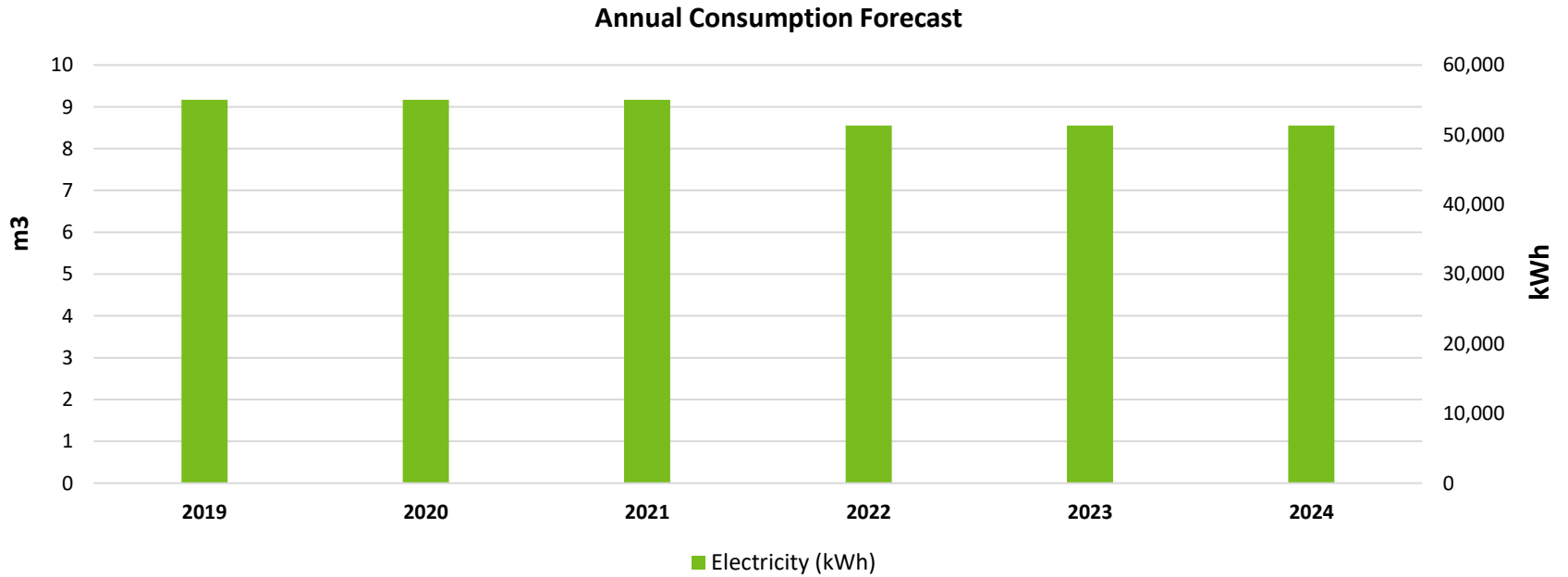
Table 123 Proposed Energy Conservation Initiatives

4.26.4 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)	55,006	0%	55,006	0%	55,006	0%	51,335	7%	51,335	7%	51,335	7%
Natural Gas (m^3)	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%

Table 124 Forecasted Annual Consumption

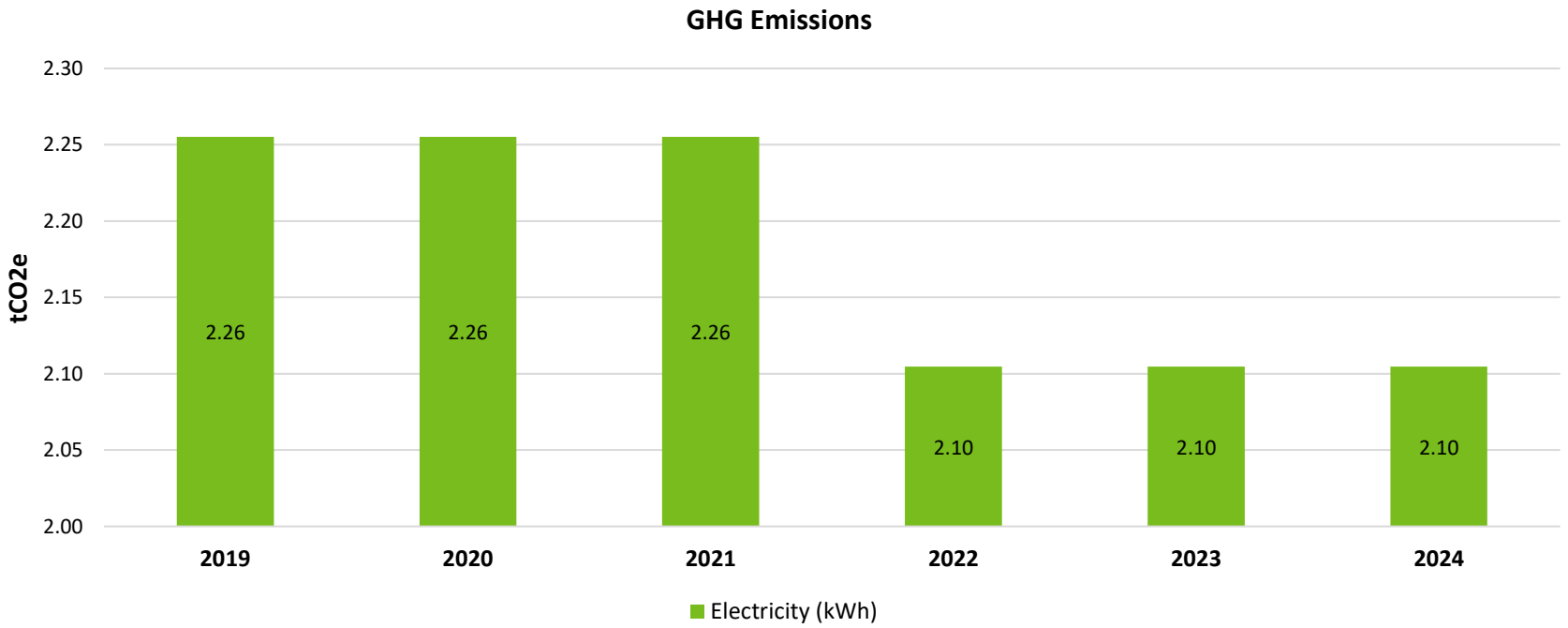


4.26.5 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	2.26	2.26	2.26	2.10	2.10	2.10
Natural Gas	0	0	0	0	0	0
Total Scope 1 & 2 Emissions	**2.26**	**2.26**	**2.26**	**2.10**	**2.10**	**2.10**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**

Table 125 Forecasted Annual GHG Emissions



4.27 Yard 42 Depot

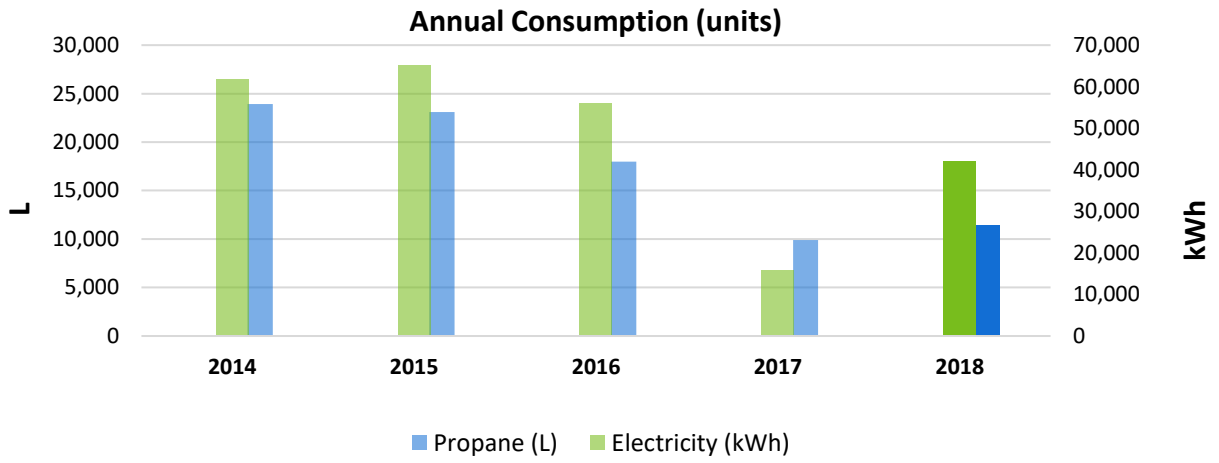
Facility Information	
Facility Name	**Yard 42 Depot**
Address	178 Clarke Townline, Bowmanville, ON
Gross Area (Sq. Ft)	5,208
Type of Operation	Storage facilities where equipment or vehicles are maintained, repaired or stored
Average Operational Hours Per Week	40

4.27.1 Utility Consumption Analysis

Utilities to the site are electricity and propane. 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	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity (kWh)	61,748	65,199	55,976	15,789	42,118
Propane (L)	23,927	23,102	17,996	9,908	11,444

Table 126 Annual Consumption Summary

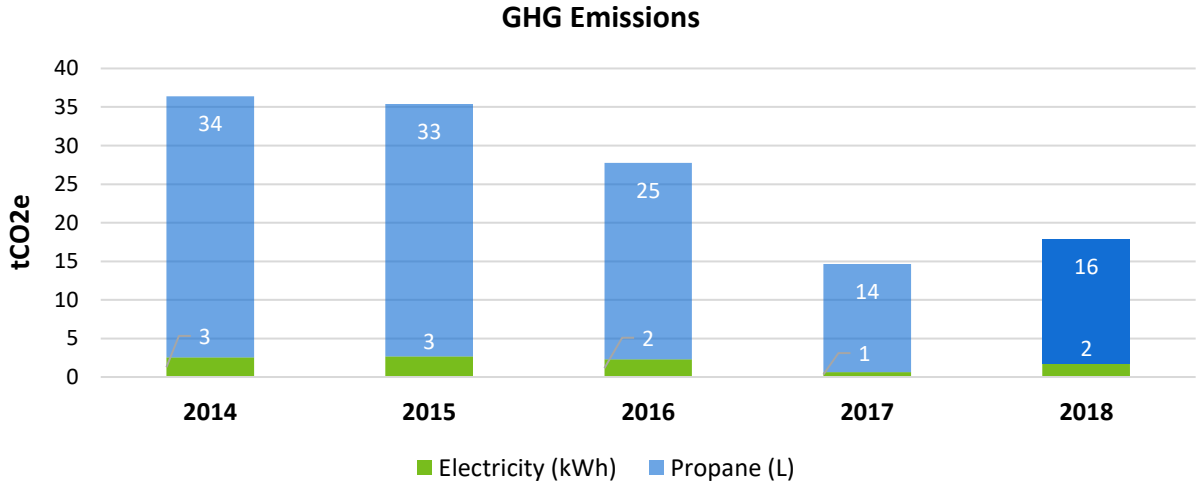


4.27.2 GHG Emissions Analysis

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

GHG Emissions (tCO2e)					
Utility Source	**2014**	**2015**	**2016**	**2017**	**2018**
Electricity	3	3	2	1	2
Propane	34	33	25	14	16
Totals	**36**	**35**	**28**	**15**	**18**

Table 127 Annual GHG Emissions Analysis

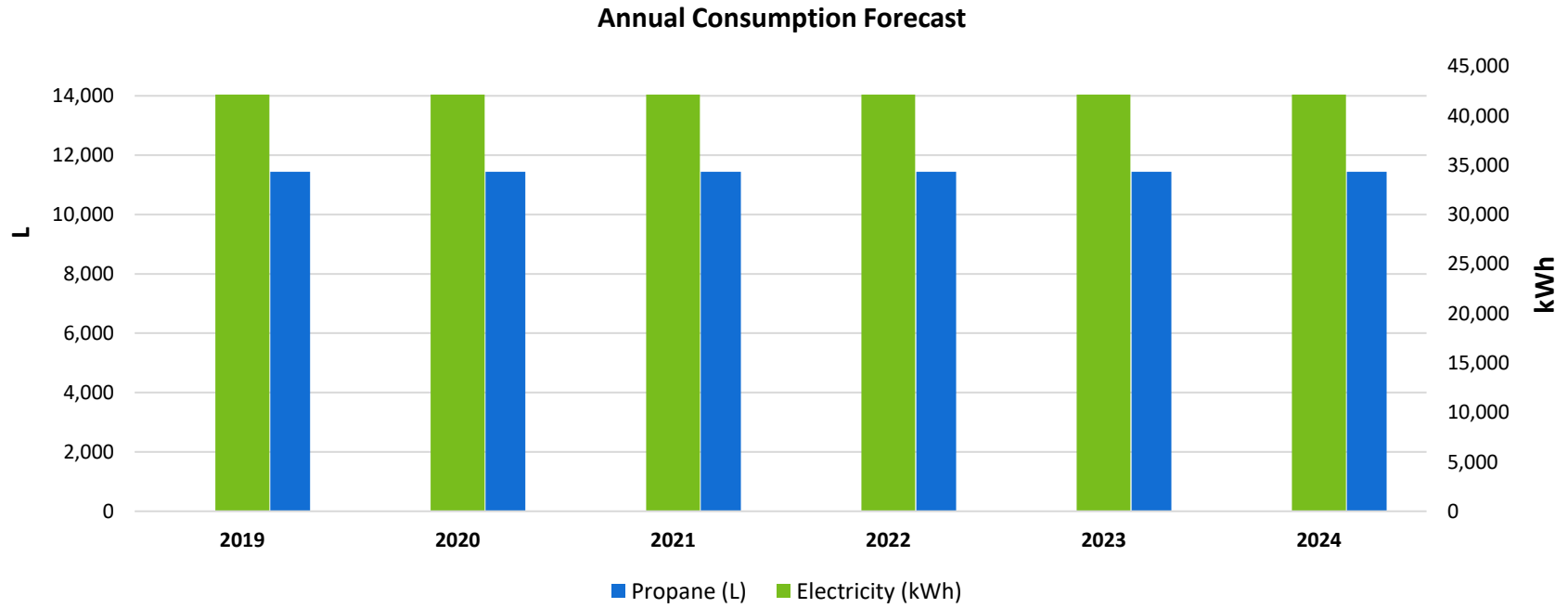


4.27.3 Utility Consumption Forecast

There are limited opportunities to reduce consumption at Yard 42. We have forecasted electricity and natural gas use based on the 2018 performance year. The forecasted utility consumption is tabulated below. Our goal will be to maintain 2018 consumption levels and review energy conservation opportunities as they present themselves.

	Annual Consumption Forecast (units)											
	2019		2020		2021		2022		2023		2024	
	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change	Units	% Change
Electricity (kWh)	42,118	0%	42,118	0%	42,118	0%	42,118	0%	42,118	0%	42,118	0%
Propane (L)	11,444	0%	11,444	0%	11,444	0%	11,444	0%	11,444	0%	11,444	0%

Table 128 Forecasted Annual Consumption

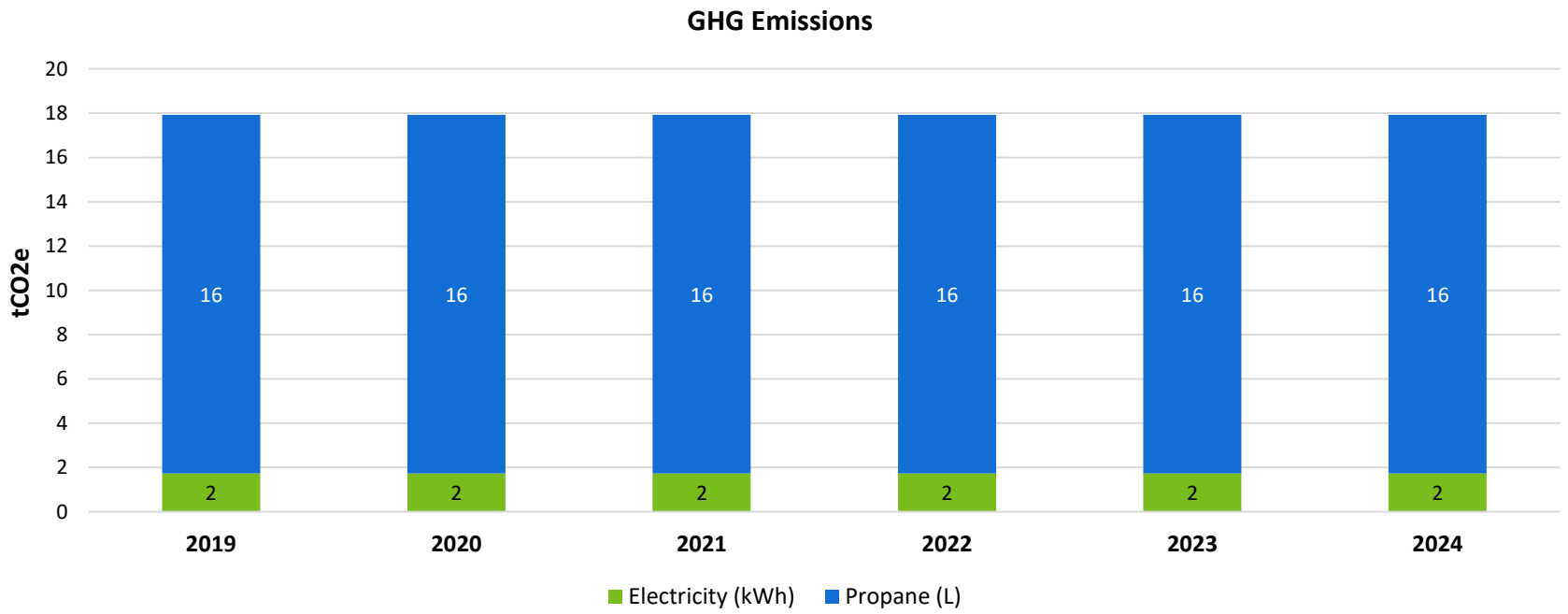


4.27.4 GHG Emissions Forecast

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.

Forecasted GHG Emissions						
Utility Source	2019	2020	2021	2022	2023	2024
Electricity	2	2	2	2	2	2
Propane	16	16	16	16	16	16
Total Scope 1 & 2 Emissions	18	18	18	18	18	18
Reduction from the Baseline Year (2018)	0%	0%	0%	0%	0%	0%

Table 129 Forecasted Annual GHG Emissions



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, MoC'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 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)	10,360,462	0%	10,098,449	3%	10,054,351	3%	9,839,588	5%	9,763,913	6%	9,637,859	7%
Natural Gas (m^3)	1,403,167	0%	1,410,827	-1%	1,363,292	3%	1,362,645	3%	1,358,603	3%	1,355,166	3%
Fuel Oil (L)	8,947	0%	8,947	0%	8,947	0%	8,947	0%	8,947	0%	8,947	0%
Propane (L)	42,253	0%	42,253	0%	42,253	0%	42,253	0%	42,253	0%	42,253	0%

Table 130 Site-Wide Forecasted Annual Consumption

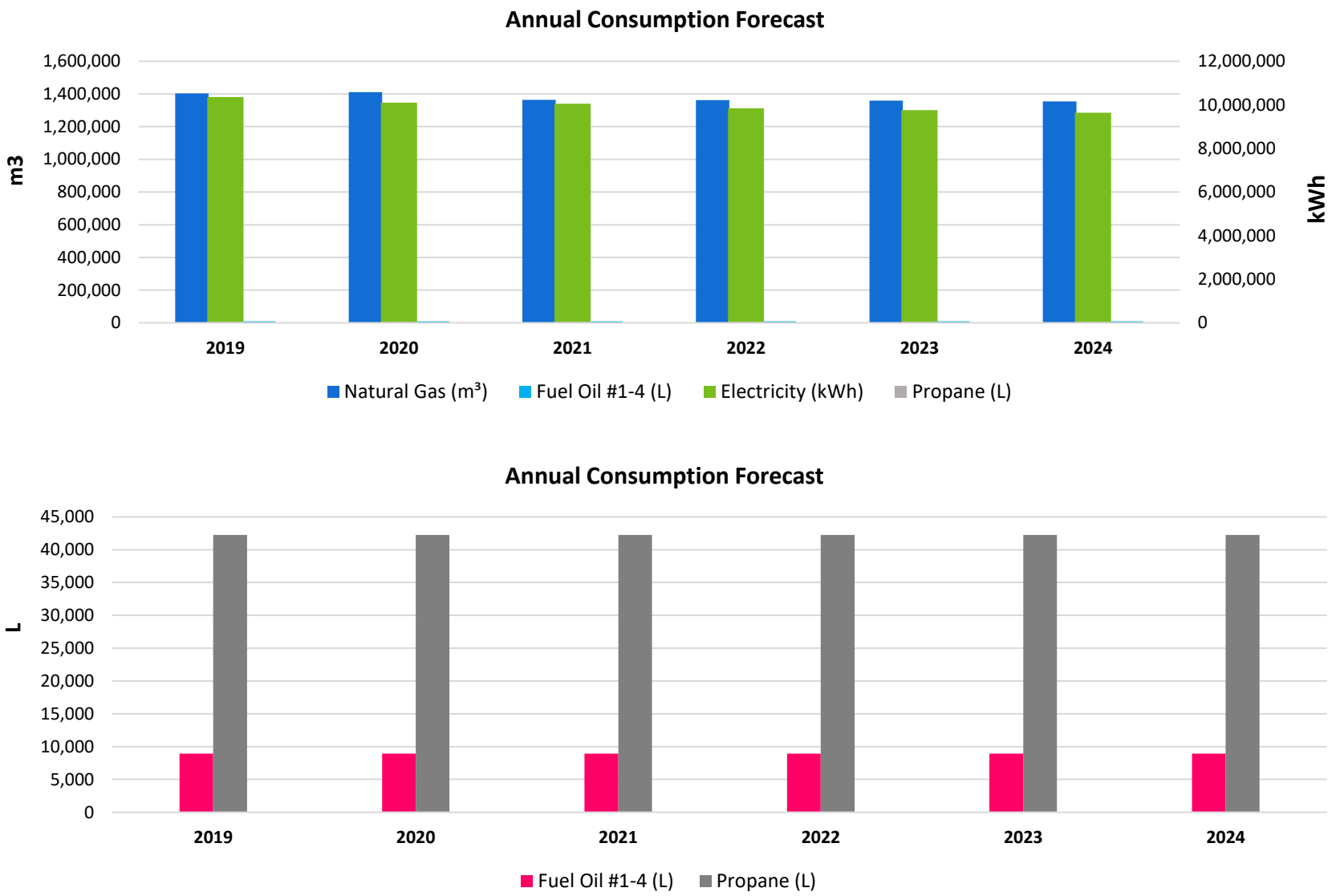


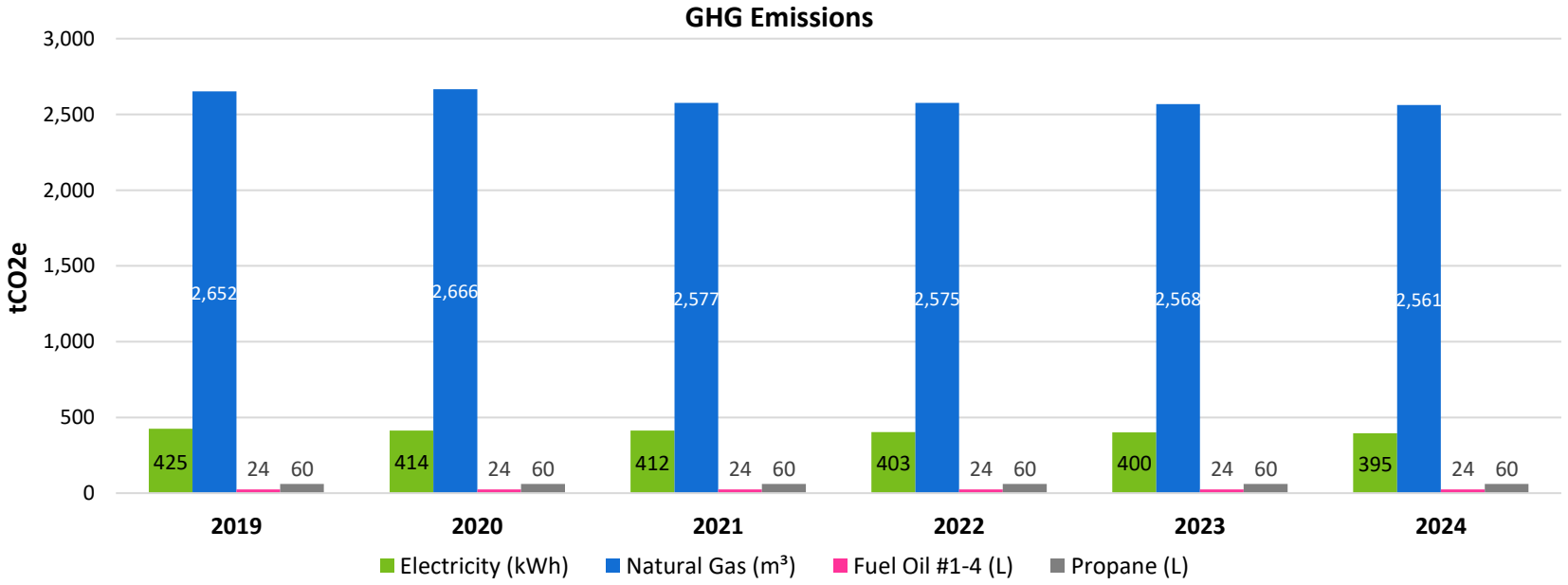
Figure 3. Site-Wide Utility Consumption Forecast

5.2 Site-Wide GHG Emissions Forecast

The site-wide forecasted greenhouse gas emissions are calculated based on the site-wide forecasted energy consumption data analyzed in the previous section and are tabulated in the following table. Greenhouse gas (GHG) emissions are expressed in terms of equivalent tonnes of Carbon Dioxide (tCO2e). The percentage of reduction is based off the data from the baseline year of 2018.

Forecasted GHG Emissions						
Utility Source	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Electricity	425	414	412	403	400	395
Natural Gas	2,652	2,666	2,577	2,575	2,568	2,561
Fuel Oil	24	24	24	24	24	24
Propane	60	60	60	60	60	60
Total Scope 1 & 2 Emissions	**3,161**	**3,165**	**3,073**	**3,063**	**3,052**	**3,041**
Reduction from the Baseline Year (2018)	**0%**	**0%**	**3%**	**3%**	**3%**	**4%**

Table 131 Site-Wide Forecasted Annual GHG Emissions



5.3 Site-Wide Measure Summary

The table below provides a summary for the measures for all sites, listed by year of implementation.

Year	Facility	ECDM Measure	Estimated Cost ($)	Estimated Annual Savings		Simple Payback (years)
				kWh	m3	
2019	Animal Services Building	Heating, Ventilation, and Air Condition (HVAC) System - Scheduling / Setback	$1,500	2,616	1,506	2.33
2019	Community Resource Centre	Heating, Ventilation, and Air Condition (HVAC) System - Scheduling / Setback	$5,000	4,074	2,059	5.33
2019	Fire Station #2	Natural Gas Pulse Meter	$0	0	0	0
2019	Fire Station #3	Programmable Thermostat	$750	10,695	0	0.58
2019	Fire Station #3	Replace Electric Hot Boiler	$65,000	44,564	-6,171	8.05
2019	Municipal Administrative Centre	Lighting Retrofit	$12,800	155,500	0	0.68
2019	Orono Library	Heating, Ventilation, and Air Condition (HVAC) System - Scheduling / Setback	$750	0	587	5.88
2019	Orono Library	Insulate Hot Water / Domestic Hot Water Piping	$1,183	0	530	10.28
2020	Alan Strike Aquatic and Squash Centre	Pool Liquid Thermal Blanket	$10,000	0	5,325	8.6
2020	Alan Strike Aquatic and Squash Centre	Building System Recommissioning	$15,000	6,467	2,396	2.85
2020	Courtice Community Complex	Pool Liquid Thermal Blanket	$15,000	0	16,236	4.23
2020	Courtice Community Complex	Pump Variable Frequency Drive	$2,500	3,000	0	6.81
2020	Courtice Community Complex	Install Air Curtains	$4,000	0	1,000	18.31
2020	Diane Hamre Recreation Complex	Pool Liquid Thermal Blanket	$10,000	0	11,989	3.82
2020	Diane Hamre Recreation Complex	Waste Heat Recovery on Filtration System	$20,000	0	3,000	30.52
2020	Fire Station #1	Heating, Ventilation, and Air Condition (HVAC) System - Scheduling / Setback	$2,000	2,782	1,286	3.22
2020	Fire Station #2	Heating, Ventilation, and Air Condition (HVAC) System - Scheduling / Setback	$2,000	9,162	2,704	1.17
2020	Garnet Rickard Recreation Complex	Install Air Curtains	$20,000	3,841	3,599	15.92
2020	Hampton Hall	Lighting Retrofit / Controls	$9,177	1,796	0	41.76
2020	Hampton Operations Depot	Motion Sensors	$500	1,306	0	3.13
2020	Hampton Operations Depot	Other Lighting Upgrades	$22,642	15,456	0	11.97

Year	Facility	ECDM Measure	Estimated Cost ($)	Estimated Annual Savings		Simple Payback (years)
				kWh	m3	
2020	Tourism Centre	Programmable Thermostat for Electric Baseboard Heaters	$460	288	0	13.05
2021	Courtice Community Complex	Lighting Retrofit	$53,000	126,531	0	3.38
2021	Courtice Community Complex	Lighting Controls	$14,000	24,600	0	4.59
2021	Fire Station #1	Lighting Retrofit	$7,200	8,600	0	6.75
2021	Fire Station #2	Lighting Retrofit	$37,458	27,487	0	10.98
2021	Garnet Rickard Recreation Complex	LED Lighting Retrofit	$14,450	18,250	0	6.38
2021	Sarah Jane Williams Heritage Centre	Motion Sensor Lighting Controls	$1,800	4,896	0	2.96
2021	Tourism Centre	Lighting Upgrade	$3,291	728	0	36.44
2021	Visual Arts Centre	Lighting Upgrade	$2,850	2,592	0	8.86
2021	Visual Arts Centre	Window Upgrade	$9,600	1,079	647	34.78
2022	South Courtice Arena	Building System Recommissioning	$15,000	33,175	4,042	2.95
2022	South Courtice Arena	LED Lighting Retrofit	$24,000	42,500	0	4.49
2023	Alan Strike Aquatic and Squash Centre	Install Air Curtains	$4,000	0	1,000	18
2023	Courtice Community Complex	Building System Recommissioning	$15,000	30,818	1,838	3.46
2023	Diane Hamre Recreation Complex	Install Air Curtains	$4,000	3,613	599	6.73
2023	Garnet Rickard Recreation Complex	Rink Lighting Upgrade	$57,800	73,000	0	6.21
2023	Newcastle Branch Library	LED Lighting Retrofit	$29,130	18,624	0	12.26
2024	Bowmanville Indoor Soccer	Upgrade Metal Halide Lamps (in soccer pitches)	$20,790	15,941	0	10.08
2024	Bowmanville Indoor Soccer	Upgrade High Pressure Sodium Lights (parking lot)	$10,620	6,091	0	13.48
2024	Bowmanville Indoor Soccer	Heating, Ventilation, and Air Condition (HVAC) System - Scheduling / Setback	$15,000	6,157	4,631	8.19
2024	Bowmanville Indoor Soccer	Install Air Curtains	$2,000	0	500	17.89
2024	Darlington Sports Centre	Lighting Retrofit in Arena	$98,700	16,000	0	47.69
2024	Newcastle Branch Library	Heating, Ventilation, and Air Condition (HVAC) System - Scheduling / Setback	$10,000	6,208	1,350	9.05
		Totals	**$669,951**	**728,437**	**60,653**	

Table 132. Site-Wide Proposed Measures Summary

5.4 Site-Wide Conservation Strategies

Staff Training and Energy Awareness

Human behaviour significantly influences energy performance. It is typical for a behavioural optimization program to reduce energy consumption by 5 to 10%, depending on existing conditions and operations. Developing a sustained corporate culture in which energy efficiency is prioritized and continuously improved can result in significant long-term energy savings. The following strategies are typically part of an effective culture.

- Awareness – raising awareness of occupants as to their impact on and the importance of energy efficiency.
- Education – increasing the competency of occupants make changes that improve energy efficiency.
- Empowerment – authorizing and encouraging occupants to make changes that improve energy efficiency.

An evaluation of energy awareness programs found that the most energy savings were achieved by programs that:

- effectively engage participants,
- program information in a format that is accessible, applicable, and easily integrated,
- motivate participants through showing benefits of decreasing energy use for themselves, and their community,
- address phantom load management when possible,
- continue to follow-up with participants at intervals after the original education is complete, and
- offers energy education efforts that are highly interactive, offer hands-on learning opportunities, and appeal to different adult learning styles.

We will review this conservation strategy by reviewing the opportunity to host on-site workshops at multiple times throughout the year, limiting workshops length to 2 hours or less, and focusing on a small number of actions to generate immediate savings.

Phantom Load Management

Phantom electricity load is the small amount of electricity used by electronics and small appliances when they are not turned completely off. This can attribute a small portion of electricity used by facilities when this equipment is in “stand-by” mode. In order to manage this consumption load, equipment can be unplugged, or power bars can be used. We will review opportunities for phantom load management wherever possible.

6 Closing Comments

Thank you to all who contributed to The Municipality of Clarington's Energy Conservation & Demand Management Plan. We consider our facilities primary sources of service, 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 services while integrating environmental stewardship into all aspects of facility operations. This Energy Conservation & Demand Management plan fulfills all of the requirements in the new regulatory update.

This ECDM plan was created through a collaborative effort between the Municipality of Clarington 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)
Broader Public Sector	BPS	Starting in 2014, the Broader Public Sector (BPS) was required to report the utility consumption of their facilities
Carbon Dioxide	CO2	Carbon dioxide is a commonly referred to greenhouse gas that results, in part, from the combustion of fossil fuels.
Energy Conservation & Demand Management Plan	ECDM	Under regulation O. Reg. 507/18: Broader Public Sector: Energy Conservation and Demand Management Plans (ECDM). public agencies are required to report on energy consumption and greenhouse gas (GHG) emissions annually and develop Energy Conservation and Demand Management (ECDM) Plans
Energy Usage Intensity	EUI	Energy usage intensity means the amount of energy 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 building with zero net energy consumption, meaning the total amount of energy used by the building on an annual basis is roughly equal to the amount of renewable energy 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.