City of Spruce Grove

2018-2019 GHG Inventory Update & Analysis

Final Report

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1. HIGHLIGHTS

This report summarizes the results of a greenhouse gas (GHG) inventory for the City of Spruce Grove for the years 2018 and 2019. Key results are:

- Total GHG emissions in 2019 from the combination of community & corporate activities were 448,733 $tC02_{eq}$, or 12.0 $tC02_{eq}$ per person

- While total energy use across the city increased by 12% since 2015, GHG emissions stayed the same. This was possible due to a large reduction in the GHG energy intensity of the Alberta electrical grid between 2015 and 2019.

- Corporate GHG emissions were 13% lower in 2019 than in 2015, while community GHG emissions rose by less than 1%.

- Due to a replacement of streetlights with energy efficient LED lights in 2018 and 2019, city energy use for streetlights has fallen by 40% since 2015.

- The population of Spruce Grove has increased by 17% since 2015. The fact that the population is growing at a faster rate than corporate and community emissions suggests that the city is starting to decouple growth in emissions from growth in population.

- The city set the following energy and GHG emissions reduction targets in 2016:

Energy use:

  - Reduce corporate energy use per capita to 40% below 2015 levels by 2035.
  - Reduce community energy use per capita to 25% below 2015 levels by 2035.

In 2019, corporate energy use **per capita** was 6% below 2015 levels, and community energy use **per capita** was 5% below 2015 levels

GHG Emissions:

  - Reduce corporate GHG emissions per capita to 50% below 2015 levels by 2035.
  - Reduce community GHG emissions per capita by 35% below 2015 levels by 2035.

In 2019, corporate GHG emissions **per capita** were 27% below 2015 levels, and community GHG emissions **per capita** were 14% below 2015 levels.

- Modelling projections suggest that in order to meet its targets, the city has a total corporate carbon budget of 123,640 tCO_2eq over the next fifteen years, and a total community carbon budget of 7,938,065 tCO_2eq over the same time frame. These, respectively, are the maximum amounts of GHG emissions that can be emitted from 2020 until 2035 by city services and from the community in order to reach Spruce Grove's GHG emissions targets.

2. INTRODUCTION

Context

Over the past decade the urgency of addressing the climate crisis has become increasingly clear. Firstly, there is unequivocal proof that the climate system has warmed since the pre-industrial era, as evident from observations of rising air and sea surface temperatures globally. Most of the observed increase in temperatures is due to human-caused (anthropogenic) emissions of heat-trapping greenhouse gases (GHGs). Continued emissions of GHGs will cause further warming and long-lasting changes in our climate system. Secondly, there is increasing evidence that changes in the climate is having negative impacts on human and environmental systems. The IPCC special report of 2018 warned governments across the world of the damage that will result to ecosystems and the health and economic livelihoods of people across the planet without prompt and aggressive efforts to reduce GHG emissions.

In terms of size, cities occupy a tiny fraction of the world's landmass; in Alberta, for example, small and medium cities occupy less than 0.2 per cent of the province's landmass. In terms of climate impact, however, they leave a large carbon footprint. It is estimated that cities world-wide account for more than 70% of global carbon dioxide (CO_2) emissions. North American cities have the largest footprints per capita. At the same time, cities are at high risk from many of the adverse physical impacts of climate change—both because weather and climate extremes can be especially disruptive to interconnected urban systems and because they are where much of our population live, work and raise their families. About 4-in-5 Albertans reside in cities, towns or villages.

Cities are well positioned to meet the challenge of climate change. As a level of government that interacts directly with citizens, cities have powerful impact on the way that we all live our lives. Cities affect land-use and building design choices, incentivize particular ways of working and living, and affect the culture of people who live there. Cities can also act as early adopters of mitigation efforts such as energy efficient building measures, renewable energy technologies, and electric vehicles; among many other options that reduce GHG emissions.

Background

Spruce Grove is a community of approximately 37,000 thousand people located 11 km west of Edmonton, Alberta.

The City of Spruce Grove (the City) has been a partner in the Partners for Climate Protection (PCP) GHG emission reduction program since 2003. The PCP program is a partnership between ICLEI — Local Governments for Sustainability (ICLEI Canada) and the Federation of Canadian Municipalities (FCM) designed to help municipalities take action to reduce both "corporate" and "community" GHG emissions. Municipalities work through a five-step Milestone Framework:

Milestone 1: Create a baseline emissions inventory and forecast.
Milestone 2: Set emissions reduction targets.
Milestone 3: Develop a Local Action Plan.
Milestone 4: Implement the Local Action Plan.
Milestone 5: Monitor progress and report results.

The City achieved the fifth and final milestone of the PCP program in 2017.

The City completed its first GHG emissions inventory for the year 1996. When Spruce Grove joined the PCP program in 2003, it set goals to reduce corporate GHG emissions to 20% below 1996 levels by 2013 and community GHG emissions to 6% below 1996 levels by 2013. However, since 2003, the city's population more than doubled. This created challenges to reducing GHG emissions. As a result, the city failed to achieve the 2013 targets. Nonetheless, it did reduce both total energy use per person and GHG emissions per person over that timeframe.

In 2016, as part of a long-term plan to reduce GHG emissions, the City's "Energy Management Plan and GHG Reduction Strategy" set updated targets:

Energy use:

- Reduce corporate energy use per capita to 40% below 2015 levels by 2035.
- Reduce community energy use per capita to 25% below 2015 levels by 2035.

GHG Emissions:

- Reduce corporate GHG emissions per capita to 50% below 2015 levels by 2035.
- Reduce community GHG emissions per capita by 35% below 2015 levels by 2035.

This report first presents an update of the city's (corporate and community) GHG inventory for 2018 and 2019, and second, projects 2019 emissions through to 2035 and assesses the level of emissions reductions required to achieve the above targets. In addition, the report identifies a number of potential ways to cost-efficiently lower the city's GHG emissions.

3. METHODS AND INVENTORY ANALYSIS NOTE

The PCP Milestone Tool, and its accompanying methods document 'PCP Protocol: Canadian Supplement to the International Emissions Analysis Protocol' informed the generation of the 2018 and 2019 inventory for Spruce Grove. The PCP Tool provides (national and provincial) default assumptions and data for the GHG emission calculations, like GHG emission intensities for energy, fuels and solid waste. For some emission sources, these default values were used. Where possible, however, information specific to Spruce Grove was used in the calculations instead of the default values. These exceptions are noted throughout the report.

A wide array of information from multiple sources was used to generate the 2018 and 2019 GHG emissions inventories. Key information inputs included:

- Annual electricity and natural gas consumption data, by billing codes and City buildings, obtained from the City and local utility retailers.
- Detailed fuel use history for the City's vehicle fleet.
- Residential waste data, including both annual waste tonnages and the breakdown by waste streams, based on a 2019 waste audit.

- Vehicle registration numbers for Spruce Grove.
- Alberta-specific statistics regarding the composition of the vehicle stock, fuel economy and average distances travelled (from NRCAN's Comprehensive Energy Use Database)[1].
- Population projections from the 2016 Growth Study (med-high scenario)[2].

For all but solid waste, estimated GHG emissions are a function of both the amount of energy used in a given year, as well as the GHG intensity of that energy. The GHG intensity of most energy commodities does not change over time; the exception is electricity. For example, the amount of coal being used in recent years for electricity generation in Alberta has gone down, which has reduced the GHG intensity of electricity. The GHG consumption intensity of electricity in Alberta fell by 23% between 2013 and 2018, as can be seen in Figure 1. This is important to keep in mind when assessing trends in GHG emissions from electricity use over time; the quantity of *GHG emissions* from electricity consumption may fall from one inventory to the next, but the total amount of *electricity used* is actually rising. In addition, some energy sources are more energy intensive than others: in 2015, the GHG emissions from one GJ of electricity would be five times than the GHG emissions produced from the same amount of energy from natural gas.

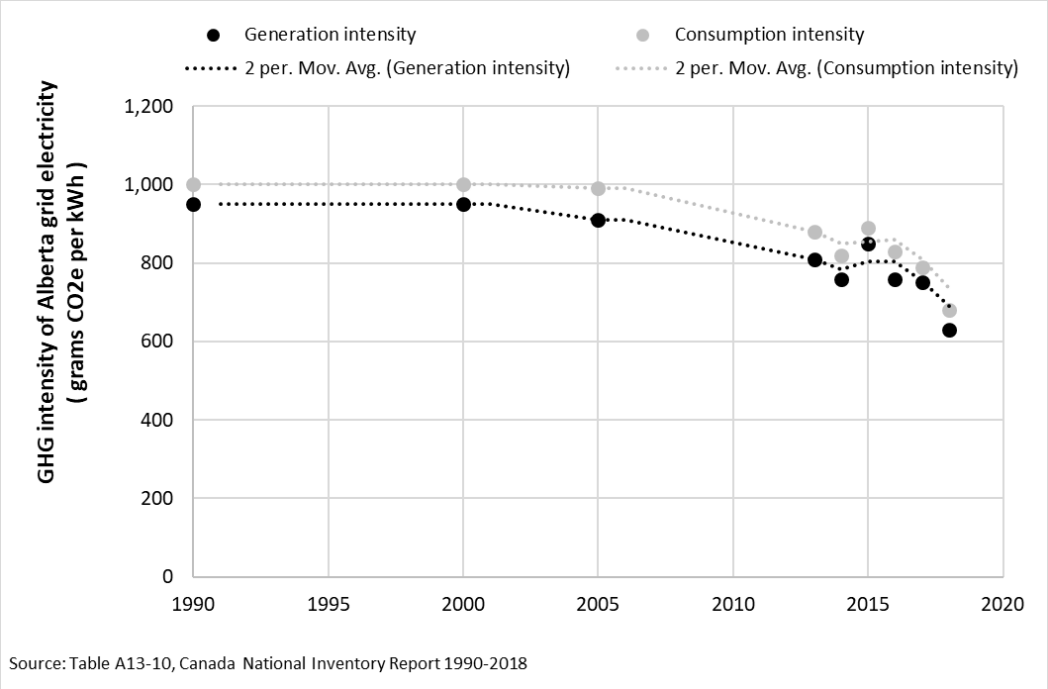

Figure 1: GHG intensity of electricity generation and consumption in Alberta

[1] https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/menus/trends/comprehensive_tables/list.cfm.
[2] https://www.sprucegrove.org/media/2067/growth-study-2016.pdf.

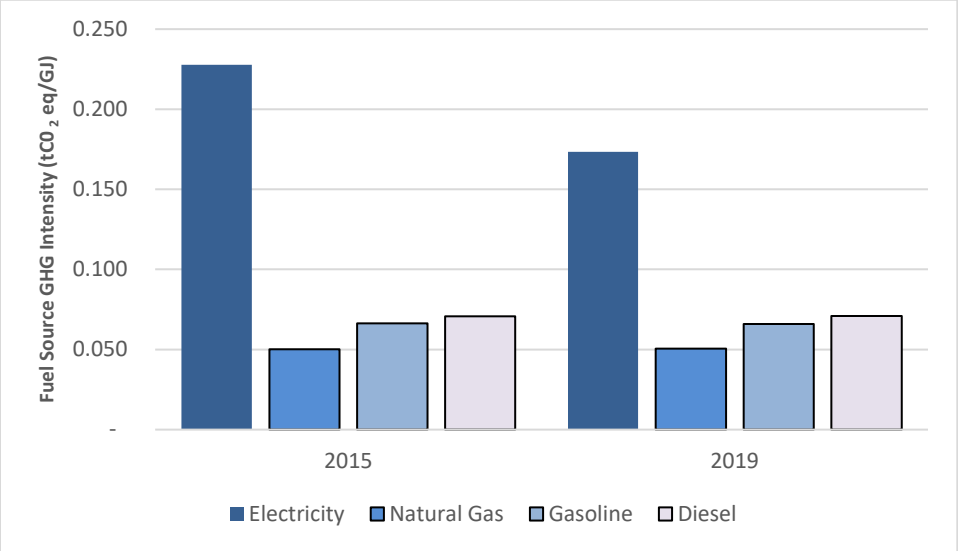

Figure 2: Relative GHG emissions intensity of Alberta energy sources in 2015 vs 2019

4. TOTAL SPRUCE GROVE ENERGY USE AND GHG EMISSIONS

Table 1 below shows total city-wide energy use (from both corporate and community energy use) in 2018 and 2019, as well as the difference in energy use from the 'base' year of 2015. In 2019, total energy use is estimated at 5,785,462 GJ, or 154 GJ/person. Total energy use has risen by 11.6% since 2015, but energy use per person has fallen by 5%.

Table 1 City-wide energy use (combined corporate and community energy use)

Energy Source	2018	2019	Change 2015-2019
Total City Energy Use (GJ)	5,553,305	5,785,462	+11.6%
Energy use per person (GJ/p)	155	154	-5.0%

Table 2 shows the total GHG emissions of Spruce Grove for each year over the period 1996-2019 when a GHG inventory was generated. Overall, the city emitted an estimated 448,733 t CO_2eq in 2019. Corporate GHG emissions (from city service areas) were 1.6% of this total, down from 2.5% of total emissions in 1996 (see Figure 3).

Table 2: City-wide GHG emissions: corporate and community 1996-2019

Emissions source	1996	2003	2015	2016	2017	2018	2019	Change 2015-2019
Corporate (t CO_2eq)	6,675	5,456	8,365	9,024	8,155	7,216	7,305	-13%
Community (t CO_2eq)	264,874	323,818	440,319	481,507	458,493	427,765	441,428	0.3%
Total (t CO_2eq)	**271,549**	**329,274**	**448,684**	**490,531**	**466,648**	**434,981**	**448,733**	**0.01%**
Population	14,123	17,082	32,036	33,640	34,881	35,766	37,522	+17%
Total (t O_2eq/person)	**19.2**	**19.3**	**14.0**	**14.6**	**13.4**	**12.2**	**12.0**	**-14%**

Figure 3: Corporation's share of total GHG emissions: 1996 vs 2019

The main sources of GHG emissions in 2019 were: electricity (29%), natural gas (24%), vehicle fuels (44%) and solid waste (2%). Compared to 1996, when the city's first inventory was conducted, as a share of total GHG emissions, significantly less emissions are due to electricity consumption. There are modest increases in the share of total emissions from solid waste and road transport. Recall that the fall in electricity-related emissions is due in large part to reductions in the GHG intensity of the provincial grid.

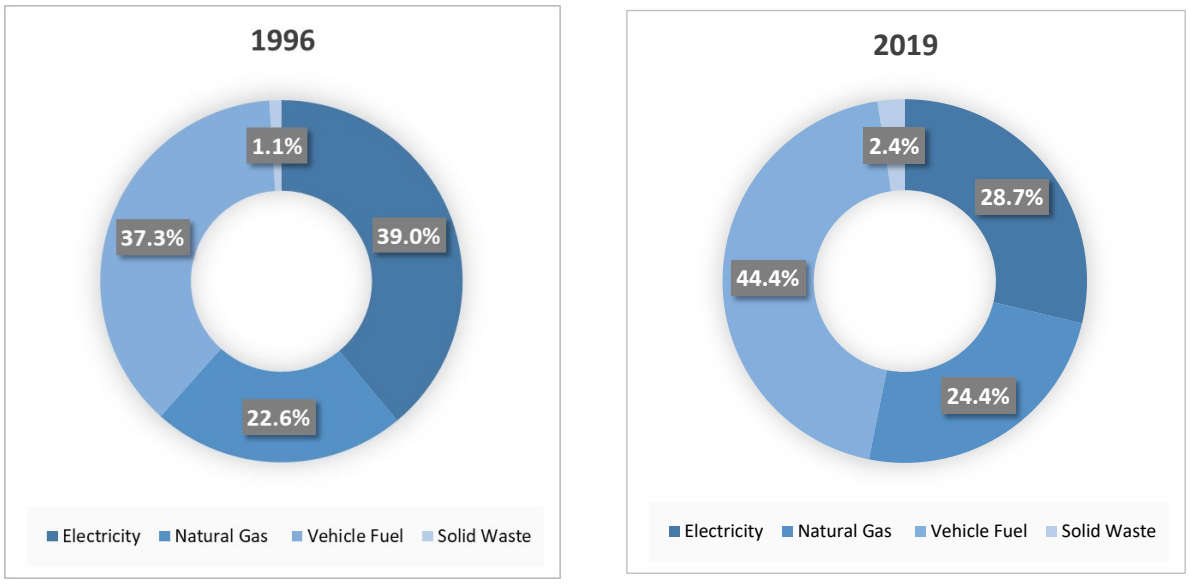

Figure 4: Proportion of total Spruce Grove GHG emissions by source: 1996 vs 2019

Trends in total GHG emissions

Figure 5 plots corporate GHG emissions (bottom line), community GHG emissions (middle line) and total population (top line) growth over time. The fact that the population is growing at a faster rate than corporate and community emissions suggests that the city is starting to decouple growth in emissions from growth in populations. This is also reflected in the next figure, which shows that per capita emissions are also declining over time.

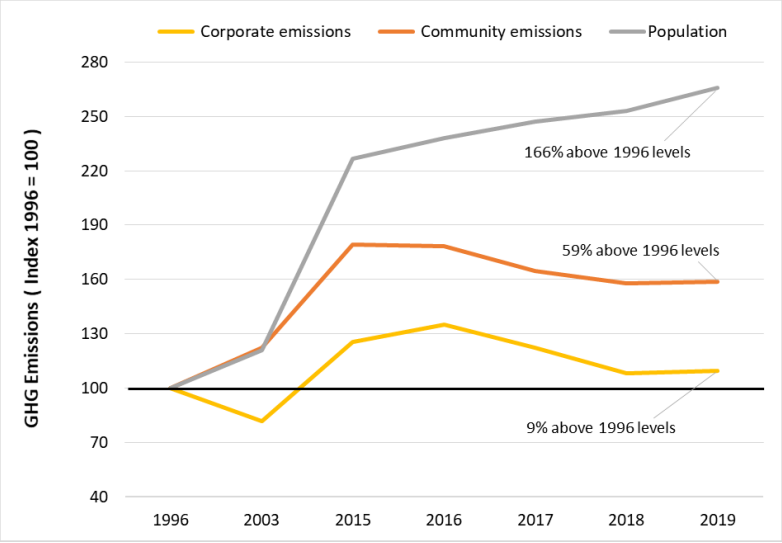

Figure 5: Growth in total GHG emissions since 1996 [1996=100]

Figure 6 shows both total and per capita GHG emissions over the period 1996-2019. Over this period, per capita GHG emissions are decreasing at an average annual rate of about 335 kg $C0_2$eq. In 2019, the level of GHG emissions per capita is about 12 t $C0_2$eq per year.

It can be challenging to precisely compare different jurisdictions to each other due to potential differences in GHG inventory methodologies, scope and electricity emissivity, among other things. Still, for context, the Canadian per capita average in 2016 was 15.1 $tC0_2$ per person, and the average in Germany (an advanced economy with ambitious GHG reduction goals) was 8.8 $tC0_2$ per person (The World Bank Data).

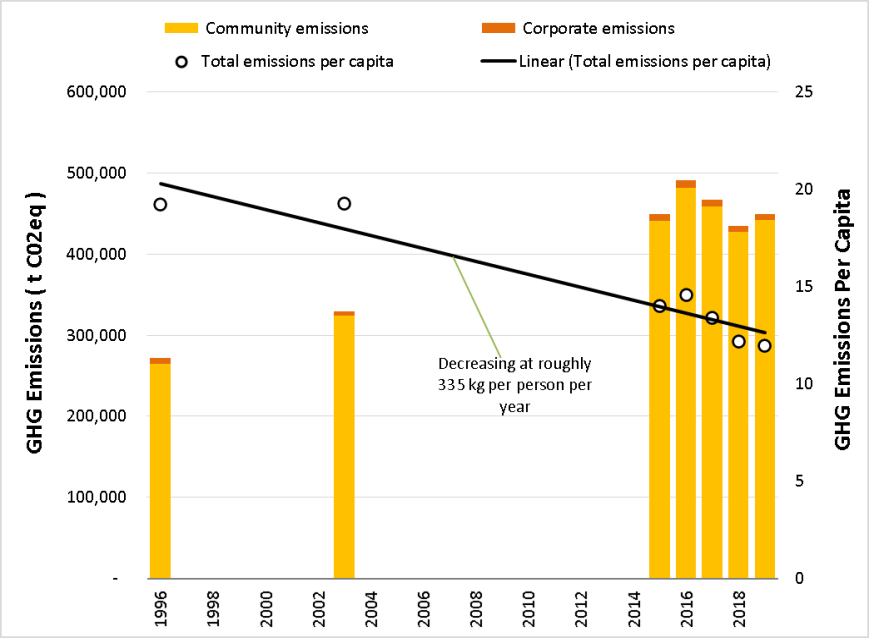

Figure 6: Trend in total GHG emissions per capita since 1996

5. CORPORATE INVENTORY

Summary and Trends

Corporate activities can be split into four service areas: buildings, corporate fleet, water and sewage, and lights and signs. As shown in Figure 7 below, the majority (67%) of corporate GHG emissions come from buildings operated by the city. The remaining emissions are split relatively evenly between fuel for the corporate fleet (12%), water and sewage management (9%) and lights and signs (12%).

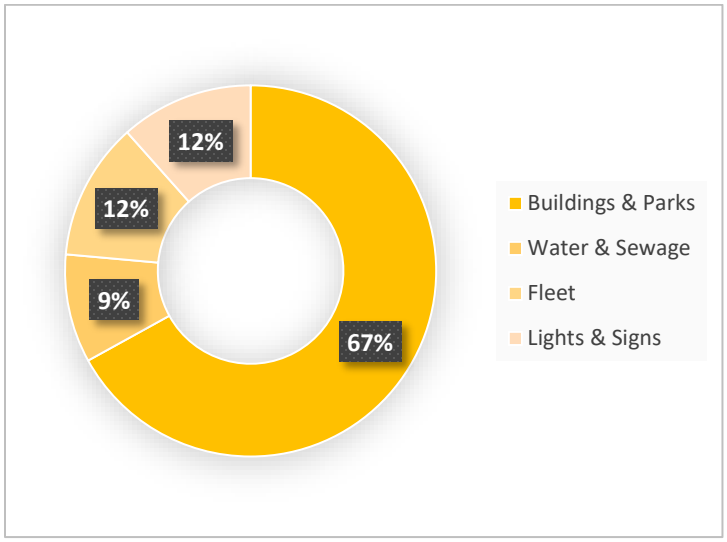

Figure 7: Source of corporate GHG emissions by sector - 2019

Table 3 shows corporate energy use for each inventoried year between 1996 and 2019, broken down by corporate service area. Table 4 shows corporate GHG emissions for the same periods. These tables also show the 2035 per capita goals GHG reduction goals, which have a baseline year of 2015.

Energy use from corporate service areas were 70,078 GJ in 2018 and 77,403 GJ in 2019. Overall, total energy use rose 10.5% since 2015, but the relative change to energy use varied widely between corporate service areas. For example, while energy use from water and sewage increased by 25.8%, energy use from lights and signs fell by 39.8% over the same time period. Per capita energy use is 5.9% lower in 2019 that it was in 2015.

Table 3: Corporate energy use 1996-2019 (GJ)

Service Area	1996	2003	2015	2016	2017	2018	2019	Change 2015-19	2035 Goal
Buildings & Parks	42,206	22,686	45,718	38,727	44,526	45,052	54,773	+19.8%	
Fleet	5,706	5,040	12,279*	8,524	12,085	13,022	12,758	+3.9%	
Water & sewage	2,737	2,965	3,964	4,013	3,993	5,071	4,988	+25.8%	
Lights & signs	4,171	5,493	8,117	8,644	8,587	6,933	4,884	-39.8%	
Total	**54,820**	**36,184**	**70,078**	**59,907**	**69,192**	**70,078**	**77,403**	**+10.5%**	
Total per capita	3.9	2.1	2.2	1.8	2.0	2.0	2.1	-5.9%	-40%

Note: * updated since the 2016 report; see fleet analysis section

Corporate GHG emissions in 2018 and 2019 were very similar to each other, at 7,216 and 7,305 $tC0_2eq$ respectively. Unlike corporate energy use, corporate GHG emissions fell by 12.7% since 2015. While total GHG emissions increased slightly in the corporate fleet over this time, GHG emission in other corporate categories went down over this time. Per capita GHG emissions fell by 26.9%. Figure 8 Figure 9 show trends in energy use and GHG emissions, respectively, over time. The trendline shows changes in per person energy use and GHG emissions. Note how total energy use rises from 2015-2019, while GHG emissions decline over the same time frame. As described in Section 3, this is due to a reduction in the GHG intensity of electricity in Alberta over that time frame.

Figure 8: Corporate energy use over time

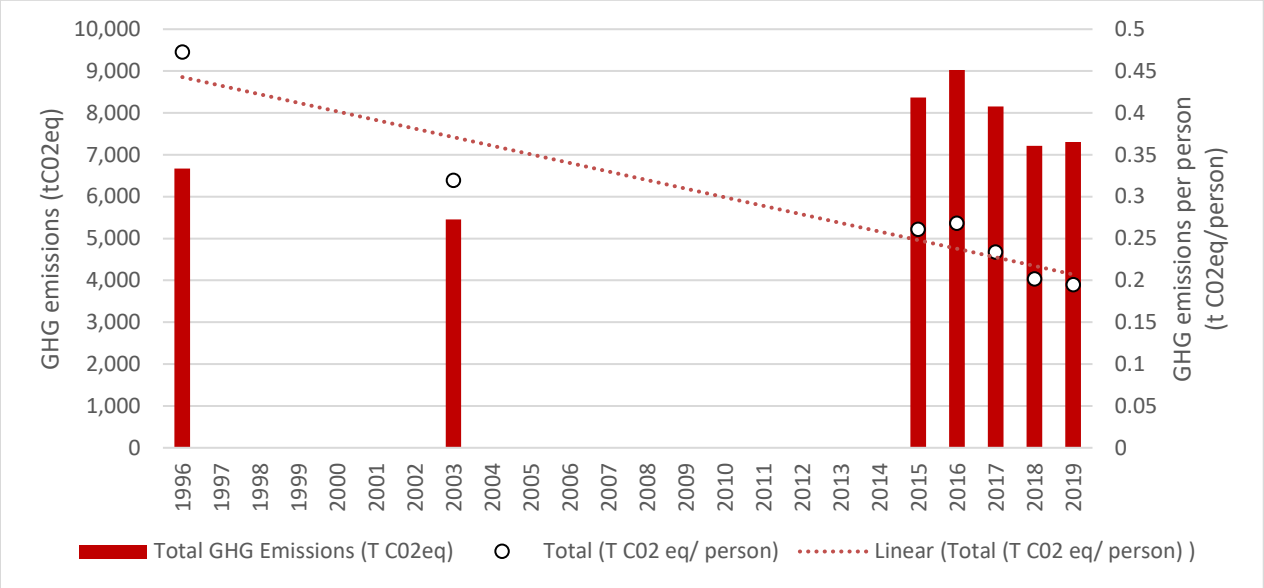

Figure 9: Corporate GHG emissions over time

Table 4: Corporate GHG emissions 1996-2019 (tCO_2eq)

Service Area	1996	2003	2015	2016	2017	2018	2019	Change 2015-19	2035 Goal
Buildings	4,526	3,012	4,962	5,217	4,735	4,508	4,893	-1.4%	
Fleet	419	368	843*	662	856	895	876	+3.9%	
Water & sewage	572	627	711	863	663	631	690	-3.0%	
Lights & signs	1,157	1,450	1,849	2,283	1,901	1,183	846	-54.2%	
Total	**6,675**	**5,456**	**8,365**	**9,024**	**8,155**	**7,216**	**7,305**	**-12.7%**	
Total per capita	0.47	0.32	0.26	0.27	0.23	0.20	0.19	-26.9%	-50%

Note: * updated since the 2016 report; see fleet analysis section

The underlying source of corporate GHG emissions are shown in Figure 10 below. The majority of corporate GHG emissions (61%) are from electricity, followed by natural gas (27%) and vehicle fuel (12%).

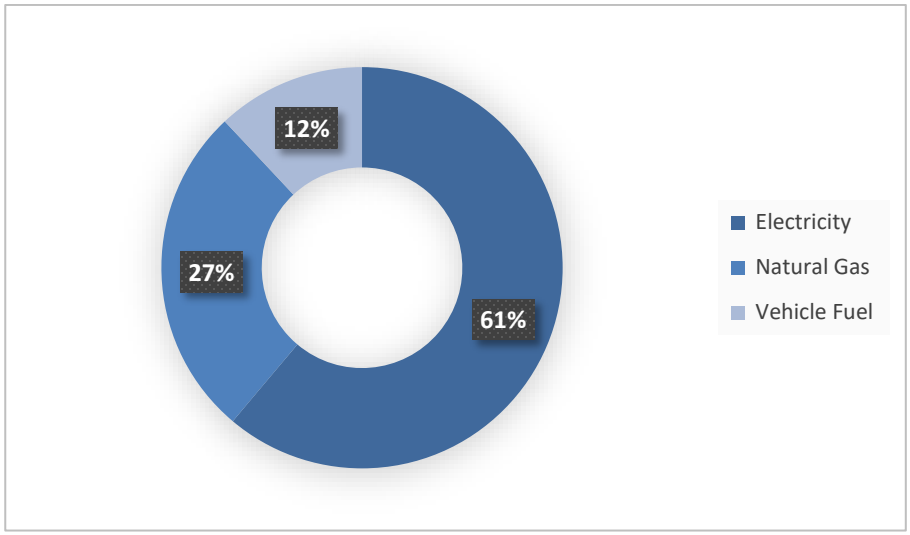

Figure 10: Energy Source of Corporate GHG Emissions in 2019

Energy use and GHG emissions by service areas

Corporate Buildings & Parks

Summary

This service area includes buildings and parks (B&P) operated by the City that use electricity and/or natural gas for their operation. Table 5 shows B&P energy use as well as per capita and per square metre energy use, and Table 6 shows the related GHG emissions.

Total corporate energy use for B&P has risen 20% since 2015, with most of the increase between 2018 and 2019. Total energy use was higher in 2019 than in 2018 due largely to the opening of the new RCMP facility as well as the expanded and renovated Protective Services building. During this time, the total footprint of B&P in the city has risen by 64%[3], and energy use per square meter has fallen by 27%. Buildings that have been constructed or renovated in the past several years have included a variety of energy efficiency components. Given the relative increase in energy use compared to the total footprint increase of corporate buildings and parks, it is likely that these energy efficiency measures have been helpful in reducing the energy use of city buildings and parks.

Table 5: Corporate Building Energy Use

Buildings & Parks Energy and Emission Trends	1996	2015	2018	2019	Change 2015-2019
Total Energy (GJ)	42,206	45,718	45,004	54,732	+20 %
Per Capita Energy Intensity (GJ/p)	3.0	1.4	1.3	1.5	+2.3%
Built Area Energy Intensity[3] (GJ/m^2)	2.5	1.6	1.3	1.2	-27%

Despite the increase in total energy use since 2015, total GHG emissions are 2% lower in 2019 than in 2015. This is largely due to the high proportion (61%) of building energy use from electricity, and the reduction in the GHG emissions intensity of the Alberta electrical grid since 2015. Per capita GHG emission intensity in 2019 was 50% lower than in 2015.

Table 6: Corporate Building GHG Emissions

Building Energy and Emission Trends	1996	2015	2018	2019	Change 2015-2019
Total Emissions (tCO_2eq)	4,526	4,962	4,500	4,886	-2 %
Per Capita Emissions Intensity (CO_2eq/p)	0.32	0.29	0.14	0.15	-50%
Built Area Emissions Intensity (tCO_2eq/m^2)	0.27	0.17	0.10	0.08	-51 %

[3] Since 2015, trees in Central Park are lit at Christmas. If the footprint of this Park is included in the calculations, the footprint rises to 105% and a per m^2 reduction of 40%. However, inclusion of this information in the total corporate footprint skews the data due to its small amount of electricity use over a relatively large area of land.

One important factor to consider when assessing building energy use from year to year is the weather. More energy use – particularly for heating – tends to be used in colder years than in warmer years. One metric that can be used to assess the impact of weather on energy use is Heating Degree Days (HDD). For a given day, the HDD is equal to the number of degrees below 18 °C that the day's mean temperature is. For a given year, the HDD is the sum of the HDD values for each day. Years with colder winters will have higher HDD values.

Figure 11 show total building and park natural gas and electricity use compared to HDD for that year. As would be expected, the total energy use in a given year is higher in years with a higher HDD.

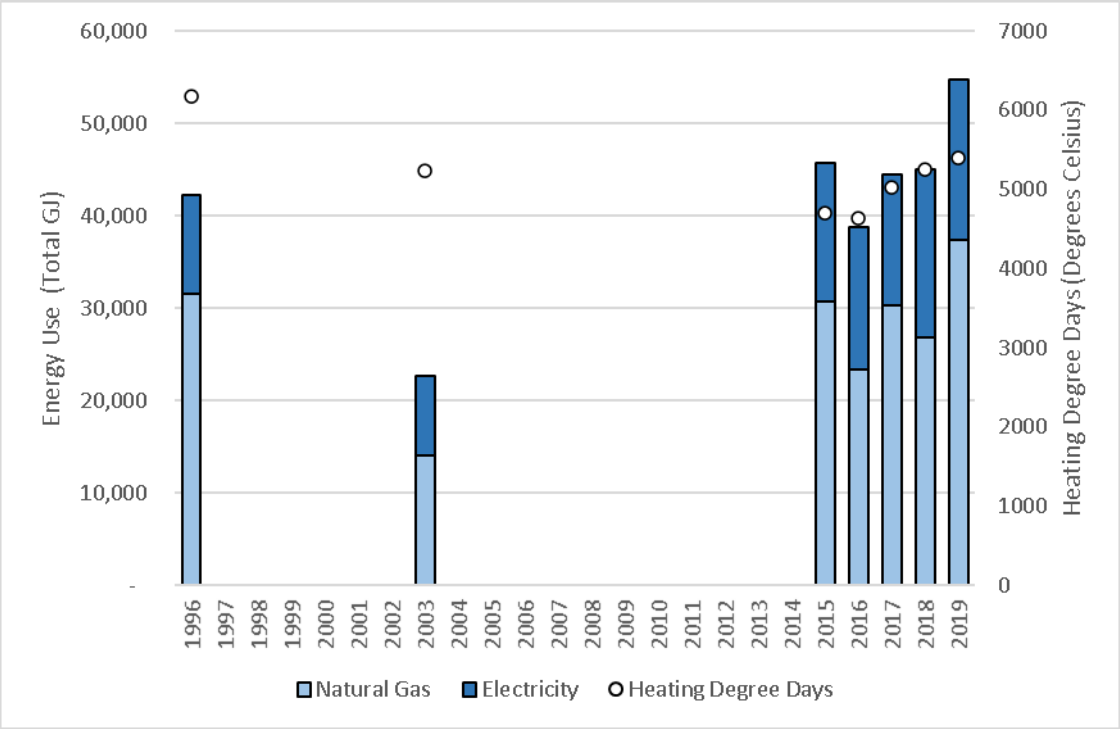

Figure 11: Corporate Building & Parks Energy Use

Building & Park Assessment by Type

Because buildings and parks are the source of the majority of Spruce Grove's corporate GHG emissions, this section explores these areas in further detail. There is a wide variability in the Spruce Grove's buildings and parks. To help understand this variability better, these buildings and parks have been grouped into similar types of categories, as shown in Table 7. The relative annual energy use in 2019 between these categories are shown in Figure 12. Parks and outdoor recreation areas use the least energy, and indoor recreation facilities use the most energy by a substantial margin.

Table 7: Building Names and Service Type Categorizations

Parks & Outdoor Recreation	Public Works & Eco Centre
Central Park Christmas Tree Lights	Eco Centre
Henry Singer Park	PW Spruce Ridge Satellite
Aspenglen Rink	PW Shop - Schram St.
Columbus park	PW Shop - Century Cl.
Brookwood Rink	**Other City Services**
Jubilee Park	Transit Building
Other (tunnel and rink)	FCSS
Protective Services	Log Cabin
RCMP Facility	Elks Hall
Protective Services	Library
Renovated Protective Services/Vacant RCMP*	City Hall
Indoor Recreation	
Fuhr Sports Park/ West District Park	
BPAC	
Agrena	

*Refers to the protective services building, which historically housed the RCMP, that was substantially renovated and expanded in 2019

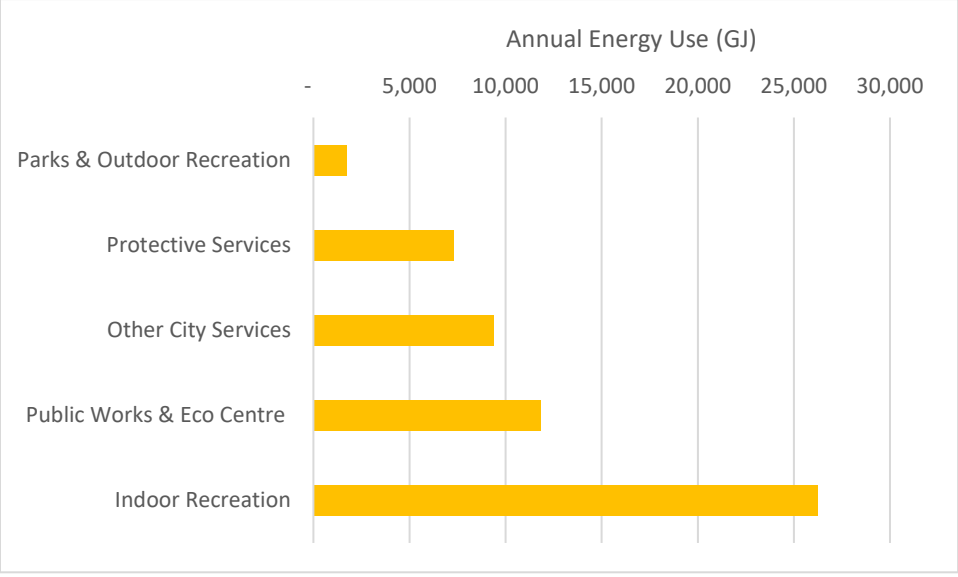

Figure 12: Relative annual energy use of city building categories in 2019

An addition to using more total energy than buildings in other categories, Table 8 shows how indoor recreation facilities are also energy intensive per square metre of floor space. While certain types of facilities will always use more energy than others, this information can still be useful when identifying targets for energy efficiency improvements.

Table 8: Energy Use and Intensity by Building or Park Type - 2019

City Service Category	Total Energy Used (GJ) - 2019	Energy Use Intensity (GJ/m^2)
Parks & Outdoor Recreation	1,743	0.10
Protective Services	7,299	0.37
Other City Services	9,388	0.54
Public Works/Eco Centre	11,839	1.28
Indoor Recreation	26,248	2.40

Cost and GHG Savings - Agrena

The Agrena contains two full-sized ice rinks in the winter that are used for public skating and a variety of sports. It is the building with the largest total energy use that belongs to the city. This energy is split between electricity use (33% of energy use in 2019) and natural gas (67% of energy use in 2019). As with other buildings, more energy tends to be used in years with more 'heating degree days', as is shown in Figure 13.

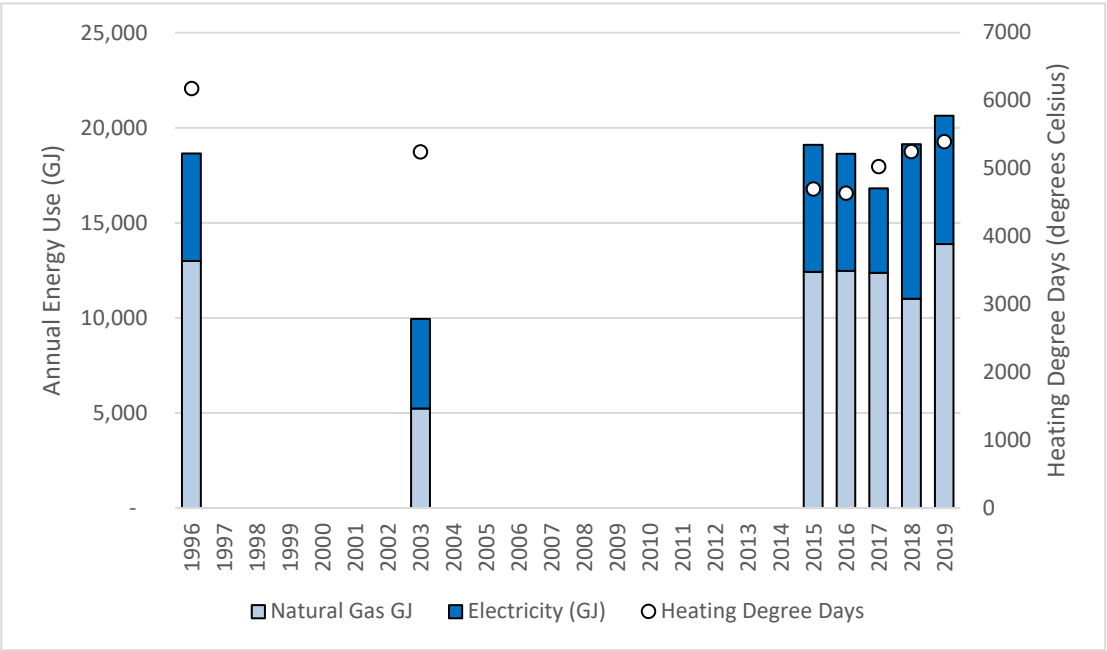

Figure 13: Agrena Energy Use and Winter Weather

Energy use in 2003 was significantly lower than in other years. This was likely due to a period of major construction renovations that year which meant the facility was closed to the public for several months.

There have been some efforts to improve the efficiency of the lights in the Agrena:

- In 2013 half the building moved to T5 lights
- In 2015 the remainder of building moved to LED lights

The installation of these lights was expected to reduce electricity use in the Agrena. One way to estimate the size of these energy savings over time is to estimate how much energy would have been used for electricity if the building had the same energy use as it did before these lights were installed, normalized to account for temperature fluctuations between years. While Agrena electricity use in 2012 – before the T5 lights were installed – was not readily available, it is possible to compare energy use in 2015 to the years since then.

In Table 9, several Agrena electricity use factors are shown: annual electricity used, the annual 'heating degree days (HDD)', and electricity use normalized to those HDD, for 2015, 2016-2019, and the difference between the two. A higher 'normalized' electricity use value implies more energy use in cold weather, and a lower value implies less energy use. The value of electricity use normalized for winter temperatures is the highest in 2015, indicating improved energy efficiency since that time. If no other factors relating to energy use changed at the facility during this time (e.g. hours the facility was open, or other reasons for the lights to be on or off throughout the year), then it can be estimated that the LED lighting improvements have saved an average of 1070 GJ of electricity, 158 tC02eq and $17,000 per year between 2016-2019 (2019 dollars).

Table 9: Agrena electricity use factors

Agrena	2015	2016-2019 average	Difference
Annual Electricity Used (GJ)	6674	6373	301
Annual HDD (°C)	4697	5077	380
Normalized electricity use (GJ/°C HDD)	1.42	1.30	0.12

Fleet analysis

Fuel use from corporate fleet vehicles is relatively evenly split between gasoline and diesel, as shown in Table 10. Fuel energy consumption rose by 3.9% since 2015. On a per capita basis, energy from fuel use fell by 11.3% since 2015.

Table 10: Energy from Corporate Vehicles

Energy from Fuel	1996	2015	2018	2019	Change 2015-2019
Gasoline (GJ)	2,510	5,626*	6,002	5,966	+6.0%
Diesel (GJ)	3,196	6,653*	7,020	6,792	+2.1%
Total (GJ)	**5,706**	**12,279***	**13,022**	**12,758**	**+3.9%**
Total per person (GJ/p)	0.40	0.38	0.36	0.34	-11.3%

*updated from previously reported values

Trends in GHG emissions from corporate fuel use are almost identical to energy use. The majority of corporate fuel GHG emissions come from vehicles classified as either trucks (41%) or tractors (36%) – a term used to describe utility vehicles such as bobcats, forklifts, grass mowing machines, and gravel trucks. Remaining GHG emissions come from cars and vans (12%), Specialized Transit Service vehicles (4%), fire trucks and related equipment (3%), and other machinery such as generators and rototillers (3%).

Table 11: GHG Emissions from Corporate Vehicles

GHGs from Fuel	1996	2015	2018	2019	Change 2015-2019
Gasoline (t CO_2eq)	178	373	398	396	+6.1%
Diesel (t CO_2eq	242	470	496	480	+2.2%
Total (t CO_2eq)	**419**	**843**	**895**	**876**	**+3.9%**
Total per person (t CO_2eq /person)	0.030	0.026	0.025	0.023	-11.3%

The values shown in Table 10 and Table 11 above for the year 2015 are revised from those reported in Spruce Grove's 2016 Energy Management Plan. Initial analysis of the reported results indicated unexpected differences in fuel use between 2015 and 2016-2019. Fuel use records were re-analyzed, and the resulting values, which are more comparable to recent years, are reported here.

Additional Staff Travel

In addition to travel using corporate vehicles, Spruce Grove staff sometimes use their own vehicles on city business, stay overnight on city-related work, and take flights to locations for city work. These type of GHG emissions fall just outside of the scope of emissions calculated using the methodology this report is based on. However, it is informative to track these GHG emissions to understand the relative GHG impacts from this type of staff travel. Spruce Grove staff have tracked GHG emissions from mileage claims and hotel reimbursements since 2017. Estimated GHG emissions are shown in Table 12 below. These emissions are an under-estimate of GHG emissions from staff travel. This partly because is possible that not all mileage and hotel night stays were reported in the available dataset. As well, although a number of city staff take flights each year on behalf of the City, information about how many flights were taken and to what locations was not readily available. For context, a single round trip flight to Ottawa, assuming no stopovers and an economy class ticket, is estimated to emit 0.7 tCO_2eq. So, one round-trip flight to Ottawa each month of the year would increase the estimate of additional staff travel emissions by 26%.

Table 12: GHG emission factors and GHG emissions from staff travel

Year	Motor vehicle distance travelled	GHG emissions from motor vehicle travel (tC02eq)	Hotel Nights	GHG emissions from hotel stays (tC02eq)	Estimated GHG emissions from motor vehicle use and hotel stays (tC02eq)*
2017	53,810	18.4	118	1.5	**19.9**
2018	70,921	24.5	75	0.9	**25.5**
2019	93,413	32.3	14	0.2	**32.5**

*values do not sum exactly due to rounding

Water and Sewage

Spruce Grove has several intermediate facilities that assist with the transportation of their water and sewage. This inventory does not include the assessment of GHG emissions from treatment of water and sewage. Energy use for these facilities increased by 26% from 2015, as shown in Table 13. This is due to the opening of the Reservoir Pump Station in 2017.

Table 13: Water and sewage facility energy use

Source	1996	2015	2018	2019	Change 2015-2019
Electricity (GJ)	1,929	2,883	3,048	3,568	+18%
Natural Gas (GJ)	808	1,081	2,024	1,420	+31%
Total (GJ)	**2,737**	**3,964**	**5,071**	**4,988**	**+26%**
Total/person (GJ/person)	0.194	0.124	0.142	0.133	+7%
Facility Footprint (m^2)	276	298	639	639	+114%

Table 14: Water and Sewage Facility GHG Emissions

Source	1996	2015	2018	2019	Change 2015-2019
Electricity (t $C0_2$eq)	532	657	528	619	-6%
Natural Gas (t $C0_2$eq)	41	54	102	72	+33%
Total (t $C0_2$eq)	**572**	**711**	**631**	**690**	**-3%**
Total/person (t $C0_2$eq/person)	0.041	0.022	0.018	0.018	-18%

Despite the increase in energy use since 2015, GHG emissions for these facilities decreased by 3% since 2015. As noted elsewhere, this is due to the reduced GHG intensity of the Alberta electrical grid between 2015 and 2019.

Lights & Signs

The city reduced its energy use for lights and signs by 40% between 2015-2019, as shown in Table 15. Related GHG emissions are shown in Table 16. This dramatic reduction is due to the changeover to LED streetlights in 2018 and in 2019. Figure 14 shows light and sign energy use over time. In 2019, electricity use for lights and signs was only 17% higher than its value twenty-three years earlier, in 1996.

Table 15: Energy Use from Lights and Signs

Unit	1996	2015	2018	2019	Change 2015-2019
Energy (GJ)	4,171	8,117	6,933	4,884	-40 %
Energy Intensity (GJ/person)	0.30	0.25	0.19	0.13	-49 %

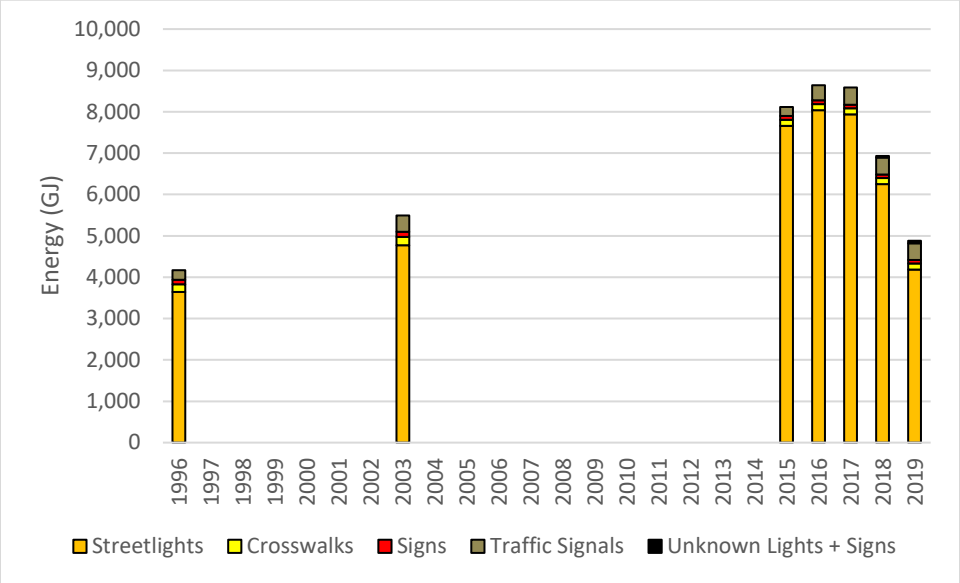

Figure 14: Electricity Use of Traffic Lights and Signs

This reduction in energy use carried over to GHG emissions. Total GHG emissions from lights and signs were 54% lower than 2015, and per capita GHG emissions were 61% lower than 2015.

Table 16: GHG Emissions from Lights and Signs

	1996	2015	2018	2019	Change 2015-2019
GHG Emissions (t CO_2eq)	1,157	1,849	1,183	846	-54 %
GHG Emissions Intensity (t CO_2eq /person)	0.08	0.06	0.03	0.02	-61 %

Cost and GHG Savings – LED Lights

The full effect of cost and GHG savings from LED streetlight installation will not be known until 2020 electricity use is compared to electricity use for streetlights prior to 2018, since some of the lights were installed in 2019. However, as an indicator of the type of magnitude that can be expected in future years, if the same amount of electricity had been used in 2019 as in 2015, light and sign use in 2019 would have cost an additional $51,647 (in 2019 dollars) and an additional 561 tC02eq emissions (based in the GHG intensity of the electricity grid in 2019). .

6. COMMUNITY INVENTORY

Summary and Trends

Community GHG Emissions can be broken into the categories of: residential; institutional, commercial and industrial (ICI); road transportation; and solid waste. Figure 15 shows how these four categories contributed to total community GHG emissions in 2019. The largest source of community GHG emissions is road transportation, at 45%. The next largest source is from the residential sector (31%), followed by ICI (22%) and landfill waste (2%).

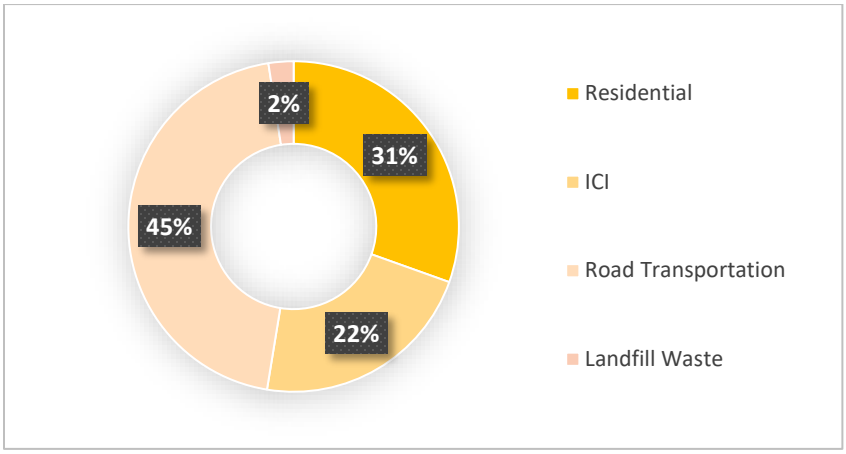

Figure 15: Sources of community GHG emissions by source sector - 2019

These same GHG emissions organized by fuel type are shown in Figure 16. Vehicle fuels are the largest component, in the form of gasoline (36%), diesel (9%) and propane (0.2%). This is followed by electricity (28%), natural gas (24%) and landfill waste (3%).

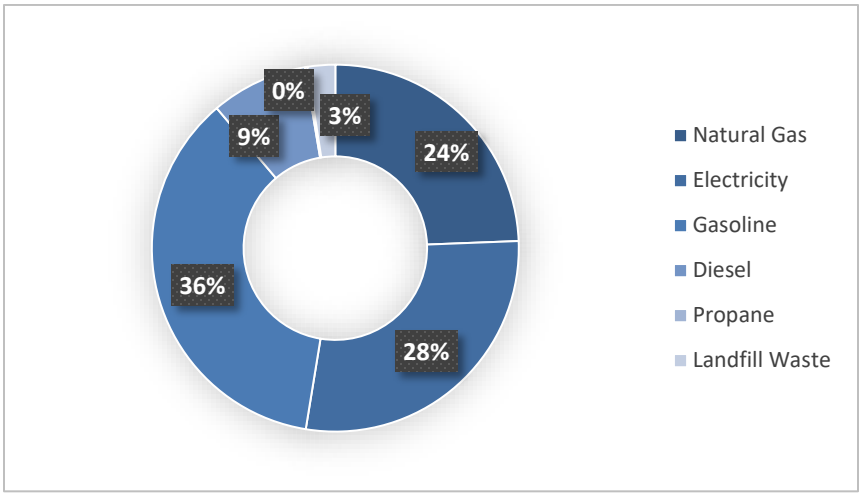

Figure 16: Energy sources of community GHG emissions - 2019

Community energy use for each inventoried year is shown in Table 17. The related GHG emissions are shown in Table 18. The table also shows the per person energy and GHG reduction goals for 2035 that relate to a 2015 baseline. These values are shown visually in Figure 17 and Figure 18.

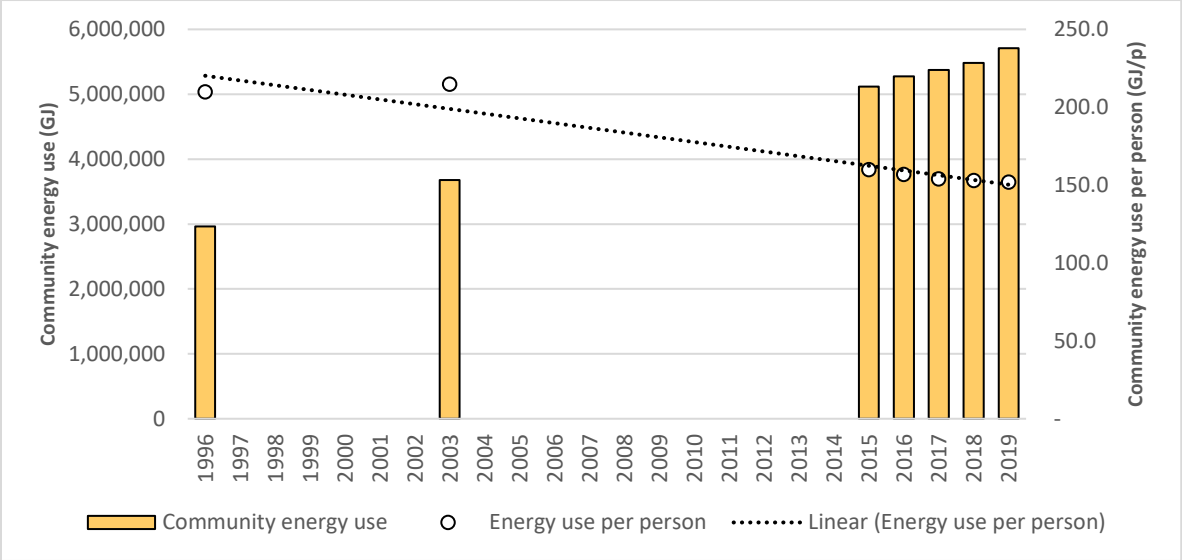

Figure 17: Community energy use

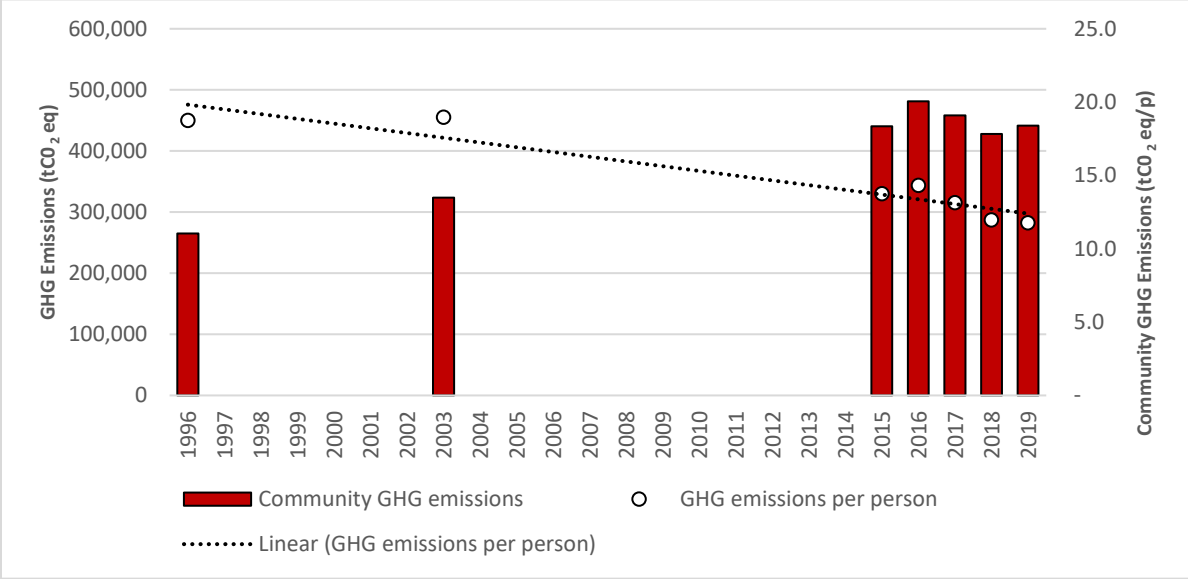

Figure 18: Community GHG emissions

Table 17: Community energy use

Source Sectors	1996	2003	2015	2016	2017	2018	2019	Change 2015-19	2035 Goal
Residential (GJ)	979,232	1,036,836	1,424,162	1,485,153	1,654,320	1,709,942	1,780,184	+25.0%	
ICI (GJ)	572,789	575,762	874,170	922,579	990,573	1,010,167	1,070,509	+22.5%	
Road Transportation (GJ)	1,410,008	2,065,895	2,817,544	2,868,139	2,730,867	2,763,118	2,857,366	+1.4%	
Solid Waste (GJ)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Total (GJ)	**2,962,029**	**3,678,493**	**5,115,876**	**5,275,871**	**5,375,760**	**5,483,227**	**5,708,059**	**+11.6%**	
Total per person (GJ/p)	210	215	160	157	154	153	152	-5.0%	-25%

Table 18: Community GHG emissions

Source Sectors	1996	2003	2015	2016	2017	2018	2019	Change 2015-19	2035 Goal
Residential (t CO_2eq)	101,536	114,014	131,358	148,680	149,166	131,549	134,466	+2.4%	
ICI (t CO_2eq)	59,515	63,328	106,109	126,095	110,097	94,548	97,638	-8.0%	
Road Transportation (t CO_2eq)	100,908	144,711	195,930	199,300	189,738	191,979	198,527	+1.3%	
Solid Waste (t CO_2eq)	2,915	1,765	6,923	7,433	9,492	9,689	10,796	+24.7%[1]	
Total (t CO_2eq)	**264,874**	**323,818**	**440,319**	**481,507**	**458,493**	**427,765**	**441,428**	**+0.3%**	
Total per person (t CO_2eq/p)	18.8	19.0	13.7	14.3	13.1	12.0	11.8	-14.4%	-35%

[1]Due to a change in methodology between years, the change between time periods appears to be +55.9%, but when similar methods are applied to both years, the true change is +24.7%

Total community energy use has risen each year since 2015. This was due to residential and ICI energy use, which increased by 25% and 22%. This increase was partially offset by an incremental increase in road transportation energy use. However, the trend in per capita energy use is negative, as shown by the trendline in Figure 17.

While community energy use increased since 2015, total GHG emissions stayed essentially the same (0.3% increase). Increased residential, road transportation and solid waste were offset by reduced ICI emissions. Per person emissions are 14% lower than in 2015.

Emissions Source Sectors

Residential

The Residential sector refers the natural gas and electricity used by Spruce Grove residents to heat and power their homes. Table 19 shows selected years of energy use over time. Energy use broken down by source is shown in Figure 19.

Since 2015, Spruce Grove's population is estimated to have increased by 17%. In that time, total residential energy use has increased by 25%. This is primarily driven by a 30% increase in natural gas consumption. This increase in natural gas use remains when natural gas values are normalized to winter temperatures, as shown in Table 19. Total energy use per person has increased by 7%.

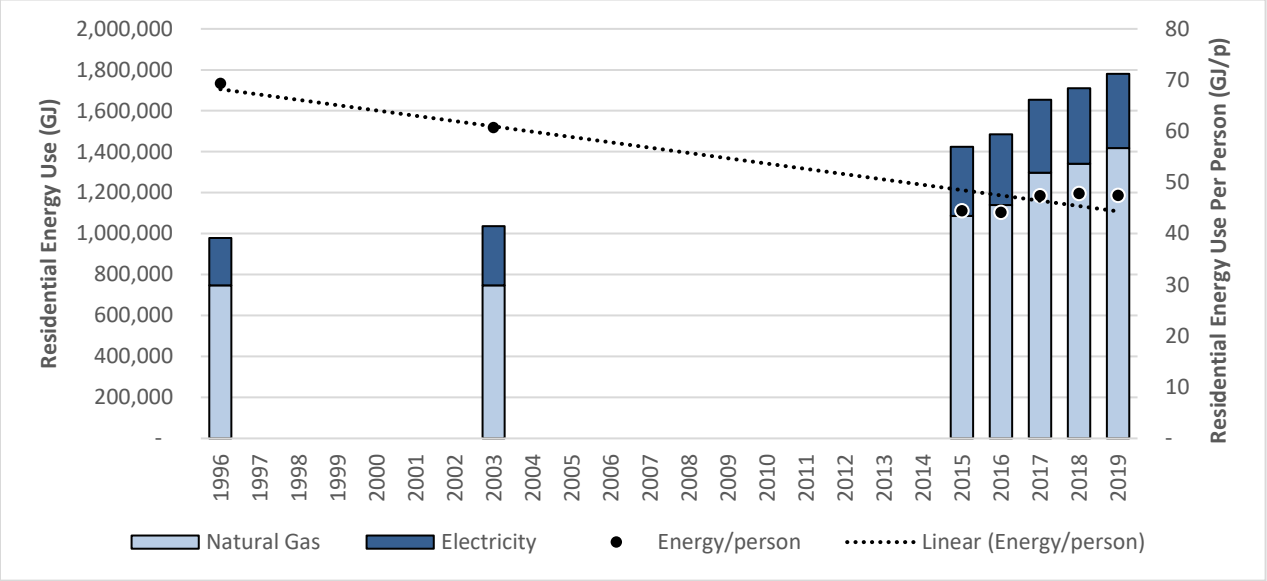

Figure 19: Sources of residential energy use

Table 19: Residential energy use

	1996	2015	2018	2019	Change 2015-2019
Natural Gas (GJ)	747,880	1,087,173	1,341,796	1,417,140	+30 %
Electricity (GJ)	231,352	336,989	368,146	363,044	+8 %
Total (GJ)	**979,232**	**1,424,162**	**1,709,942**	**1,780,184**	**+25 %**
Total per person (GJ/p)	69	44	48	47	+7 %
Normalized Energy (GJ/°C HDD)	121	231	258	256	+11%

Residential GHG emissions have also risen since 2015, but only by 2%. This value is lower than the rise in energy use due to a) the relative GHG emissions intensities of natural gas and electricity and b) the reduction in electricity GHG intensity from 2015 to 2019. As shown at the beginning of the report, in 2019 each GJ of electricity produced three times as many GHG emissions as a GJ of energy from natural gas. So even though the source of more residential energy is from natural gas use than electricity, electricity use is a large proportion of total residential GHG emissions. The GHG intensity of electricity has fallen since 2015, resulting in reduced GHG emissions from electricity. On a per person basis, GHG emissions have fallen by 13% since 2015.

Table 20: Residential GHG emissions

	1996	2015	2018	2019	Change 2015-2019
Natural Gas (t CO_2eq)	37,786	54,599	67,713	71,515	+31%
Electricity (t CO_2eq)	63,750	76,759	63,836	62,951	-18%
Total T (t CO_2eq)	**101,536**	**131,358**	**131,549**	**134,466**	**+2.4%**
Total per person (t CO_2eq/p)	7.19	4.10	3.68	3.58	-13%

Industrial, Commercial and Institutional (ICI)

The 'Industrial, Commercial and Institutional' (ICI) category includes energy use and GHG emissions from local businesses. In past years, it was possible to split industrial energy use from commercial and institutional energy use. However, due to client privacy concerns, it was only possible to obtain a combined 'industrial, commercial and institutional' value for natural gas use in 2019. Therefore, for ease of comparison, combined 'ICI' results are reported below for both 2019 and past years.

Total ICI energy use has increased since 2015, by 22.5%, as shown in Table 21. As with residential energy, this is primarily due to a 37% increase in natural gas use. ICI energy use person has increased by 5%, although the long-term trend since 1996 is negative.

Table 21: ICI energy use

	1996	2015	2018	2019	Change 2015-2019
Natural Gas (GJ)	436,916	523,821	655,740	715,713	+37%
Electricity (GJ)	135,873	350,349	354,427	354,796	+1%
Total (GJ)	572,789	**874,170**	1,010,167	**1,070,509**	**+23%**
Total per person (GJ/p)	41	27	28	29	+5%
Normalized Energy (GJ/°C HDD)	93	186	193	198	+6%

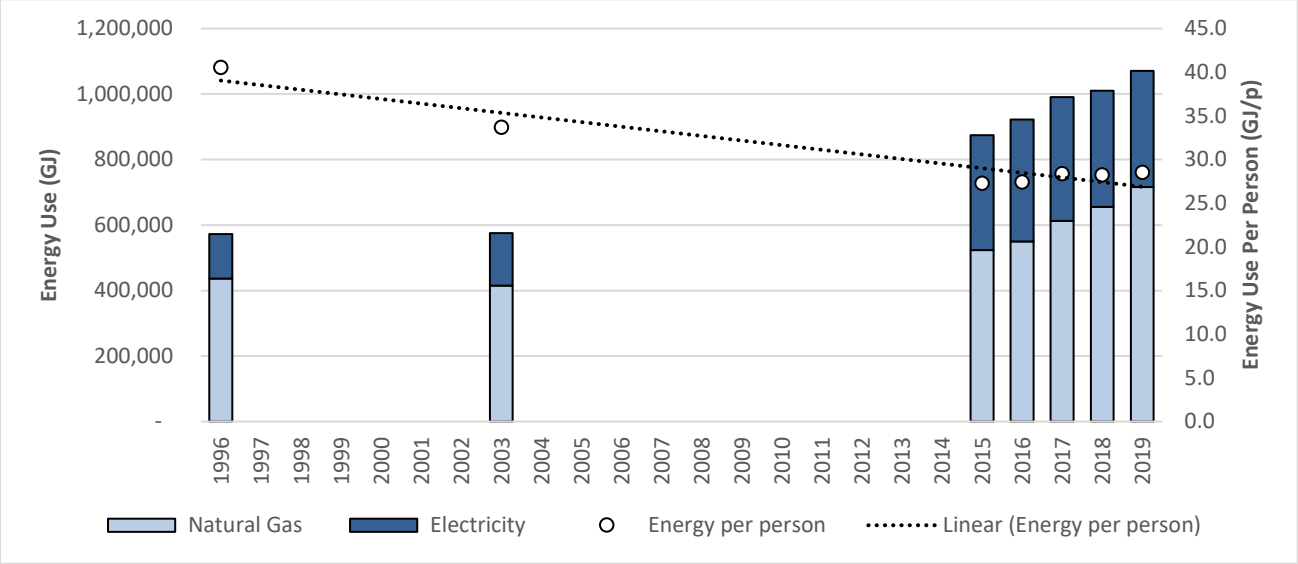

Figure 20: ICI energy use

GHG emissions from the ICI sector decreased by 8% since 2015, shown in Table 22. Similar to the residential sector, the increased GHG emissions from natural gas were offset by the high GHG intensity of electricity and the drop in that intensity since 2015.

Table 22: ICI GHG Emissions

	1996	2015	2018	2019	Change 2015-2019
Natural Gas (t CO_2eq)	21,451	26,307	33,092	36,118	+37%
Electricity (t CO_2eq)	36,429	79,802	61,456	61,520	-23%
Total T (t CO_2eq)	**57,880**	**106,109**	**94,548**	**97,638**	**-8%**
Total per person (t CO_2eq/p)	4.1	3.3	2.6	2.6	-21%

Road Transportation

Road Transportation refers to GHG emissions from personal vehicle use by Spruce Grove residents. Energy use and GHG emissions for road transportation were originally estimated using the PCP tool, and then refined using Natural Resources Canada reference values. For consistency of comparability, this process was used to estimate GHG emissions from 2015-2019.

Table 23 below shows changes in vehicle numbers, estimated annual mileage per vehicle, and estimated total kilometres travelled by all vehicles in the city in 2015, 2018 and 2019. While the total number of vehicles rose by 7% in Spruce Grove between 2015 and 2016, the annual distance travelled by those vehicles is estimated to have declined by 4%. This results in a 2% reduction in estimated total vehicles kilometres travelled between 2015 and 2019.

Table 23: Spruce Grove vehicle characteristics

	2015	2018	2019	Change 2015-2019
Registered vehicles in Spruce Grove	43,838	45,237	46,780	+7%
Estimated annual km/vehicle	16,074	15,410	15,410	-4%
Estimated total km, all Spruce Grove vehicles	704,652,012	697,102,170	720,879,800	-2%

The majority of fuel use energy in Spruce Grove is from gasoline powered vehicles, followed by diesel and a small fraction of propane vehicles. Total fuel use energy doubled since 1996, and increased by 1% since 2015. Fuel energy use per person is estimated to have gone down by 13% since 2015, and is trending downwards over time, as shown in Figure 21.

Table 24: Community fuel use energy

	1996	2015	2018	2019	Change 2015-2019
Gasoline (GJ)	983,406	2,153,023	2,235,187	2,311,427	+7%
Diesel (GJ)	406,468	645,578	513,330	530,840	-18%
Propane (GJ)	20,134	18,943	14,601	15,099	-20%
Total Fuel (GJ)	**1,410,008**	**2,817,544**	**2,763,118**	**2,857,366**	**+1%**
Fuel/person (GJ/p)	100	88	77	76	-13%

Estimated GHG emissions from community vehicles are shown in Table 25. The relative change in GHG emissions between 2015-2019 matches the estimated fuel energy use.

Table 25: GHG emissions from community vehicles

TONNES	1996	2015	2018	2019	Change 2015-2019
Gasoline (tCO_2eq)	70,243	148,954	154,654	159,929	7%
Diesel (tCO_2eq)	28,973	45,834	36,445	37,688	-18%
Propane (tCO_2eq)	1,204	1,142	880	910	-20%
Total (tCO_2eq)	**100,420**	**195,930**	**191,979**	**198,527**	**+1%**
Total /p (tCO_2eq/p)	7	6	5	5	-13%

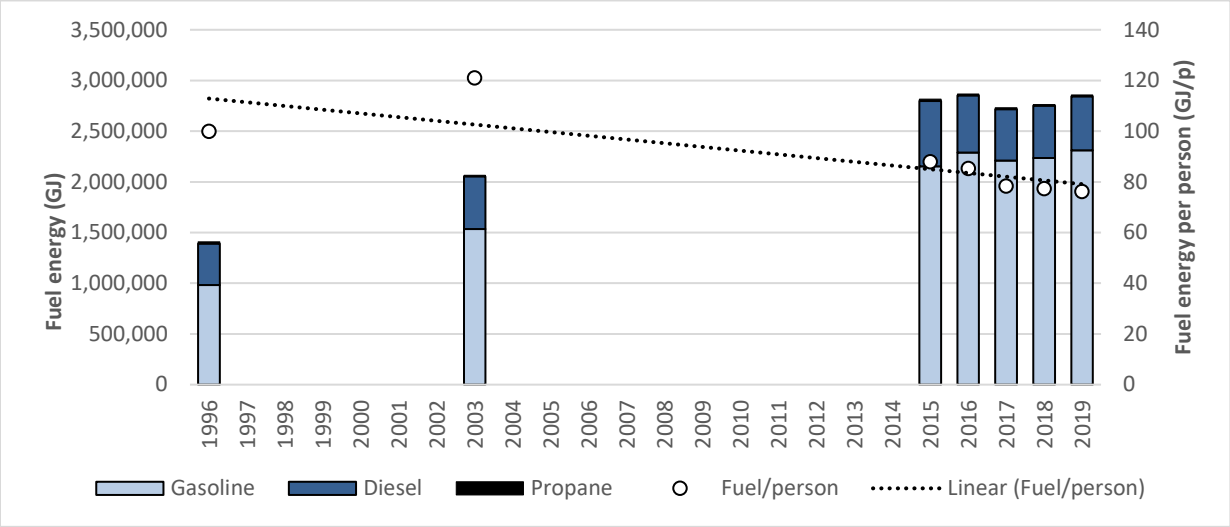

Figure 21: Community Fuel Use Trends

Landfill Waste

This category refers to emissions of biodegradable waste material that has been sent by residents to the landfill. Material that is recycled or collected in Spruce Grove's 'Green Bin' program and composted is not included in the following assessment. Landfill waste composed 60% of the total waste stream in 2019.

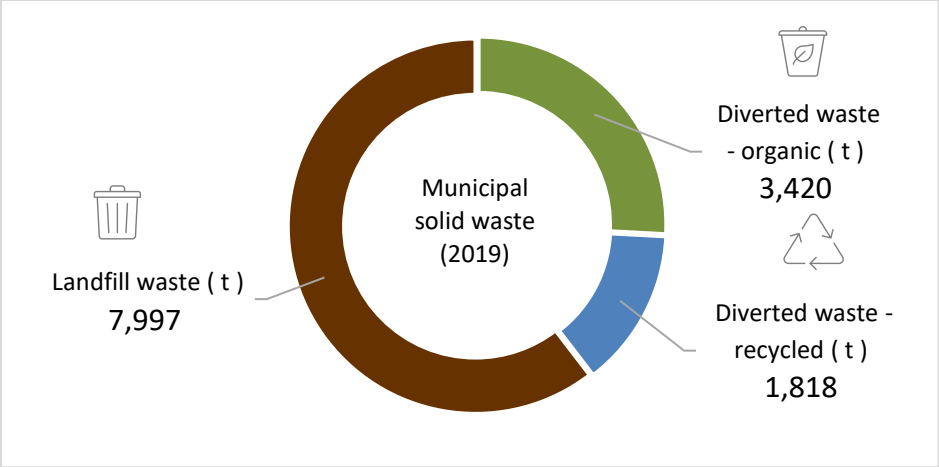

Figure 22: Proportion of waste streams - 2019

The weight of landfill waste in 1996 and 2003 was not available. The weight of landfill waste from 2015-2019 is shown in Table 26. The volume of landfill waste has increased by 25% since 2015, despite a 7% increase in the landfill diversion rate over this time. The weight of landfill waste per person has also increased by 7% since 2015.

Table 26: Weight of landfill waste

	2015	2016	2017	2018	2019	Change 2015-2019
Landfill waste (t)	6,410.5	6,883.0	7,031.3	7,176.9	7996.79	+25%
Landfill waste per person (t/p)	0.200	0.205	0.202	0.201	0.213	+7%
Landfill Diversion Rate	37%	44%	41%	41%	40%	+7%

The city of Spruce Grove conducted a residential waste audit in both 2016 and 2019. As a result of this, it was possible to update the assumptions used to estimate GHG emissions from landfilled waste from the previously used 'default' values. A summary of the differences between these sets of assumptions is shown in Table 27. The most important difference to note is that the estimate percent of the waste stream composed of organic material is almost 10% higher in the updated assumptions. This resulted in higher estimated GHG emissions.

Table 27: Differences in assessed waste stream composition

Waste Categories	Default assumptions	Updated assumptions	Difference in interpreted waste percentages
Food	28.4	26.4	-2.0%
Garden + Plant Debris	8.9	16.8	+7.9%
Paper & Cardboard	10.7	15.6	+4.9%
Wood Products	0.6	2.3	+1.7%
Textiles	5.0	2.3	-2.7%
Percent of waste stream composed of organic material	53.6	63.5	+9.9%
Degradable organic carbon per tonne of landfill waste	0.12	0.15	0.03

In Table 28, estimated GHG emissions from waste using both the default and updated assumptions are shown. Underlined values indicate the results shown in each year's GHG inventory. The two estimates are shown below together to explain the otherwise large apparent increase in waste GHG emissions between 2016 and 2017. Under both sets of assumptions, GHG emissions from landfilled waste have increased by 25% since 2015. Per capita GHG emissions have increased by 7% since 2015.

In the 2016 Energy Management Plan, the reported values for waste in 1996, 2003 and 2015 were the weight of the fraction of landfill waste assumed to be either paper products, food waste, plant debris or wood/textiles – not GHG emissions. The inventory tables have been updated to report the GHG emissions from that waste.

Table 28: Estimated GHG emissions, old vs updated assumptions

Waste over time	2015	2016	2017	2018	2019	Change 2015-2019
GHG Emissions (tCO_2eq) – Default assumptions	<u>6923</u>	<u>7433</u>	<u>7594</u>	7751	8,637	+25%
GHG Emissions (tCO_2eq) – Updated assumptions	8653	9291	9492	<u>9689</u>	<u>10,796</u>	+25%
GHG Emissions/person (tC02eq/p) – Updated assumptions	0.20	0.21	0.20	0.201	0.21	+7%

<u>Underlined</u> values indicate the final value reported in the inventory

7. PROJECTED EMISSIONS AND TARGETS

Corporate GHG emissions

Spruce Grove aims to reduce corporate GHG emissions per capita to 50% below 2015 levels by 2035. The figures below compare two scenarios: a conservative scenario in which business as usual (BAU) per capita GHG emissions remain constant at 2018-2019 levels, and a scenario in which the goal per capita GHG emissions are achieved in a linear pathway.

Figure 23 shows the difference in per capita emissions between the conservative BAU scenario and the goal scenario. By 2035, per capita corporate GHG emissions need to be at or below 0.13 t $C0_2$eq/capita to reach the 2035 target.

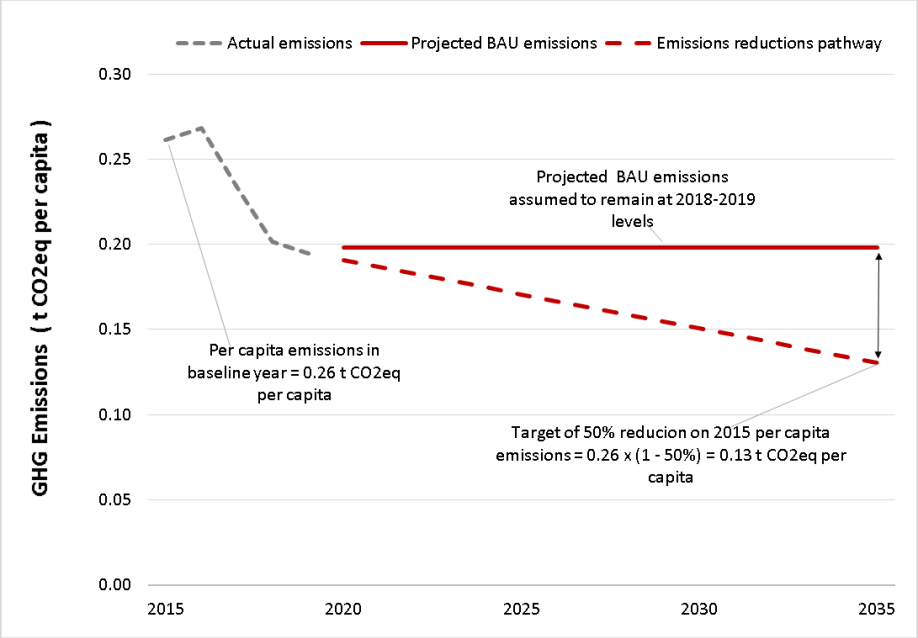

Figure 23: Actual (2015-2019) and projected (2020-2035) BAU corporate per capita GHG emissions and linear pathway to 2035 target

Figure 24 shows how total annual GHG emissions would change from year to year under the same scenarios shown in Figure 23. Total emissions per year will continue to grow even if the per capita GHG emission value stays constant over time.

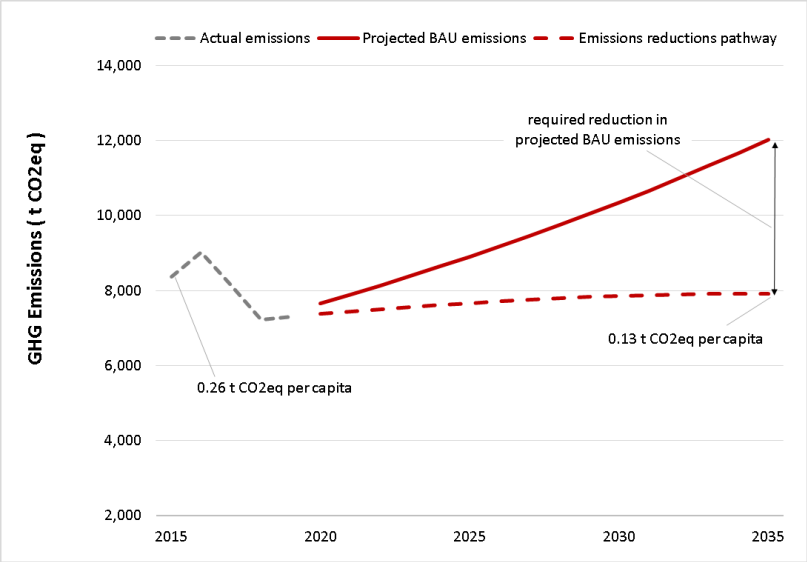

Figure 24: Actual (2015-2019) and projected (2020-2035) BAU corporate GHG emissions (tonnes) and linear pathway to 2035 target

Figure 25 illustrates the cumulative carbon budget available (123,640 tCO_2eq) for corporate GHG emissions. This is the maximum number of GHG emissions (tCO_2eq) that can be emitted from Spruce Grove service areas between 2020 and 2035 and still achieve the GHG reduction target.

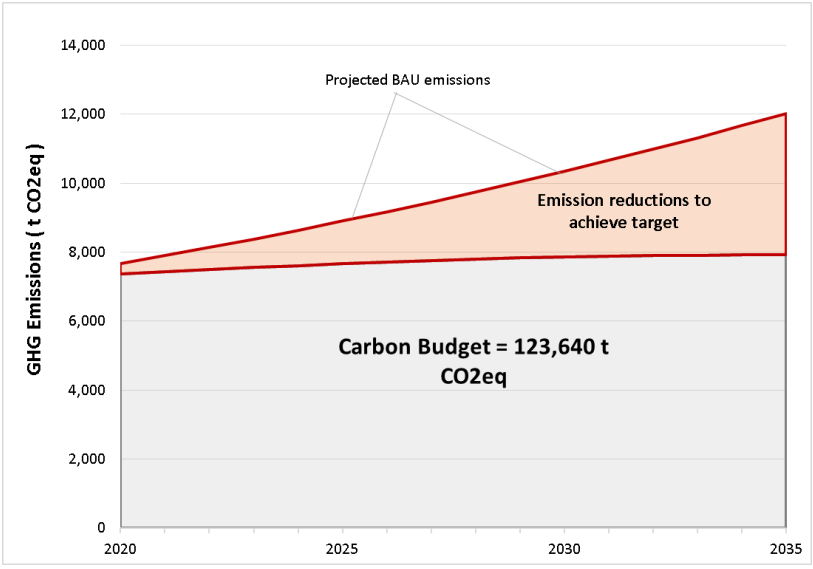

Figure 25: Required reduction in projected (2020-2035) BAU corporate GHG emissions (tonnes) and available carbon budget to achieve 2035 target

Community GHG emissions

Spruce Grove aims to reduce per capita GHG emissions from community source sectors by 35% below 2015 levels by 2035. Figures 26-28 illustrate the pathway towards this goal, compared to a conservative BAU situation where annual per capita community GHG emissions remain at 2018-2019 levels. Figure 26 shows changes in annual per capita GHG emissions, and Figure 27 shows changes to total annual GHG emissions.

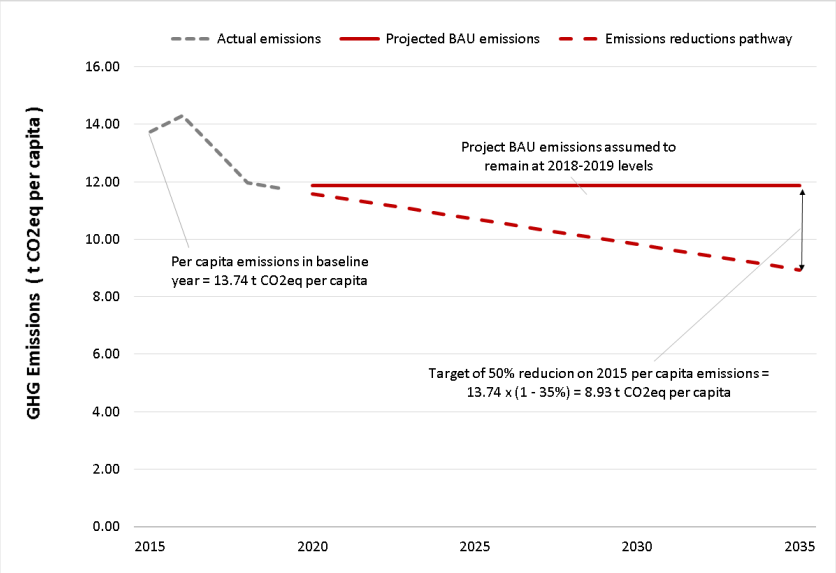

Figure 26: Actual (2015-2019) and projected (2020-2035) BAU corporate GHG emissions (tC02eq per capita) and linear pathway to 2035 target

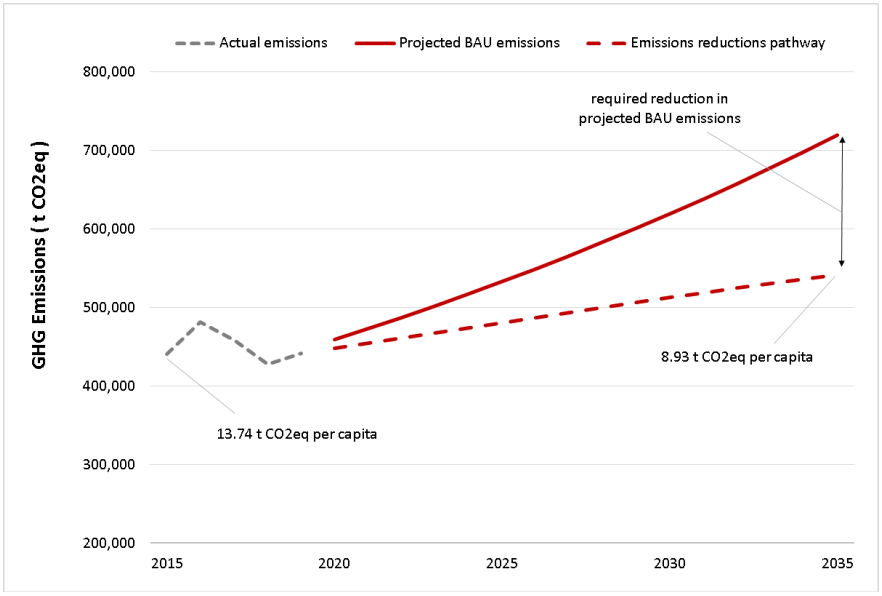

Figure 27: Actual (2015-2019) and projected (2020-2035) BAU community GHG emissions (total tC02eq) and linear pathway to 2035 target

Figure 28 illustrates the cumulative carbon budget (7,938,065 tCO_2eq) that is available to achieve the 2035 community emissions target. This value is significantly larger than the carbon budget for the corporate inventory, due to the larger relative value of community vs corporate GHG emissions.

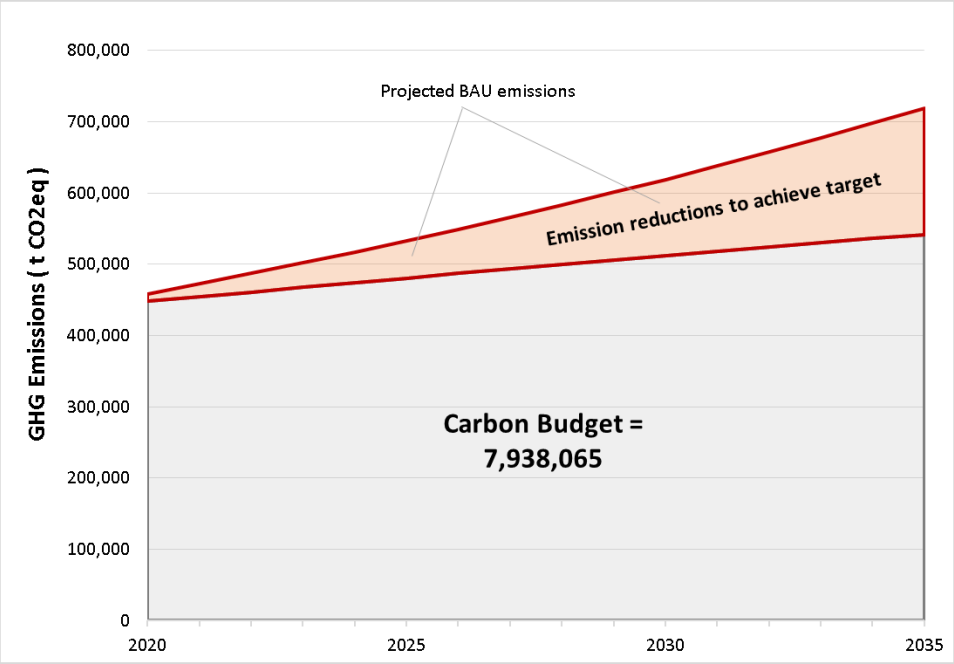

Figure 28: Required reduction in projected (2020-2035) BAU community GHG emissions (tonnes) and available carbon budget to achieve 2035 target

8. OPPORTUNITIES FOR GHG EMISSION REDUCTIONS

There are a wide variety of options that Spruce Grove could explore in order to reduce its GHG emissions. Below is a summary of options that have been identified as cost-effective measures by the cities of Leduc (2019), Calgary (2018) and Saskatoon (2018). While the economics and appropriateness of each measure will vary somewhat from city to city, these options serve as guidelines for Spruce Grove to investigate. Some options, such as improving the energy efficiency of city buildings, have already been pursued by Spruce Grove. These options are still included in the review below to provide context on the relative costs and benefits of various actions.

Recommendations that were identified in all three assessments included:

- Energy efficiency building retrofits
- Increased housing density
- Increased adoption of electric vehicles
- Increased installation of solar electricity

Both Calgary and Leduc recommended exploring the Clean Energy Improvement Program. This recently legalized 'PACE'-style financial tool allows energy efficiency upgrades to be paid for over time through property taxes.

Priorities for each city were expressed in different ways. Leduc identified the following actions as priorities, due to their relative cost and potential for GHG reductions, organized from higher to lower GHG reductions over time:

Table 29: Cost and Carbon Efficient GHG Reductions Identified in Leduc

Priority GHG Emission Reduction Actions in Leduc
• Biocover for landfill
• Garbage baling
• Infill/high density development policy
• Solar on selected city buildings
• LED Streetlights
• Energy retrofits to city buildings
• Mixed Use Development Policy
• Tree Planting

Calgary identified two 'top 10' lists of potential actions, with one list identifying the most cost effective GHG emission reduction actions and the other list identifying the actions with the highest GHG reduction potential.

Table 30: Cost and Carbon Efficient GHG Reductions Identified in Calgary

Most Cost Effective GHG Reduction Options	Actions with the Highest Potential for GHG Reduction
1. Adjust city land use through a Municipal Development Plan*	1. Improve **existing** single family homes through interventions such as: • Zero Energy buildings • High Performance-Based Standard • Upgrade to Mid Performance Based Standard • Upgrades to code
2. Increase Parking Levies*	2. Increase uptake of private electric vehicles*
3. Increase adoption of electric vehicles for commercial goods transportation	3. Improve **new** single family homes through interventions such as: • Zero Energy buildings • High Performance-Based Standard • Upgrade to Mid Performance Based Standard • Code plus efficient lights and appliances
4. Increase the adoption of private hybrid vehicles	4. Use the Advanced Energy Design Guide (AEDG) 30-50% goals when constructing new *retail* spaces
5. Increase the adoption of private electric vehicles*	5. Increase the use of biofuels

6. Retrofit existing apartments, townhouses and single family homes with efficient lights and appliances	6. Get energy from waste, incineration, and landfill gas utilization
7. Conduct 'shallow retrofits' of retail spaces, offices, and warehouses	7. Adjust city land use through a Municipal Development Plan*
8. Retrofit **new apartments, townhomes and single family homes** relating to the building code as well as efficient lights and appliances	8. Increase parking levies*
9. Conduct moderate to deep retrofits of existing retail spaces	9. Reduce car ownership
10. Use the Advanced Energy Design Guide (AEDG) 30-50% goals when constructing new *office buildings*	10. Improve **existing townhouses** through interventions such as: • Zero Energy buildings • High Performance-Based Standard • Upgrade to Mid Performance Based Standard • Code plus efficient lights and appliances

*On both lists

Saskatoon conducted an analysis of the net cost or benefit for a series of mitigation actions. The actions described below all had a negative marginal abatement cost, indicating that over time the action would save money as well as reduce GHG emissions. While a list of 40 potential reduction targets were analyzed, the 6 actions described in Table 31 that were the most cost effective and had the largest capacity for GHG reduction are described below.

Table 31 Cost and Carbon Efficient GHG Reductions Identified in Saskatoon

Most cost effective	Largest capacity for GHG reduction
• Transit electric vehicles	1. Commercial electric vehicle adoption*
• Expansion of transit	2. Municipal Retrofits
• Installation of a Combined Heat and Power Plant at a local hospital	3. Efficient New Municipal Buildings
• Commercial electric vehicle adoption*	4. Personal electric vehicles
• Utility scale solar energy*	5. Commercial building retrofits
• Adoption of solar energy at existing commercial sites	6. Utility scale solar energy*

*On both lists

APPENDIX A: CORPORATE AND COMMUNITY INVENTORIES

1996 - Corporate

	NG (GJ)	NG ($)	NG (TC02eq)	Gasoline (L)	Gasoline (GJ)	Gasoline ($)	Gasoline ((TC02eq))	Diesel (L)	Diesel (GJ)	Diesel ($)	Diesel (TC02eq)	Electricity (kWh)	Electricity (GJ)	Electricity ($)	Electricity (TC02eq)
Buildings															
Agrena	12,998	$ 32,582.00	657									1,571,944	5,659	$ 112,702.00	1,559
Aspenglen Rink															
BPAC															
Brookwood Rink	254	$ 890.00	13									7,222	26	$ 900.00	7
City Hall	3,206	$ 8,976.00	162									342,778	1,234	$ 37,009.00	340
Eco Centre															
Elks Hall															
FCSS															
Fuhr Sports Park/ West District Park															
Protective Services	2,266	$ 6,421.00	114									266,944	961	$ 17,530.00	265
Henry Singer Park	95	$ 457.00	5									556	2	$ 241.00	1
Kinsmen Arts Centre															
Library	1,139	$ 3,361.00	58									160,278	577	$ 15,988.00	159
Log Cabin	223	$ 802.00	11									6,667	24	$ 2,000.00	7
Parks Shop	1,077	$ 3,092.00	54									11,944	43	$ 1,924.00	12
P&E - 414 King St.															
PW Shop - Century Cl.															
PW Shop - Schram St.	2,778	$ 7,847.00	140									209,167	753	$ 18,619.00	207
Pool	7,533	$ 20,756.00	381									377,222	1,358	$ 20,383.00	374
Fleet															
Cars				429	15	$ 223.00	1								
SGFS				7,029	246	$ 3,637.00	16	705	27	$ 327.00	2				
Tractors								49,530	1,897	$ 17,757.00	149				
Trucks				53,286	1,865	$ 27,249.00	133	33,211	1,272	$ 14,566.00	91				
STS															
Vans				10,971	384	$ 5,664.00	27								
Water & Sewage															
Water Commission (forme	508	$ 1,561.00	26									345,556	1,136	$ 26,320.00	313
Zone 2 Pump House	300	$ 1,005.00	15									220,278	793	$ 1,005.00	219
Truck Fill Station															
Lights&Signs															
Crosswalks												51,111	184	$ 2,215.00	51
Signs												28,889	104	$ 3,283.00	29
Streetlights												1,013,056	3,647	$ 336,531.00	1,005
Traffic Signals												73,056	236	$ 8,186.00	72
Total	32,377	$ 87,750.00	1,636	71,715	2,510	$ 36,773.00	178	83,446	3,196	$ 32,650.00	242	4,686,667	16,737	$ 604,836.00	4,619

Cost Total	$ 762,009
GJ Total	54,820
Emissions Total	6,675

1996 - Community

	Residential	Commercial & Institutional	Industrial	Road Transportation	Solid Waste	Totals
NG (GJ)	747,880	424,571	12,345			1,184,796
NG (TC02eq)	37,786	21,451	624			59,860
Electricity (kWh)	64,264,444	36,722,500	1,020,000			102,006,944
Electricity (GJ)	231,352	132,201	3,672			367,225
Electricity (TC02eq)	63,750	36,429	1,012			101,191
Gasoline (L)				28,097,314		28,097,314
Gasoline (GJ)				983,406		983,406
Gasoline (TC02eq)				70,243		70,243
Diesel (L)				10,612,742		10,612,742
Diesel (GJ)				406,468		406,468
Diesel (TC02eq)				28,973		28,973
Propane (L)				795,496		795,496
Propane (GJ)				20,134		20,134
Propane (TC02eq)				1,204		1,204
CNG (L)				161,486		161,486
CNG (GJ)				6,151		6,151
CNG (TC02eq)				488		488
Landfill Waste (TC02eq)					2,915	2,915
Total (TC02eq)	101,536	57,880	1,636	100,908	2,915	264,874
Total (GJ)	979,232	556,772	16,017	1,416,159	-	2,968,180

2003 - Corporate

	NG (GJ)	NG ($)	NG (TC02eq)	Gasoline (L)	Gasoline (GJ)	Gasoline ($)	Gasoline(TC02eq	Diesel (L)	Diesel (GJ)	Diesel ($)	Diesel (TC02eq)	Electrickty (kWh)	Electricity (GJ)	Electricity ($)	Electricity (TC02eq)
Buildings															
Agrena	5,226	$ 45,884.00	264									1,313,333	4,728	$ 157,763.00	1,248
Aspenglen Rink												7,500	27	$ 1,024.00	7
BPAC															
Brookwood Rink	168	$ 1,590.00	8									10,556	38	$ 1,417.00	10
City Hall	1,933	$ 17,371.00	98									288,611	1,039	$ 36,315.00	274
Eco Centre															
Elks Hall															
FCSS															
Fuhr Sports Park/ West District Park															
Protective Services	1,094	$ 14,988.00	86									308,333	1,110	$ 35,778.00	293
Henry Singer Park	44	$ 552.00	2									2,222	8	$ 368.00	2
Kinsmen Arts Centre	320	$ 3,063.00	16									10,556	38	$ 1,819.00	10
Library	1,200	$ 10,850.00	61									188,333	678	$ 23,633.00	179
Log Cabin	482	$ 4,458.00	24									23,056	83	$ 4,240.00	22
Parks Shop	645	$ 5,961.00	33									8,056	29	$ 1,268.00	8
P&E - 414 King St.															
PW Shop - Century Cl.															
PW Shop - Schram St.	2,308	$ 20,827.00	117									173,333	624	$ 22,884.00	165
Pool	665	$ 5,703.00	34									55,278	199	$ 13,326.00	53
Fleet															
Cars				4,114	144	$ 2,531.00	10								
SGFS				4,200	147	$ 2,600.00	10	3,551	136	$ 1,784.00	10				
Tractors				57	2	$ 27.00	0	40,104	1,536	$ 18,319.00	121				
Trucks				54,029	1,891	$ 32,766.00	134	19,817	759	$ 10,639.00	54				
STS															
Vans				12,143	425	$ 7,547.00	30								
Water & Sewage															
Water Commission (form	503	$ 4,497.00	25									346,111	1,246	$ 40,372.00	329
Zone 2 Pump House	226	$ 2,178.00	11									275,000	990	$ 35,782.00	261
Truck Fill Station															
Lights+Signs															
Crosswalks												55,556	200	$ 7,474.00	53
Signs												33,333	120	$ 4,427.00	32
Streetlights												1,326,389	4,775	$ 279,743.00	1,260
Traffic Signals												110,556	398	$ 14,141.00	105
Total	14,814	$ 137,922.00	779	74,543	2,609	$ 45,471.00	184	63,472	2,431	$ 30,742.00	184	4,536,111	16,330	$ 681,774.00	4,309

Cost Total	$ 895,909
GJ Total	36,184
Emissions Total	5,456

2003 - Community

	Residential	Commercial & Institutional	Industrial	Road Transportation	Solid Waste	Totals
NG (GJ)	747,993	408,000	7,293			1,163,286
NG (TC02eq)	37,791	20,614	368			58,773
Electricity (kWh)	80,234,167	43,301,112	1,273,611			124,808,890
Electricity (GJ)	288,843	155,884	4,585			449,312
Electricity (TC02eq)	76,222	41,136	1,210			118,568
Gasoline (L)				43,841,000		43,841,000
Gasoline (GJ)				1,534,435		1,534,435
Gasoline (TC02eq)				106,972		106,972
Diesel (L)				13,489,974		13,489,974
Diesel (GJ)				516,666		516,666
Diesel (TC02eq)				36,855		36,855
Propane (L)				584,512		584,512
Propane (GJ)				14,794		14,794
Propane (TC02eq)				884		884
CNG (L)				46,154		46,154
CNG (GJ)				1,758		1,758
CNG (TC02eq)				140		140
Landfill Waste (TC02eq)					1,176	1,176
Total (TC02eq)	114,014	61,750	1,578	144,851	1,765	323,957
Total (GJ)	1,036,836	563,884	11,878	2,067,653	-	3,680,251

	2015 - corporate															
	NG (GJ)	NG ($)	NG(TC02eq)	Gasoline (L)	Gasoline (GJ)	Gasoline ($)	Gasoline (TC02eq)	Diesel (L)	Diesel (GJ)	Diesel ($)	Diesel (TC02eq)	Electrickty (kWh)	Electricity (GJ)	Electricity ($)	Electricity (TC02eq)
Buildings															
Agrena	12,428	$ 58,528.21	624									1,853,963	6,674	$ 101,373.41	1,520
Aspenglen Rink												6,553	24	$ 365.49	5
BPAC	591	$ 2,620.43	30									179,961	648	$ 9,980.17	148
Brookwood Rink	108	$ 1,048.25	5									7,907	28	$ 443.31	6
City Hall	1,786	$ 10,049.55	90									460,630	1,658	$ 25,621.52	378
Eco Centre	31	$ 627.78	2									29,792	107	$ 1,731.73	24
Elks Hall	2,065	$ 11,466.62	104									94,822	341	$ 5,086.43	78
FCSS												81,054	292	$ 4,600.50	66
Fuhr Sports Park/ West D	1,527	$ 9,036.66	77									161,241	580	$ 8,834.92	132
Protective Services	1,411	$ 7,847.98	71									438,457	1,578	$ 24,210.33	360
Henry Singer Park	*Combined with Truck Fill Station*											4,961	18	$ 281.93	4
Kinsmen Arts Centre															
Jubilee Park															
Library	787	$ 4,789.16	40									188,262	678	$ 10,308.56	154
Log Cabin	375	$ 2,384.27	19									24,092	87	$ 1,332.87	20
Parks Shop															
P&E - 414 King St.												*Combined with Library*			
PW Shop - Century Cl.	6,954	$ 24,112.21	349									507,847	1,828	$ 28,035.94	416
PW Shop - Schram St.	2,639	$ 12,926.70	133									131,369	473	$ 7,272.03	108
Pool															
Fleet															
Other (small equipment)				27	1	$ 24.10	0	9,565	366	$ 7,747.95	26				
Cars				7,140	250	$ 6,386.30	17	1,637	63	$ 1,325.85	5				
SGFS				-		$ -		10,460	401	$ 8,473.02	29				
Tractors				2,964	104	$ 2,650.92	8	113,474	4,346	$ 91,918.80	305				
Trucks				103,378	3,618	$ 92,468.74	240	38,336	1,468	$ 31,053.93	105				
STS				13,471	471	$ 12,049.61	31	128	5	$ 103.58	0				
Vans				33,759	1,182	$ 30,196.33	78	102	4	$ 82.87	0				
Water & Sewage															
Water Commission (form	443	$ 2,974.39	22									680,363	2,449	$ 37,676.31	558
Zone 2 Pump House	560	$ 2,186.81	28									110,160	397	$ 6,047.56	90
Truck Fill Station	77	$ 836.58	4									10,320	37	$ 575.97	8
Lights+Signs															
Crosswalks												40,971	148	$ 2,282.07	34
Signs												25,359	91	$ 1,415.70	21
Streetlights												2,128,177	7,661	$ 118,350.68	1,745
Traffic Signals												60,316	217	$ 3,360.08	49
Total	31,783	$ 151,435.60	1,596	160,738	5,626	$ 143,776.00	373	173,702	6,653	$ 140,706.00	470	7,226,577	26,016	$ 399,187.51	5,926

Cost Total	$ 835,105
GJ Total	70,078
Emissions Total	8,365

2015 - Community

	Residential	Commercial & Institutional	Industrial	Road Transportation	Solid Waste	Totals
NG (GJ)	1,087,173	514,129	9,692			1,610,994
NG (TC02eq)	54,599	25,820	487			80,906
Electricity (kWh)	93,607,984	33,497,184	63,821,853			190,927,021
Electricity (GJ)	336,989	120,590	229,759			687,337
Electricity (TC02eq)	76,759	27,468	52,334			156,560
Gasoline (L)				62,118,383		62,118,383
Gasoline (GJ)				2,153,023		2,153,023
Gasoline (TC02eq)				148,954		148,954
Diesel (L)				16,690,227		16,690,227
Diesel (GJ)				645,578		645,578
Diesel (TC02eq)				45,834		45,834
Propane (L)				741,975		741,975
Propane (GJ)				18,943		18,943
Propane (TC02eq)				1,142		1,142
Landfill Waste (TC02eq)					6,923	6,923
Total (TC02eq)	131,358	53,288	52,821	195,930	6,923	440,319
Total (GJ)	1,424,162	634,719	239,451	2,817,544	-	5,115,875

Rate categories 11 and 21	Rate categories 26, 38, 41D, 41, minus corporate use (Truck Fill Log Cabin, Henry Singer, FCSS, Elks Hall, Eco Centre, Brookwood Rink, Aspenglen Rink)	Rate categories 44 and 61, minus corporate use (Agrena, Library, FSP, Public Works, BPAC, Pump Houses, Protective Services, and City Hall)	Calculated using vehicle registration numbers (45,152)

	2016- Corporate															
	NG (GJ)	NG ($)	NG (TC02eq)	Gasoline (L)	Gasoline (GJ)	Gasoline ($)	Gasoline (TC02eq)	Diesel (L)	Diesel (GJ)	Diesel ($)	Diesel (TC02eq)	Electricity (kWh)	Electricity (GJ)	Electricity ($)	Electricity (TC02eq)
Buildings															
Agrena	12,478		630									1,708,153	6,149	$ 94,279.34	1,623
Aspenglen Rink												6,942	25	$ 388.90	7
BPAC	1,819		92									376,941	1,357	$ 20,651.48	358
Brookwood Rink	121		6									6,329	23	$ 355.95	6
City Hall	1,794		91									420,928	1,515	$ 23,068.79	400
Eco Centre	32		2									29,707	103	$ 1,664.04	27
Elks Hall	1,498		76									71,383	257	$ 3,972.60	68
FCSS												76,874	277	$ 4,276.98	73
Fuhr Sports Park/ West D	1,414		71									157,451	567	$ 8,628.29	150
Protective Services	1,515		76									421,029	1,516	$ 23,077.84	400
Henry Singer Park	*combined with truck fill station*											4,476	16	$ 246.66	4
Jubilee Park												28,710	103	$ 1,578.75	21
Library	931		47									232,835	838	$ 12,770.99	221
Log Cabin	350		18									27,155	98	$ 1,513.25	26
Parks Shop															
P&E - 414 King St.	*combined with library*												*Combined with Library*		
PW Shop - Century Cl.												624,514	2,248	$ 34,288.48	593
PW Shop - Schram St.	1461		74									61,250	221	$ 3,355.80	58
PW Spruce Ridge Satellite															
Fleet															
Other (small equipment)				28	1	$ 23.27	0	8,704	333	6529.445851	23.93				
Cars				7,394	259	$ 6,166.31	17	1,489	57	1117.338327	4.09				
SGFS				-		$ -		9,518	365	7140.490249	26				
Tractors				3,069	107	$ 2,559.60	8	103,257	1599	77462.97123	125				
Trucks				107,059	2,747	$ 89,283.52	248	34,884	1336	26170.15864	95.87				
STS				13,951	488	$ 11,634.55	32	116	4	87.29205683	0.32				
Vans				34,961	1,224	$ 29,156.18	81	93	4	69.83364547	0.26				
Water & Sewage															
Water Commission (form	481		24									703,620	2,533	$ 38,510.09	668
Zone 2 Pump House	374		19									145,632	524	$ 7,987.29	138
Truck Fill Station	64		3									10,063	36	$ 557.93	10
Lights+Signs															
Crosswalks												41,066	148	$ 2,284.00	39
Signs												25,486	92	$ 1,418.72	24
Streetlights												2,233,030	8,039	$ 125,125.00	2,123
Traffic Signals												101,402	365	$ 5,647.33	96
Total	24,333	$ -	1,228	166,463	4,826	$ 138,823.43	387	158,061	3,698	$ 118,577.53	275	7,514,976	27,050	$ 415,648.50	7,134

Cost Total	$ 673,049
GJ Total	59,907
Emissions Total	9,024

2016 - Community

	Residential	Commercial & Institutional	Industrial	Road Transportation	Solid Waste	Totals
NG (GJ)	1,139,631	540,543	9,342			1,689,516
NG (TC02eq)	57,501	27,273	471			85,245
Electricity (kWh)	95,978,417	33,627,067	69,899,163			199,504,647
Electricity (GJ)	345,522	121,057	251,637			718,217
Electricity (TC02eq)	91,180	31,946	66,404			189,529
Gasoline (L)				66,079,416		66,079,416
Gasoline (GJ)				2,290,313		2,290,313
Gasoline (TC02eq)				158,460		158,460
Diesel (L)				14,492,441		14,492,441
Diesel (GJ)				560,568		560,568
Diesel (TC02eq)				39,799		39,799
Propane (L)				676,017		676,017
Propane (GJ)				17,259		17,259
Propane (TC02eq)				1,041		1,041
Landfill Waste (TC02eq)					7,433	7,433
Total (TC02eq)	148,680	59,219	66,876	199,300	7,433	481,507
Total (GJ)	1,485,153	661,600	260,979	2,868,139	-	5,275,872

Rate categories 11 and 21	Rate categories 26, 38, 41D, 41, minus corporate use (Truck Fill Log Cabin, Henry Singer, FCSS, Elks Hall, Eco Centre, Brookwood Rink, Aspenglen Rink)	Rate categories 44 and 61, minus corporate use (Agrena, Library, FSP, Public Works, BPAC, Pump Houses, Protective Services, and City Hall)	Calculated using vehicle registration numbers (45,152)

	2017 - Corporate															
	NG (GJ)	NG ($)	NG (TC02eq)	Gasoline (L)	Gasoline (GJ)	Gasoline ($)	Gasoline(TC02eq	Diesel (L)	Diesel (GJ)	Diesel ($)	Diesel(TC02eq)	Electricity (kWh)	Electricity (GJ)	Electricity ($)	Electricity(TC02eq)
Buildings															
Agrena	12,368		624									1,235,993	4,450	$ 68,522.85	985
Aspenglen Rink												6,546	24	$ 367.90	5
BPAC	1,933		98									369,839	1,331	$ 20,541.47	295
Brookwood Rink	160		8									5,306	19	$ 298.03	4
City Hall	1,900		96									420,690	1,514	$ 23,334.84	317
Eco Centre	37		2									29,765	107	$ 1,673.23	24
Elks Hall	1,155		58									73,746	265	$ 4,146.12	59
FCSS												78,968	284	$ 4,438.76	63
Fuhr Sports Park/ West District Park	1,404		71									131,174	472	$ 7,279.50	105
Protective Services	1,809		91									427,358	1,538	$ 23,703.53	341
Henry Singer Park	*combined with truck fill station*											4,939	18	$ 277.33	4
Jubilee Park	247		12									84,172	303	$ 4,674.68	67
Library	1,331		67									257,706	928	$ 14,294.07	205
Log Cabin	411		21									33,068	119	$ 1,858.48	26
Parks Shop															
P&E - 414 King St.	*combined with library*														
PW Shop - Century Cl.	5,947		300									678,486	2,443	$ 37,628.75	541
PW Shop - Schram St.	1,552		78									71,164	256	$ 4,138.72	57
PW Spruce Ridge Satellite	50		78									8,291	30	$ 465.75	7
Columbus park												21,615	78	$ 1,214.84	17
Central Park Christmas Tree Lights												974	4	$ 54.67	1
Other (tunnel and rink)												11,109	40	$ 623.97	9
Fleet															
Other (small equipment)				22	1	$ 22.25	0	207	8	$ 179.51	1				
Cars				6,051	214	$ 6,055.61	14	37	1	$ 32.27	0				
SGFS				4,863	176	$ 4,867.33	11	9,861	378	$ 9,741.09	27				
Tractors				2,087	80	$ 2,088.80	5	97,159	3,721	$ 93,252.83	291				
Trucks				129,909	4,600	$ 130,012.43	301	57,993	2,221	$ 55,714.10	160				
STS				15,495	548	$ 15,507.95	36	531	20	$ 498.65	1				
Vans				3,187	113	$ 3,189.46	7	117	4	$ 100.90	0				
Water & Sewage															
Reservoir Pump Station	391		20												
Water Commission (former Zone 1 Pump House)	533		27									543,621	1,957	$ 30,095.31	433
Zone 2 Pump House	300		15									196,124	706	$ 10,869.30	156
Truck Fill Station	69		3									10,660	38	$ 599.28	9
Lights &Signs															
Crosswalks												40,997	148	$ 2,303.14	33
Signs												24,696	89	$ 1,387.95	20
Streetlights												2,204,063	7,935	$ 124,233.52	1,757
Traffic Signals												115,365	415	$ 6,496.70	92
Total	31,596	$ -	1,669	161,614	5,732	$ 161,743.83	376	165,905	6,353	$ 159,519.35	480	7,086,432	25,511	$ 395,522.71	5,630

Cost Total	$ 716,786	
GJ Total	69,192	
Emissions Total (T)	8,155	

Staff Travel	19921.0	kg CO2eq
	19.9	TC02eq

2017 - Community

	Residential	Commercial & Institutional	Industrial	Road Transportation	Solid Waste	Totals
NG (GJ)	1,298,211	601,697	10,777			1,910,685
NG (TC02eq)	74,583	30,364	544			105,491
Electricity (kWh)	98,919,155	33,423,773	71,603,830			203,946,758
Electricity (GJ)	356,109	120,326	257,774			734,208
Electricity (TC02eq)	74,583	25,201	53,988			153,772
Gasoline (L)				63,736,236		63,736,236
Gasoline (GJ)				2,209,098		2,209,098
Gasoline (TC02eq)				152,849		152,849
Diesel (L)				13,116,309		13,116,309
Diesel (GJ)				507,339		507,339
Diesel (TC02eq)				36,019		36,019
Propane (L)				565,236		565,236
Propane (GJ)				14,430		14,430
Propane (TC02eq)				870		870
Waste T C02eq					9,492	9,492
Total (TC02eq)	149,166	55,565	54,532	189,738	9,492	458,493
Total (GJ)	1,654,320	722,023	268,551	2,730,867	-	5,375,761

Rate categories 11 and 21	Rate categories 26, 38, 41D, 41, minus corporate use (Truck Fill Log Cabin, Henry Singer, FCSS, Elks Hall, Eco Centre, Brookwood Rink, Aspenglen Rink)	Rate categories 44 and 61, minus corporate use (Agrena, Library, FSP, Public Works, BPAC, Pump Houses, Protective Services, and City Hall)	Calculated using vehicle registration numbers (44709)

2018 - Community

	Residential	*Commercial & Institutional*	*Industrial*	ICI	Road Transportation	Solid Waste	Totals
NG (GJ)	1,341,796	*644,354*	*11,386*	655,740			2,653,276
NG (TC02eq)	67,713	*32,517*	*575*	33,092			133,897
Electricity (kWh)	102,262,886	*33,446,361*	*65,005,489*	98,451,850			299,166,587
Electricity (GJ)	368,146	*120,407*	*234,020*	354,427			1,077,000
Electricity (TC02eq)	63,836	*20,878*	*40,578*	61,456			186,748
Gasoline (L)					64,488,942		64,488,942
Gasoline (GJ)					2,235,187		2,235,187
Gasoline (TC02eq)					154,654		154,654
Diesel (L)					13,271,209		13,271,209
Diesel (GJ)					513,330		513,330
Diesel (TC02eq)					36,445		36,445
Propane (L)					571,911		571,911
Propane (GJ)					14,601		14,601
Propane (TC02eq)					880		880
Waste T C02eq						9,689	9,689
Total (TC02eq)	131,549	*53,395*	*41,153*	94,548	191,979	9,689	427,765
Total (GJ)	1,709,942	*764,761*	*245,406*	1,010,167	2,763,118	-	5,483,227

Fortis Electricity Rate categories 11 and 21

Commercial/Institutional: Fortis Electricity Rate categories 26, 38, 41D, 41, minus corporate use (Truck Fill Log Cabin, Henry Singer, FCSS, Elks Hall, Eco Centre, Brookwood Rink, Aspenglen Rink, Jubilee Park, Columbus Park, Central Park Christmas Trees)

Industrial: Fortis Electricity Rate categories 44 and 61, minus corporate use (Agrena, Library, FSP, Public Works, BPAC, Pump Houses, Protective Services, and City Hall)

Calculated using vehicle registration numbers (45237)

2018 - Corporate

	NG (GJ)	NG ($)	NG (TC02eq)	Gasoline (L)	Gasoline (GJ)	Gasoline ($)	Gasoline(TC02eq)	Diesel (L)	Diesel (GJ)	Diesel ($)	Diesel(TC02eq)	Electricity (kWh)	Electricity (GJ)	Electricity ($)	Electricity (TC02eq)
Buildings															
Agrena	11,000	$ 63,738.00	555									2,262,133	8,144	$ 129,998.81	1,412
Aspenglen Rink												7,670	28	$ 434.35	5
BPAC	1,614	$ 11,561.88	81									355,473	1,280	$ 20,478.10	222
Brookwood Rink	139	$ 1,433.00	7									10,712	39	$ 610.52	7
City Hall	1,619	$ 11,662.80	82									418,366	1,506	$ 23,810.95	261
Eco Centre	33	$ 684.94	2									35,197	127	$ 1,996.04	22
Elks Hall	1,125	$ 7,930.87	57									96,592	348	$ 5,499.02	60
FCSS												81,121	292	$ 4,627.81	51
Fuhr Sports Park/ West D	1,198	$ 8,634.15	60									125,155	451	$ 7,122.48	78
Protective Services	1,538	$ 11,365.85	78									462,414	1,665	$ 26,330.30	289
Henry Singer Park	*combined with truck fill station*											4,667	17	$ 269.00	3
Jubilee Park	466	$ 9,059.33	24									111,553	402	$ 6,348.80	70
Library	915	$ 7,589.59	46									249,259	897	$ 14,188.59	156
Log Cabin	288	$ 2,592.03	15									36,067	130	$ 2,049.22	23
Parks Shop															
P&E - 414 King St.	*combined with library*														
PW Shop - Century Cl.	5,297	$ 38,840.72	267									671,825	2,419	$ 38,236.10	419
PW Shop - Schram St.	1,573	$ 11,416.00	79									87,171	314	$ 4,944.69	54
PW Spruce Ridge Satellite	59.68	$ 894.64	3									3,848	14	$ 219.54	2
Columbus park												18,573	67	$ 1,057.06	12
Central Park Christmas Tree Lights												1,099	4	$ 62.01	1
Other (tunnel and rink)												13,211	48	$ 749.13	8
Fleet															
Other (small equipment)				32	1	$ 39.17	0	9,854	377	$ 11,313.93	27				
Cars				10,182	356	$ 11,914.21	24	4,475	171	$ 4,981.24	12				
SGFS				39	1	$ 49.09	0	9,420	361	$ 11,297.42	26				
Tractors				3,051	107	$ 3,654.12	8	121,934	4,670	$ 138,905.34	328				
Trucks				131,625	4,607	$ 155,181.54	305	37,523	1,437	$ 44,270.90	103				
STS				17,612	616	$ 20,683.99	41	-	0	$ -	0				
Vans				8,978	314	$ 10,023.71	21	117	4	$ 186.54	0				
Water & Sewage															
Reservoir Pump Station	1,357	$ 3,304.59	68												
Water Commission (form	322	$ 2,745.00	16									713,175	2,567	$ 40,768.72	445
Zone 2 Pump House	267	$ 2,293.00	13									127,140	458	$ 7,235.82	79
Truck Fill Station	78	$ 990.94	4									6,224	22	$ 354.67	4
Lights+Signs															
Unknown												12,026	43	$ 688.30	7
Crosswalks												41,009	148	$ 2,330.42	26
Signs												23,785	86	$ 1,353.57	15
Streetlights												1,736,871	6,253	$ 96,366.42	1,066
Traffic Signals												112,132	404	$ 6,372.18	69
Total	28,888	$ 196,737.33	1,457	171,518	6,002	$ 201,545.84	398	183,322	7,020	$ 210,955.38	496	7,824,468	28,168	$ 444,502.61	4,864

Cost Total	$ 1,053,741	
GJ Total	70,078	
Emissions Total (T)	7,216	

Staff Travel (km + hotel)	25,476.4	kg C02eq
	25.5	t C02eq

2019 - Community

	Residential	*Commercial & Institutional*	*Industrial*	ICI	Road Transportation	Solid Waste	Totals
NG (GJ)	1,417,140	*715713*		715,713			2,132,853
NG (TC02eq)	71,515	*36118*		36,118			107,633
							-
Electricity (kWh)	100,845,511	*33,606,650*	*64,947,815*	98,554,465			199,399,976
Electricity (GJ)	363,044	*120,984*	*233,812*	354,796			717,840
Electricity (TC02eq)	62,951	*20,978*	*40,542*	61,520			124,471
							-
Gasoline (L)					66,688,612		66,688,612
Gasoline (GJ)					2,311,427		2,311,427
Gasoline (TC02eq)					159,929		159,929
							-
Diesel (L)					13,723,880		13,723,880
Diesel (GJ)					530,840		530,840
Diesel (TC02eq)					37,688		37,688
					-		-
Propane (L)					591,419		591,419
Propane (GJ)					15,099		15,099
Propane (TC02eq)					910		910
Waste T C02eq						10,796	10,796
Total (TC02eq)	134,466	*57,096*	*40,542*	97,638	198,527	10,796	441,428
Total (GJ)	1,780,184	*836,697*	*233,812*	1,070,509	2,857,366	-	5,708,059

Fortis Electricity Rate categories 11 and 21	Fortis Electricity Rate categories 26, 38, 41D, 41, minus corporate use (Truck Fill Log Cabin, Henry Singer, FCSS, Elks Hall, Eco Centre, Brookwood Rink, Aspenglen Rink, Jubilee Park, Columbus Park, Central Park Christmas Trees)	Fortis Electricity Rate categories 44 and 61, minus corporate use (Agrena, Library, FSP, Public Works, BPAC, Pump Houses, Protective Services, City Hall, Transit Building)	Commercial & Institutional + Industrial	Calculated using vehicle registration numbers (46780) and average km travelled per vehicle in Alberta (30,915). 10.6L/100km for gasoline

	2019- Corporate														
	NG (GJ)	NG ($)	Natural Gas (T C02eq)	Gasoline (L)	Gasoline (GJ)	Gasoline ($)	Gasoline (T C02eq	Diesel (L)	Diesel (GJ)	Diesel ($)	Diesel (T C02eq)	Electricity (kWh)	Electricity (GJ)	Electricity ($)	Electricity (T C02eq)	Floor size m^2
Buildings																
Agrena	13,889	$ 61,002.07	701									1,874,144	6,747	$ 107,751.07	1,170	7,462
Aspenglen Rink												5,467	20	$ 314.46	3	9
BPAC	2,213	$ 12,065.48	112									355,710	1,281	$ 20,612.40	222	2,728
Brookwood Rink	165	$ 1,435.64	8									5,789	21	$ 333.97	4	107
City Hall	1,984	$ 11,429.36	100									392,732	1,414	$ 22,648.83	245	3,419
Eco Centre	40	$ 738.83	2									34,609	125	$ 1,992.12	22	108
Elks Hall	1,292	$ 7,616.74	65									83,575	301	$ 4,801.89	52	800
FCSS												78,773	284	$ 4,525.59	49	518
Fuhr Sports Park/ West District Park	1,610	$ 8,999.38	81									141,140	508	$ 8,120.21	88	733
Protective Services	1,085	$ 7,454.61	55									386,513	1,391	$ 22,324.49	241	1,870
Renovated Protective Services/Vacant RCMP	3,126	$ 10,990.54	158									192,705	694	$ 11,025.73	120	6,605
RCMP Facility	801	$ 5,383.81	40									55,926	201	$ 3,212.70	35	5,045
Henry Singer Park	*combined with truck fill station*											4,002	14	$ 230.46	3	89
Jubilee Park	1,001	$ 3,471.56	51									115,050	414	$ 6,629.58	72	2,104
Library	982	$ 5,852.76	50									237,294	854	$ 13,672.90	148	1,705
Log Cabin	388	$ 3,667.60	20									32,467	117	$ 1,873.64	20	379
Parks Shop													-			
P&E - 414 King St.	*combined with library*												-			695
PW Shop - Century Cl.	6,499	$ 35,511.65	328									680,400	2,449	$ 39,271.42	425	7,176
PW Shop - Schram St.	2,312	$ 13,744.20	117									90,892	327	$ 5,245.79	57	1,825
PW Spruce Ridge Satellite	74	$ 941.95	4									3,587	13	$ 206.06	2	128
Columbus park												17,823	64	$ 1,023.11	11	1,810
Central Park Christmas Tree Lights												607	2	$ 34.63	0	11,830
Other (tunnel and rink)												11,383	41	$ 653.76	7	1,200
Transit Building												8,316	30	$ 476.10	5	1,654
Fleet																
Other (small equipment)				20	1	$ 21.66	0	9,758	374	$ 9,823.32	27					
Cars				7,563	265	$ 7,830.06	18	1,674	64	$ 1,689.68	5					
SGFS				-		$ -		10,681	409	$ 11,378.81	29					
Tractors				3,150	110	$ 3,279.71	8	115,859	4,437	$ 119,892.33	312					
Trucks				109,635	3,837	$ 113,144.15	254	39,131	1,499	$ 40,622.47	108					
STS				14,287	500	$ 14,634.27	33	119	5	$ 112.12	0.33					
Vans				35,786	1,253	$ 36,131.02	83	102	4	$ 121.64	0					
Water & Sewage																
Reservoir Pump Station	523	$ 5,972.83	26													341
Water Commission (former Zone 1 Pump House)	349	$ 2,441.04	18									851,427	3,065	$ 49,007.04	531	138
Zone 2 Pump House	458	$ 2,625.68	23									134,685	485	$ 7,753.78	84	138
Truck Fill Station	90	$ 1,002.68	5									5,115	18	$ 293.89	3	22
Lights & Signs																
Unknown												18,837	68	$ 1,082.68	12	
Crosswalks												40,929	147	$ 2,347.14	26	
Signs												23,745	85	$ 1,363.74	15	
Streetlights												1,162,493	4,185	$ 66,331.65	726	
Traffic Signals												110,550	398	$ 6,349.64	68	
Total	38,881	$ 202,348.41	1,963	170,442	5,966	$ 175,040.87	396	177,326	6,792	$ 183,640.36	480	7,156,686	25,764	$ 411,510.46	4,466.06	60,638

Cost Total	$	972,540
GJ Total		77,403
Emissions Total		7,305

Staff Travel (km + hotel)	32487.0	kg C02eq
	32.5	tC02eq

In 2019, the RCMP moved partway through the year to the Parkland RCMP Facility, while Protective Services expanded into the former RCMP offices, which were also expanded

ALL ONE SKY FOUNDATION is a not-for-profit, charitable organization established in 2010 to help vulnerable populations at the crossroads of energy and climate change. We do this through education, research and community-led programs, focusing our efforts on adaptation to climate change and energy poverty. Our vision is a society in which ALL people can afford the energy they require to live in warm, comfortable homes, in communities that are able to respond and adapt to a changing climate.

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