



City of Kingston Community GHG Inventory Report – 2020

December 15, 2022

Prepared For:

City of Kingston

Julie Salter-Keane, Manager, Climate
Leadership

Prepared By:

Greenscale Inc.

Nathan C. Manion



Executive Summary

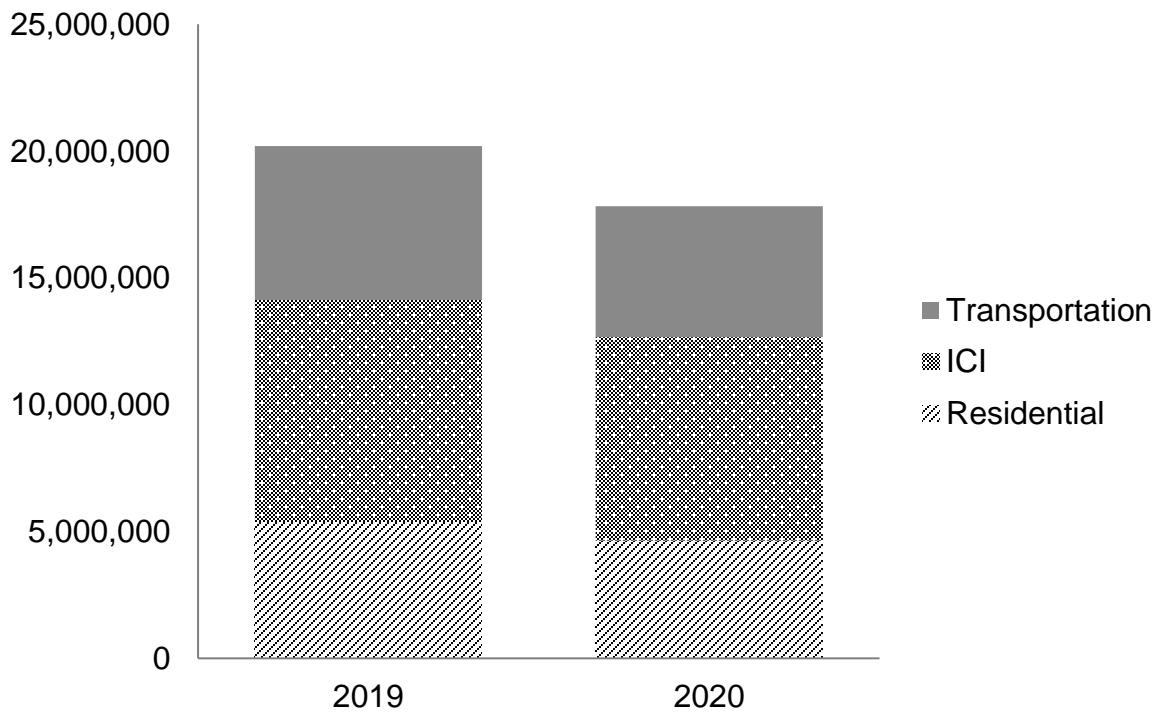
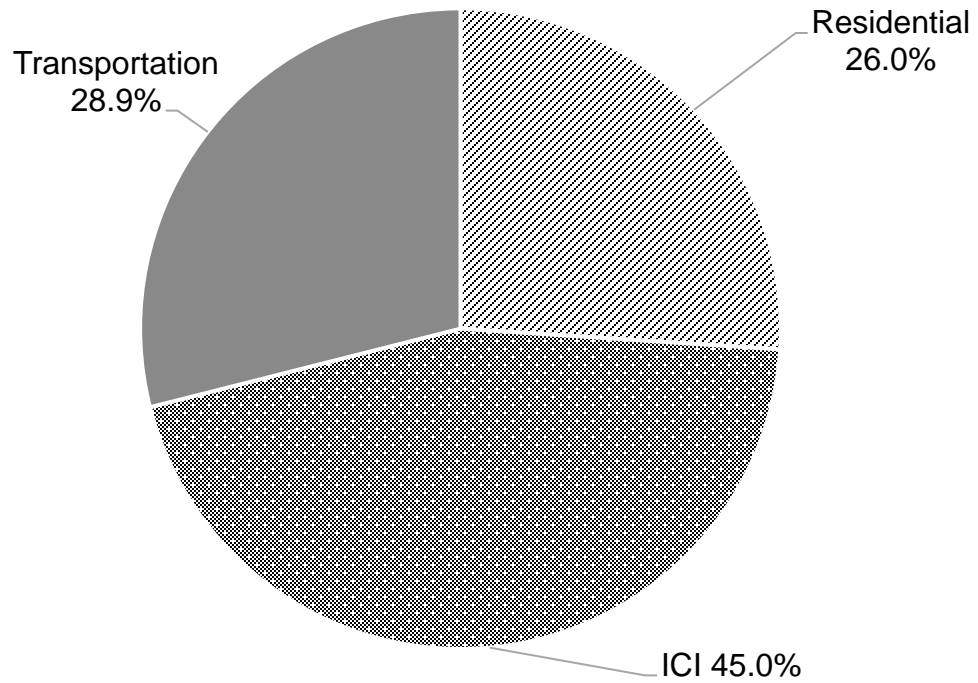
This report provides updated greenhouse gas (GHG) emissions inventory for the community-wide scope of the City of Kingston for the years 2019 and 2020. The scope of the report includes residential and ICI energy use, transportation fuel use, wastewater emissions, solid waste, and agriculture and forests. Energy and emissions are measured in the report as total energy consumption (GJ), total GHG emissions (tCO_{2e}), and energy expenditures (\$). Input data sources used for emission calculations within the report were provided by the City of Kingston, Utilities Kingston, Hydro One, Enbridge and Kalibrate Technologies Ltd. for fuel data. All emission factors used were derived using published emission factors from the National Inventory Report 1990-2019 and 1990-2020 (ECCC 2021; ECCC 2022) for 2019 and 2020. Energy conversions were derived from the Canada Energy Regulator (2022). A complete description of methods, data, and emission factors used are available in the Supplemental Information Report.

Agriculture emissions were updated for the first time in five years as a result of the publication of a new agriculture census. As part of the City's continual improvement to the community GHG inventory, emissions from manure storage and management were included this year in the agriculture sector, and landfill emission factors were verified based on updated landfill operations information. Re-calculation and restatement of 2019 results was also performed due to updated electricity and natural gas use data acquired from Utilities Kingston. In some cases the data differences were significant, varying by more than 8% from previously reported data. The data errors have been flagged for future inventories and have been corrected moving forward, however it is likely that 2018 baseline will need to be revisited and re-calculated. Because 2019 emissions varied less than 1% from 2018 emissions, comparisons to 2019 were made in this report so that progress could be accurately assessed.

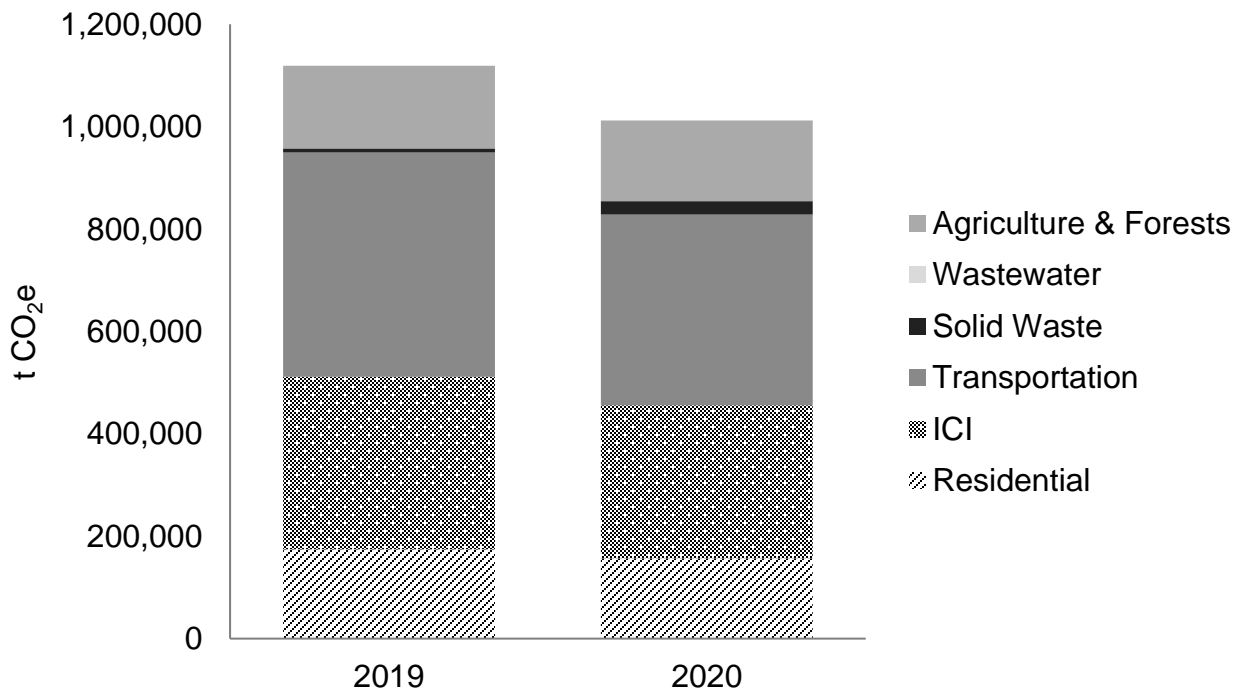
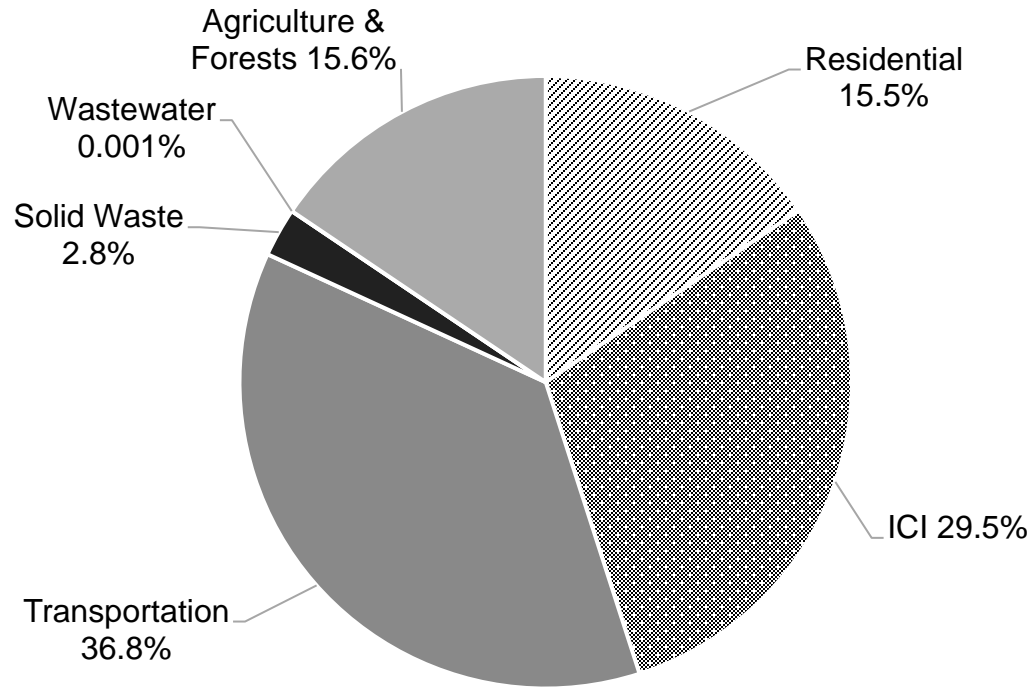
Summary of Results

1. Overall, community annual GHG emissions were reduced by 106,761 tonnes from 2019 to 2020. This represents a 9.5% reduction from 2019.
2. The most significant emissions are from the transportation sector (37% of emissions), or natural gas consumption by residential and ICI sectors (47% of all energy consumed).
3. The most significant reductions occurred in the two highest emitting sectors – transportation which decreased 15% and emissions from ICI buildings that decreased 11%.
4. The total energy consumption (GJ) decreased by 11.7% and the total expenditures (\$) decreased 18% from 2019.

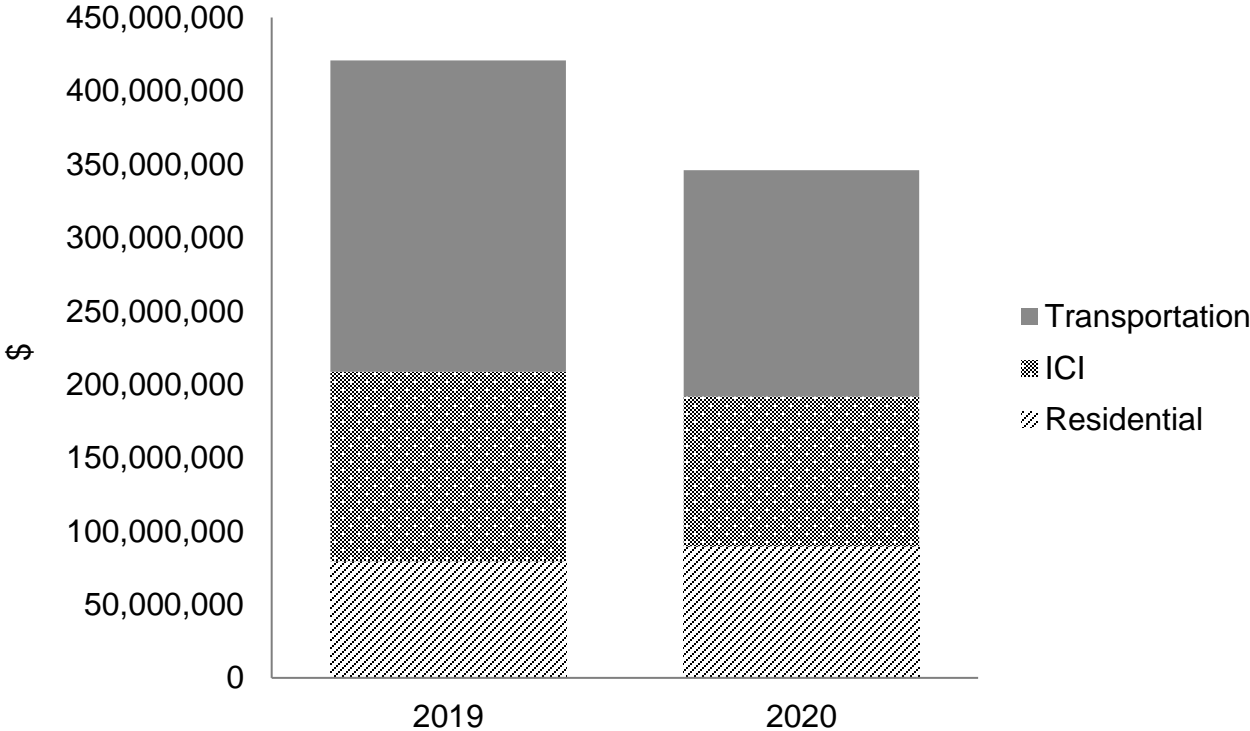
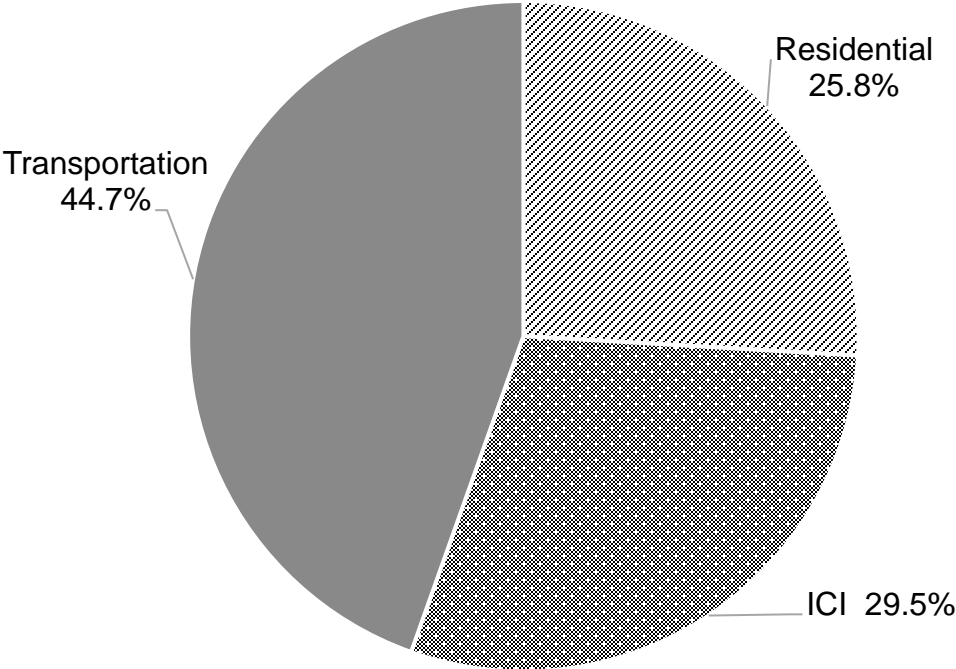
2020 Energy Consumption by sector (total: 17,819,475 GJ) and historical trend



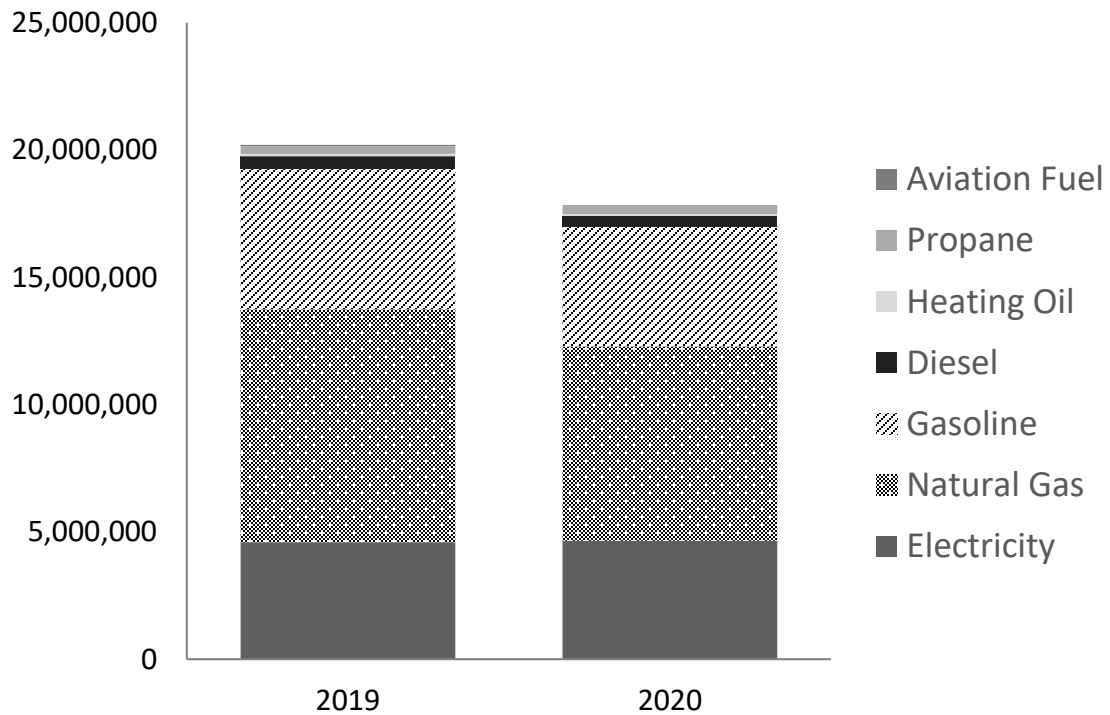
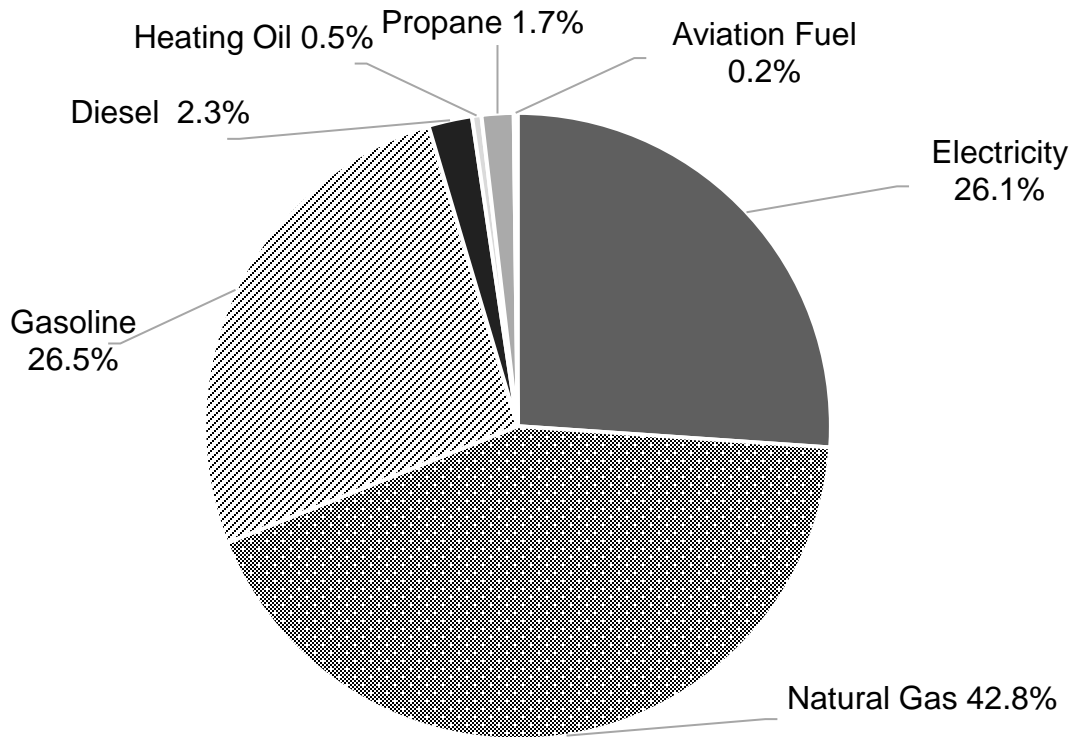
2020 GHG Emissions by sector (total: 1,012,031 tonnes CO₂e) and historical trend



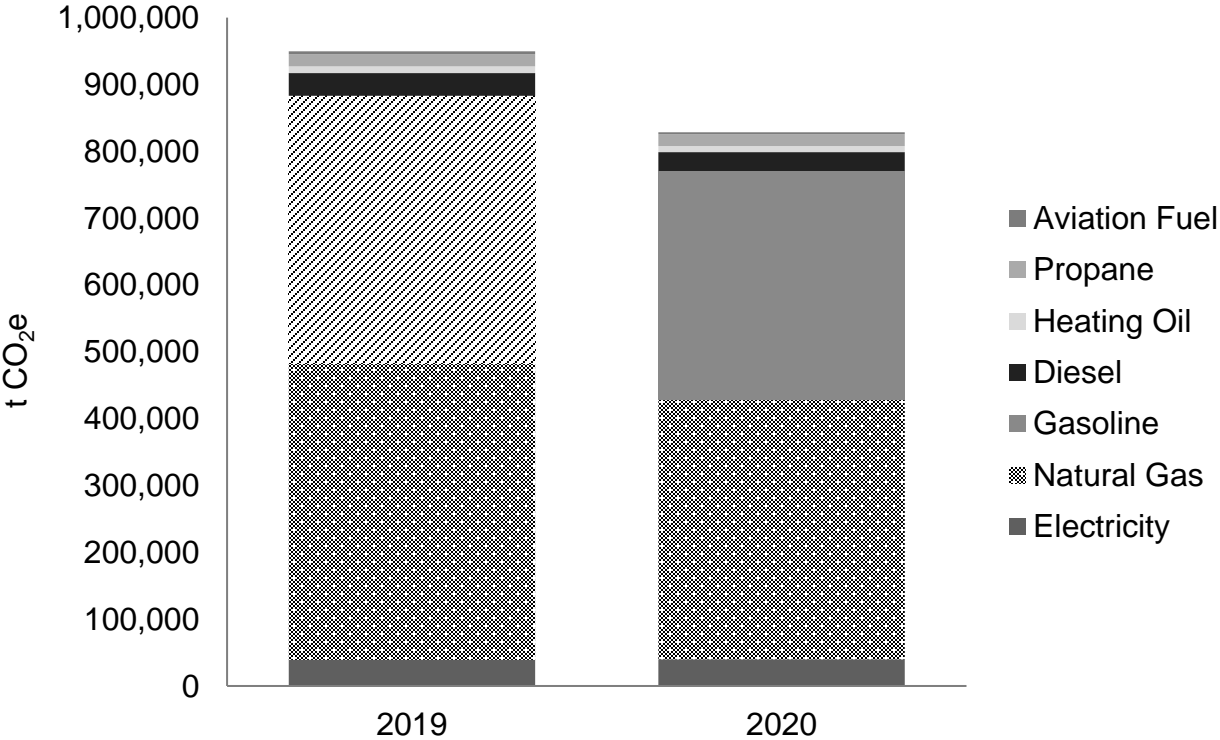
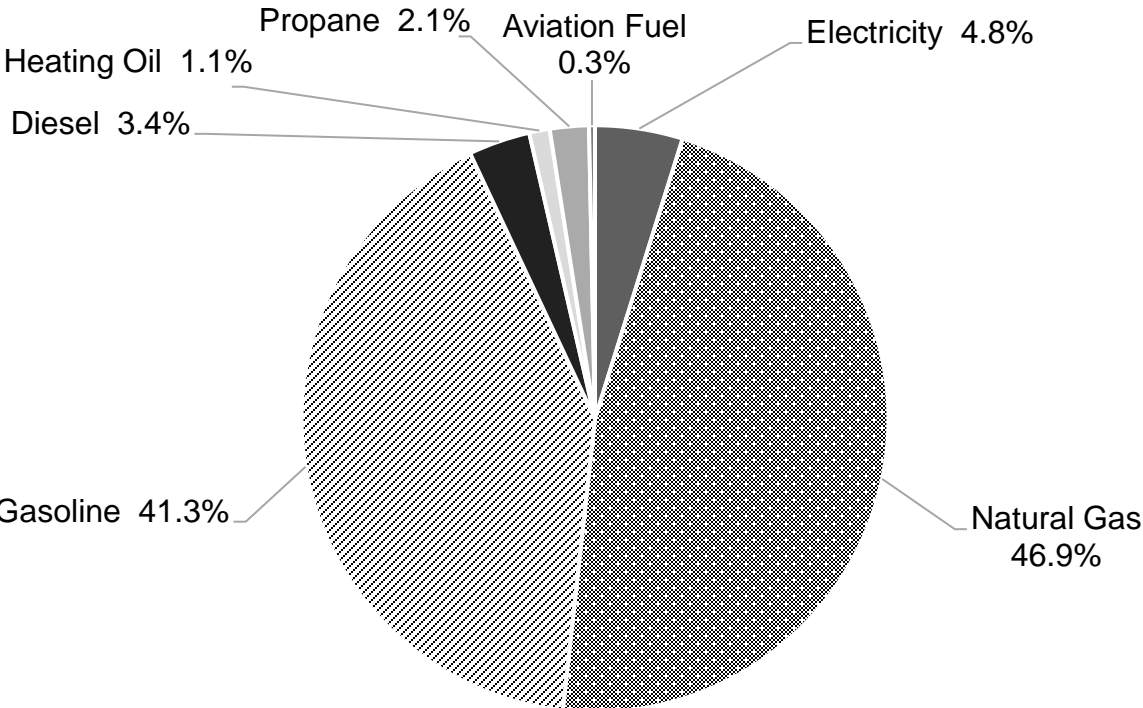
2020 Expenditures by sector (total: \$345,112,383) and historical trend



2020 Energy Consumption by source (total: 17,819,475 GJ) and historical trend



2020 GHG Emissions by source (total: 828,471 tonnes CO₂e) and historical trend



2020 Expenditures by source (total: \$345,112,383) and historical trend

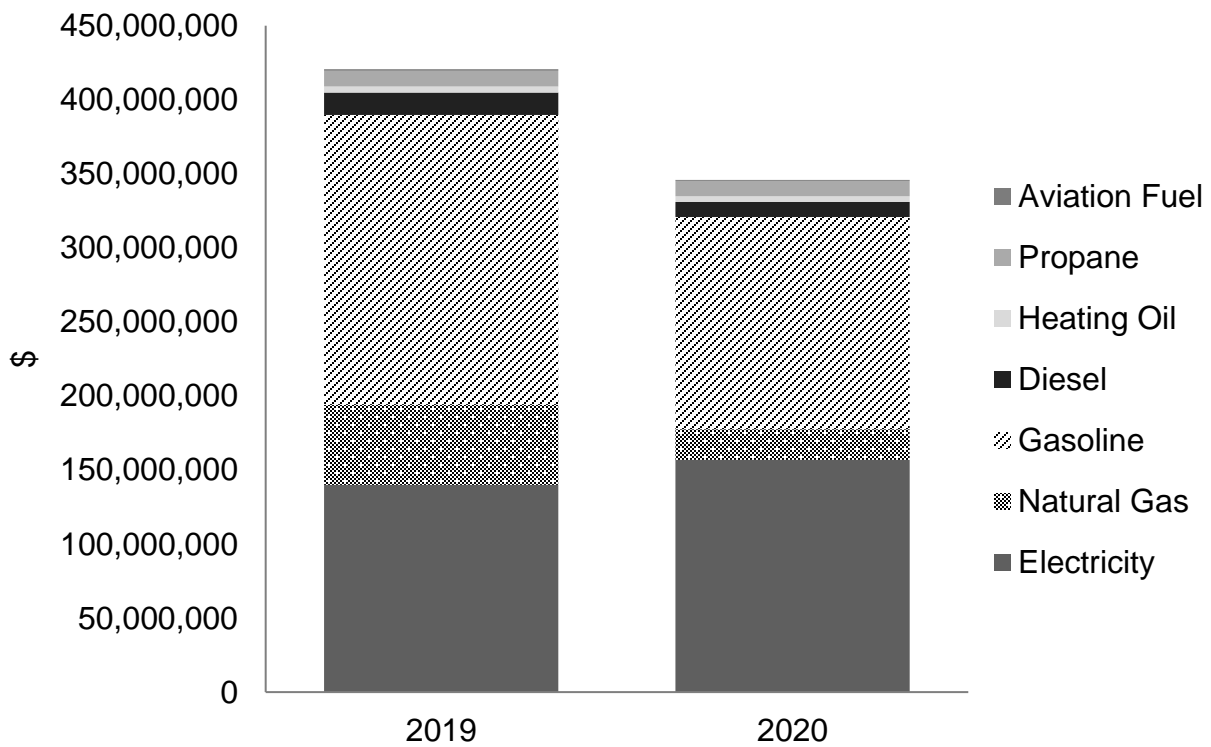
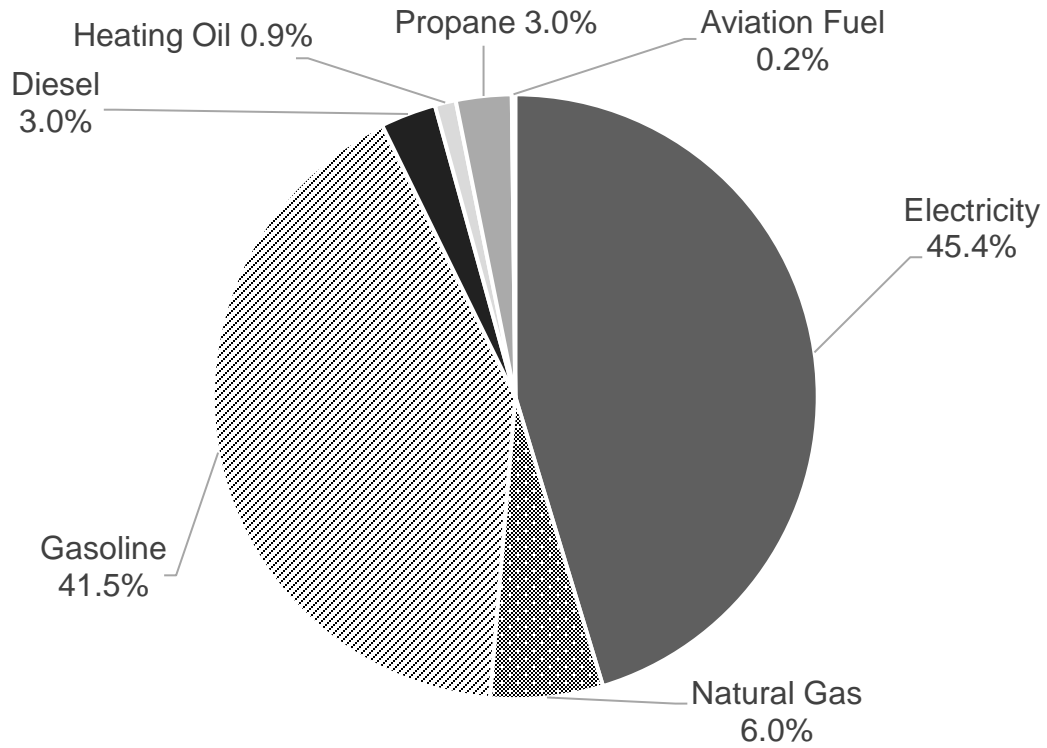


Table 1. Summary of energy consumption (GJ), GHG emissions (tCO₂e), & expenditures (\$) of 2019 - 2020 for all sectors.

Sector	2019			2020			Energy Consumption Change (GJ)	GHG Emissions Change (tCO ₂ e)	Change (\$)
	Energy Consumption (GJ)	GHG Emissions (t CO ₂ e)	Expenditure (\$)	Energy Consumption (GJ)	GHG Emissions (t CO ₂ e)	Expenditure (\$)			
Residential	5,374,059	174,726	79,477,504	4,639,556	156,928	89,060,312	-734,503	-17,797	9,582,809
ICI	8,759,737	336,423	129,160,221	8,022,289	298,946	101,932,290	-737,449	-37,477	-27,227,931
Transportation	6,066,691	438,285	212,087,594	5,157,630	372,596	154,119,780	-909,061	-65,689	-57,967,814
Solid Waste	0	8,442	0	0	26,053	0	0	17,611	0
Wastewater	0	11	0	0	10	0	0	-1	0
Agriculture & Forests	0	160,904	0	0	157,496	0	0	-3,408	0
TOTAL	20,200,487	1,118,792	420,725,319	17,819,475	1,012,031	345,112,383	-2,381,012	-106,761	-75,612,937

Table 2. Summary of energy consumption (GJ), GHG emissions (tCO₂e), & expenditures (\$) of 2019 - 2020 by energy source.

Energy Source	2019			2020			Energy Consumption Change (GJ)	GHG Emissions Change (tCO ₂ e)	Change (\$)
	Energy Consumption (GJ)	GHG Emissions (t CO ₂ e)	Expenditure (\$)	Energy Consumption (GJ)	GHG Emissions (t CO ₂ e)	Expenditure (\$)			
Electricity	4,588,065	38,837	139,981,156	4,647,528	40,020	156,731,934	59,462	1,184	16,750,778
Natural Gas	9,149,662	444,071	53,907,806	7,633,788	388,720	20,834,305	-1,515,874	-55,350	-33,073,500
Gasoline	5,527,755	400,185	195,803,496	4,720,662	341,755	143,176,784	-807,093	-58,430	-52,626,712
Diesel	487,021	34,102	15,215,427	402,088	28,155	10,297,834	-84,933	-5,947	-4,917,593
Heating Oil	89,957	9,726	4,042,635	86,428	9,344	3,174,767	-3,529	-382	-867,868
Propane	306,112	18,516	10,706,128	294,101	17,789	10,251,597	-12,010	-726	-454,531
Aviation Fuel	51,916	3,998	1,068,671	34,880	2,686	645,162	-17,035	-1,312	-423,509
TOTAL	20,200,487	949,434	420,725,319	17,819,475	828,471	345,112,383	-2,381,012	-120,964	-75,612,937

Report Takeaways

- The total reduction in GHGs from 2019 to 2020 at the community level was 106,761 tonnes. This represents a reduction of 9.5% from 2019.
- The reduction in GHGs reported in the Transportation and ICI sectors in this inventory are likely influenced by COVID pandemic shutdowns. Fewer people driving and fewer commercial and institutional buildings in operation are likely the primary reasons for emission reductions in these sectors.
- Pandemic shutdowns created energy use profiles that were not always as reflective of variations in temperatures as past years and made correlating their effects more difficult in 2020. For example, while the heating degree days (HDD) decreased by 11% and was similar to the 10% reduction in Residential energy use, the number of cooling degree days (CDD) increased by nearly 51% from 2019 which was a very different trend from a 3% decrease in electricity use.
- The COVID pandemic drastically changed the way people lived, traveled, and conducted business in 2020. The ways in which GHGs were being emitted also changed, and so there are challenges using inventory data from 2020 to determine how successful emissions reductions have been. A better reflection of Kingston's community GHG reduction progress is likely to come from the upcoming 2021 and 2022 inventory reports.

References

Canada Energy Regulator. 2022. Energy Unit Conversion Table. Webpage: <https://apps.cer-rec.gc.ca/Conversion/conversion-tables.aspx?GoCTemplateCulture=fr-CA>

Environment and Climate Change Canada (ECCC). 2022. National Inventory Report 1990-2020: Greenhouse Gas Sources and Sinks in Canada. Canada's Submission to the United Nations Framework Convention on Climate Change. Parts 1-3. <https://publications.gc.ca/site/eng/9.506002/publication.html>

Environment and Climate Change Canada (ECCC). 2021. National Inventory Report 1990-2019: Greenhouse Gas Sources and Sinks in Canada. Canada's Submission to the United Nations Framework Convention on Climate Change. Parts 1-3. <https://publications.gc.ca/site/eng/9.506002/publication.html>