City of Kingston Community GHG Inventory Report – 2021

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Prepared For:

City of Kingston

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Executive Summary

This report provides updated greenhouse gas (GHG) emissions inventory for the community-wide scope of the City of Kingston for the years 2020 and 2021. 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 2020 and 2021. Energy conversions were derived from the Canada Energy Regulator (2022). For 2021 electricity emission factors, forecasting from IESO (2020, 2021) was used. A complete description of methods, data, and emission factors used for these results are available in the Supplemental Information Report.

Summary of Results

1. Overall, community annual GHG emissions increased by 1.3% from 2020. There were 13,479 more tonnes of CO_2e emitted in 2021 than in 2020, however 2021 emissions remained 8.5% lower than the 2018 baseline levels.

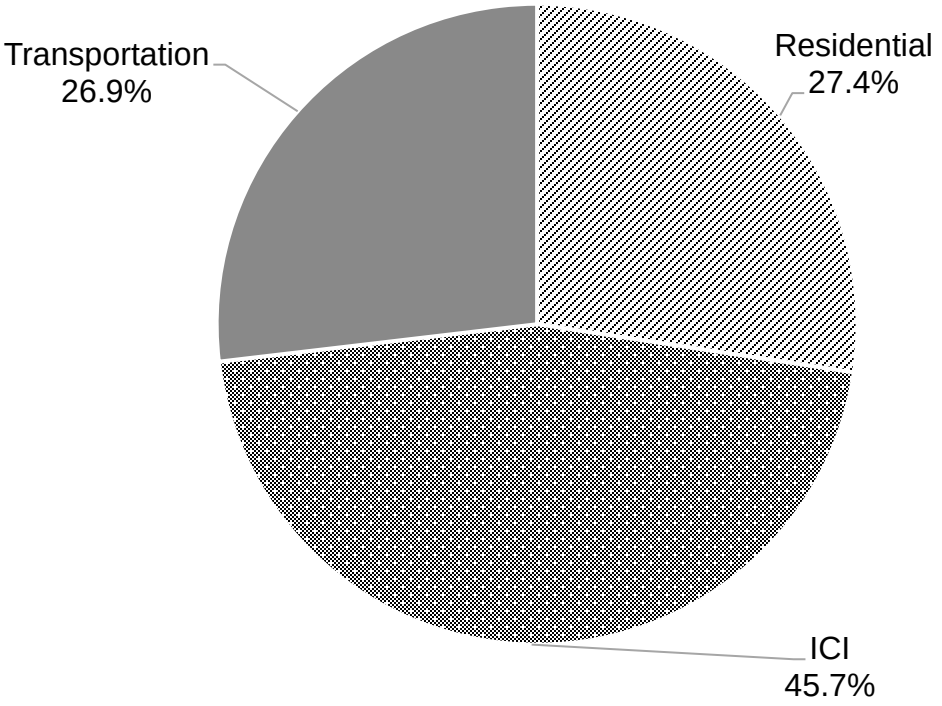
2. The largest increase in emissions was from the ICI sector (7.4%), likely a result of institutions and businesses opening back up after reduced activity in 2020.

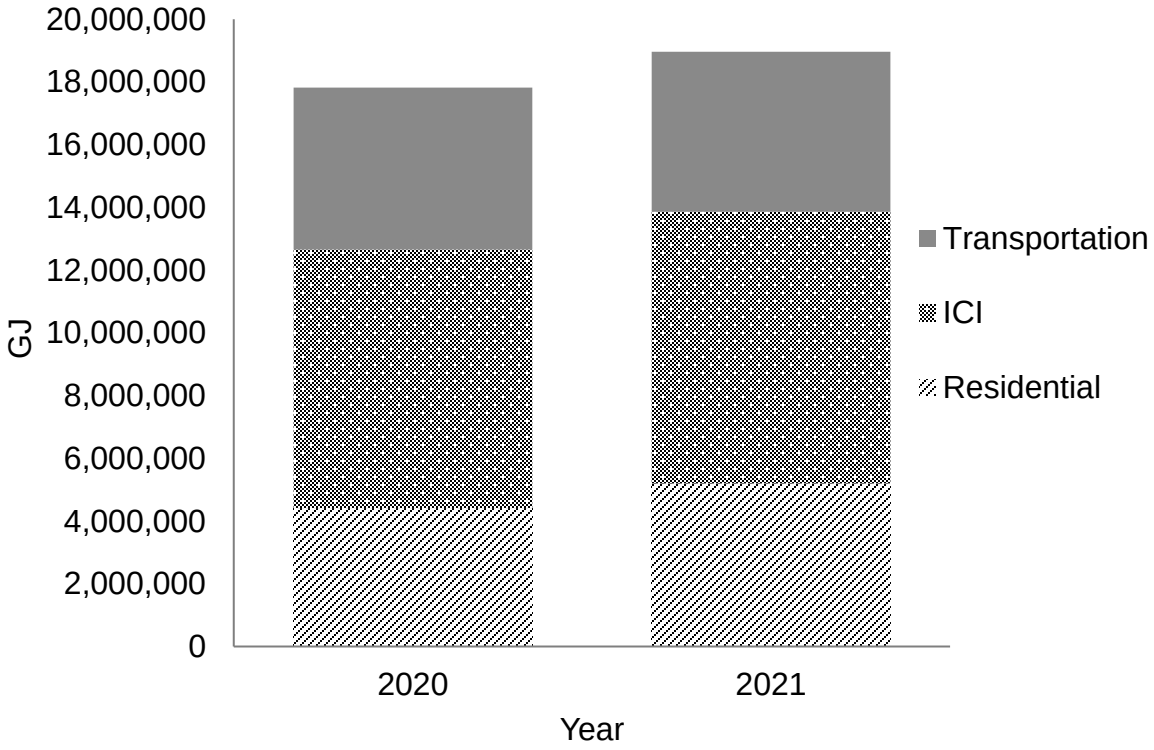
3. Emissions from natural gas remained the largest source of GHG emissions among energy sectors (48%) followed by emissions from gasoline (39.8%).

4. Emissions associated with gasoline decreased 2.1% from 2020 levels. Gasoline emissions had been expected to increase from 2020 as more of the economy re-opened.

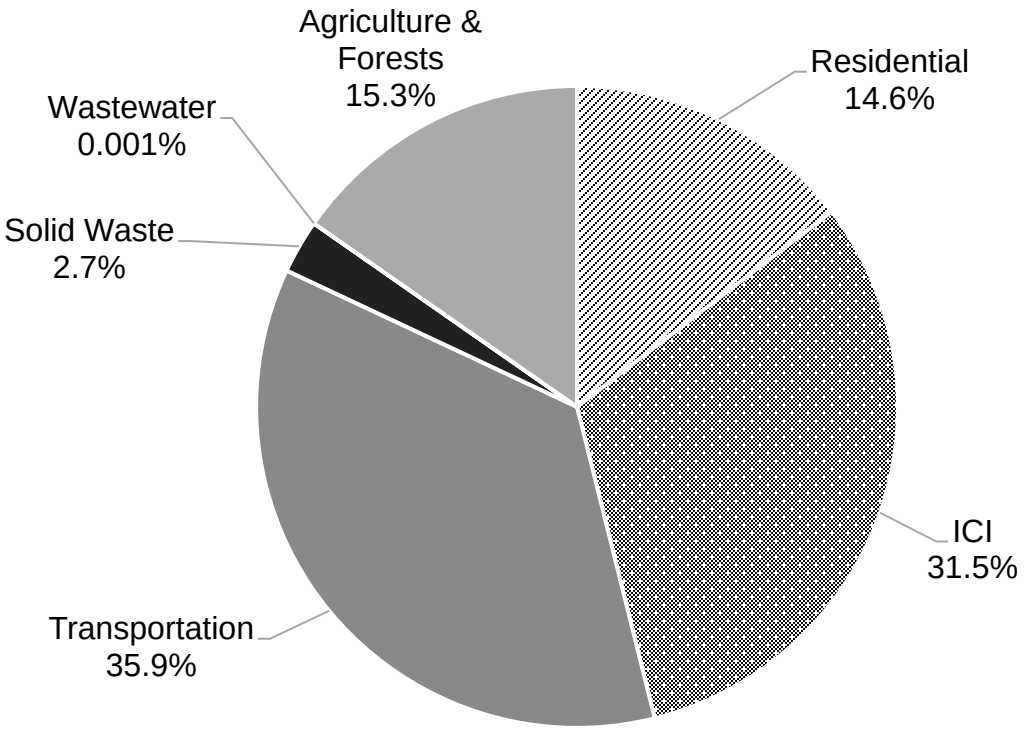
5. Natural gas is the largest energy sector in terms of total emissions (48%)

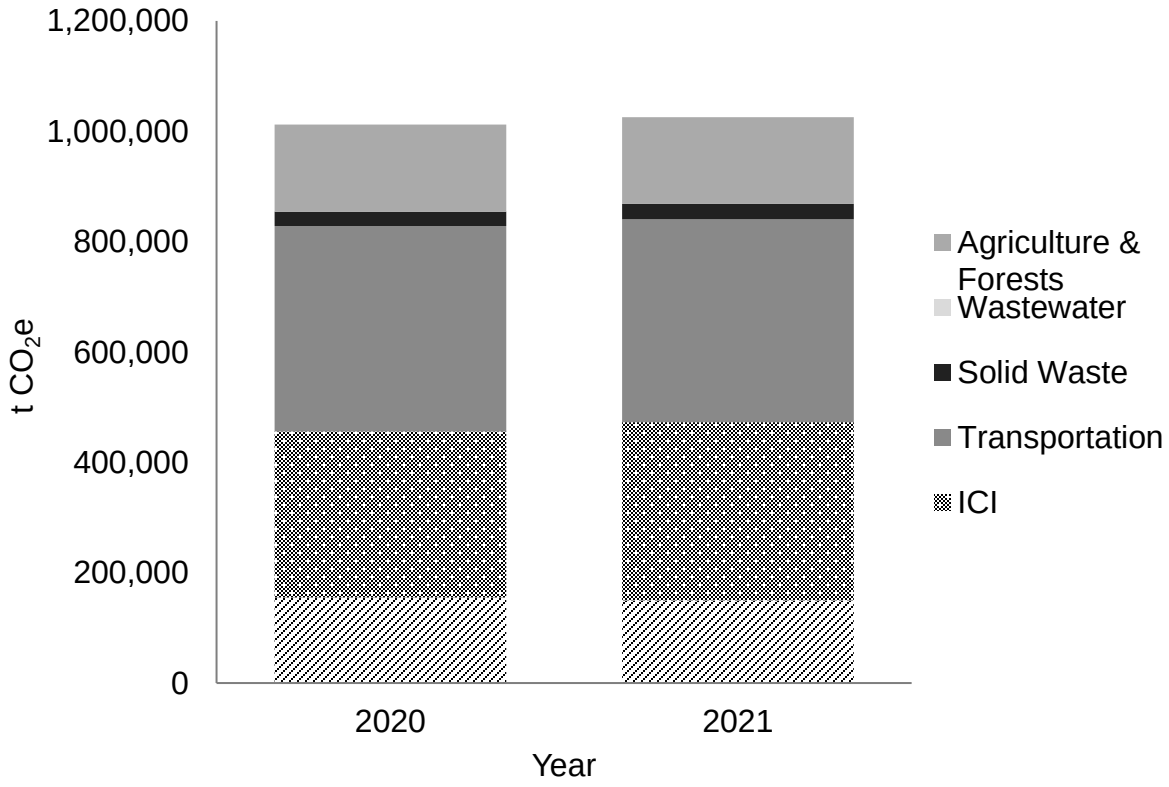
2021 Energy Consumption by sector (total: 18,958,259 GJ) and historical trend



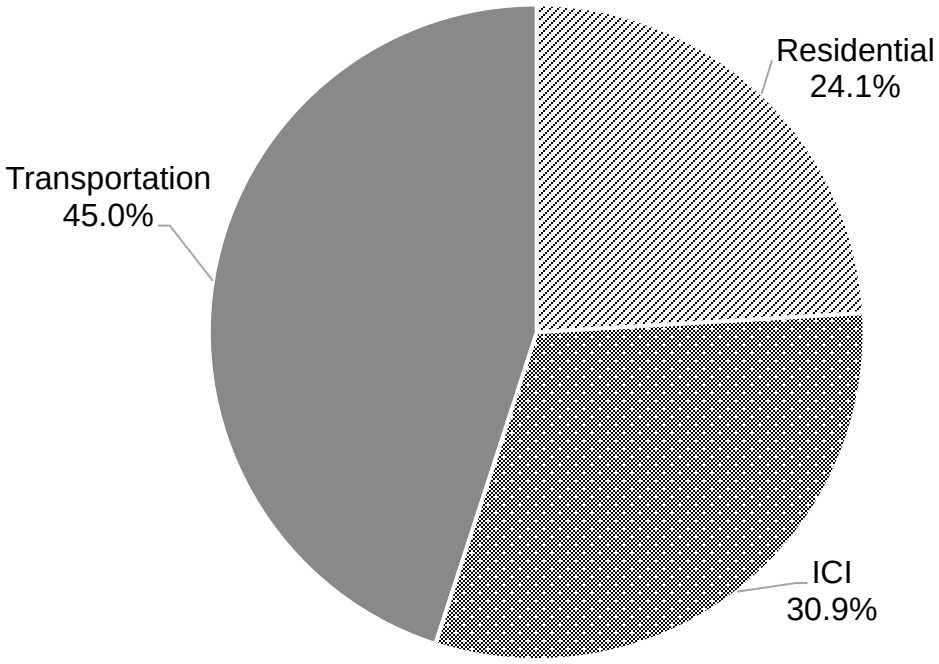


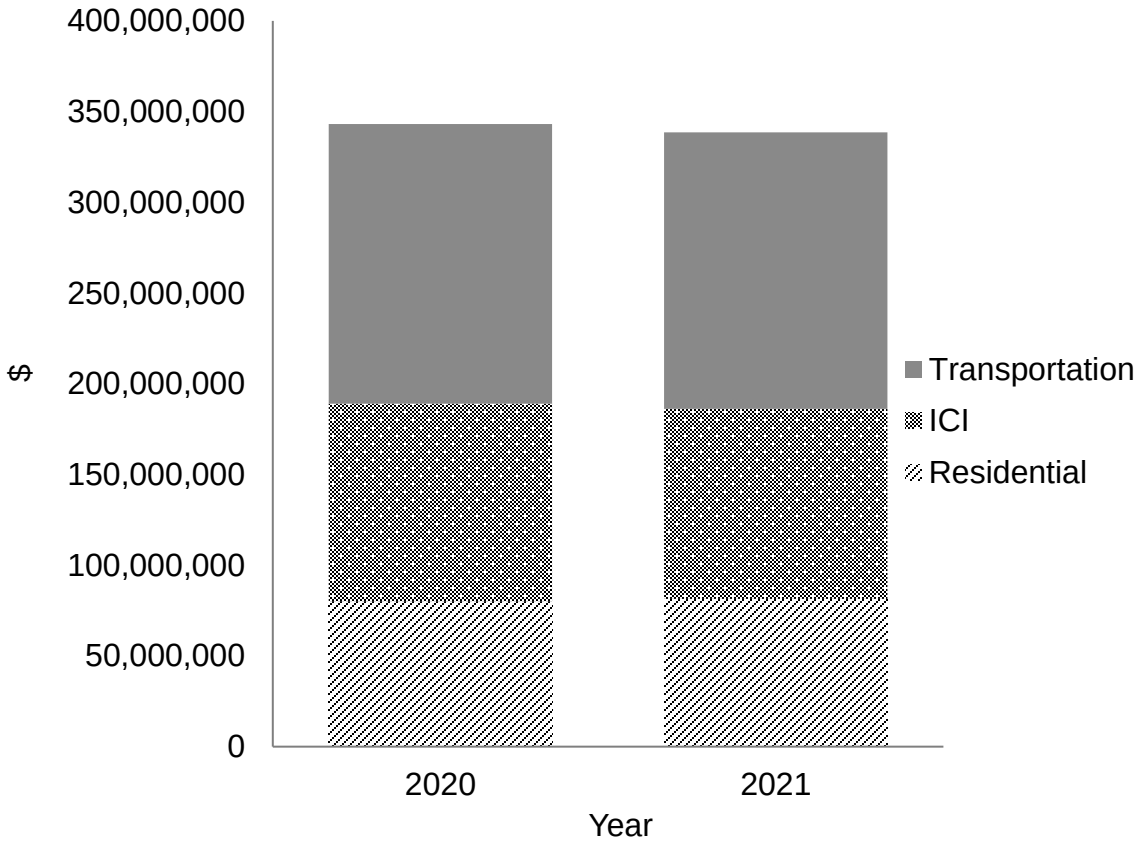
2021 GHG Emissions by sector (total: 1,025,510 tonnes CO_2e) and historical trend



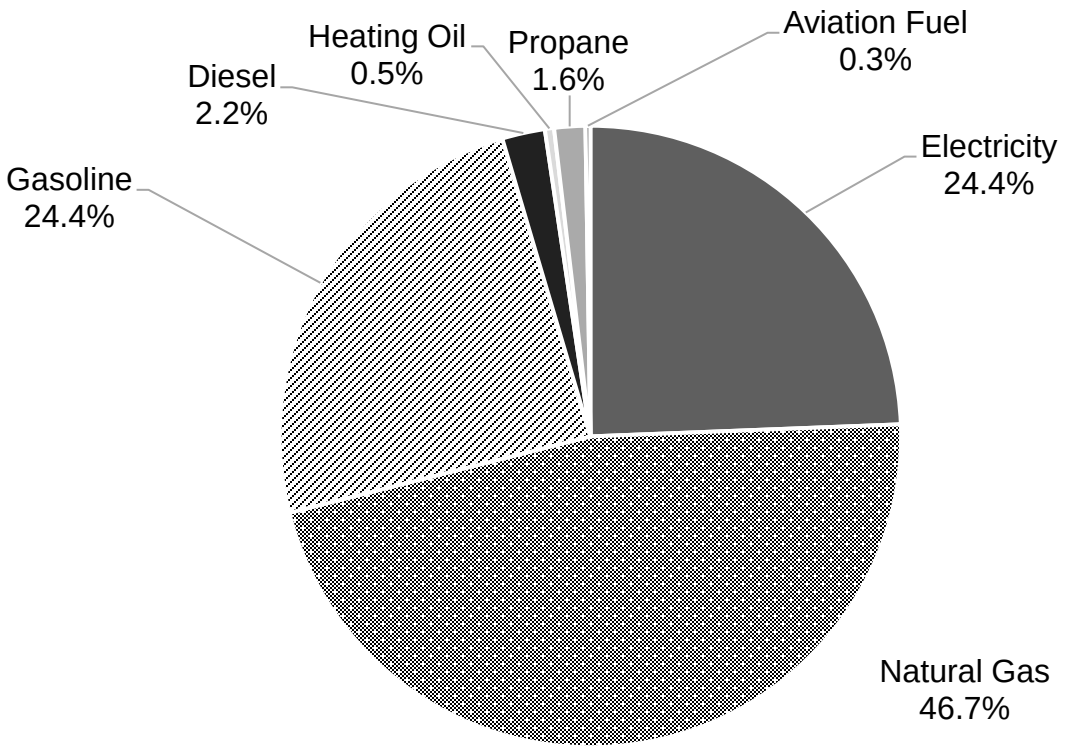


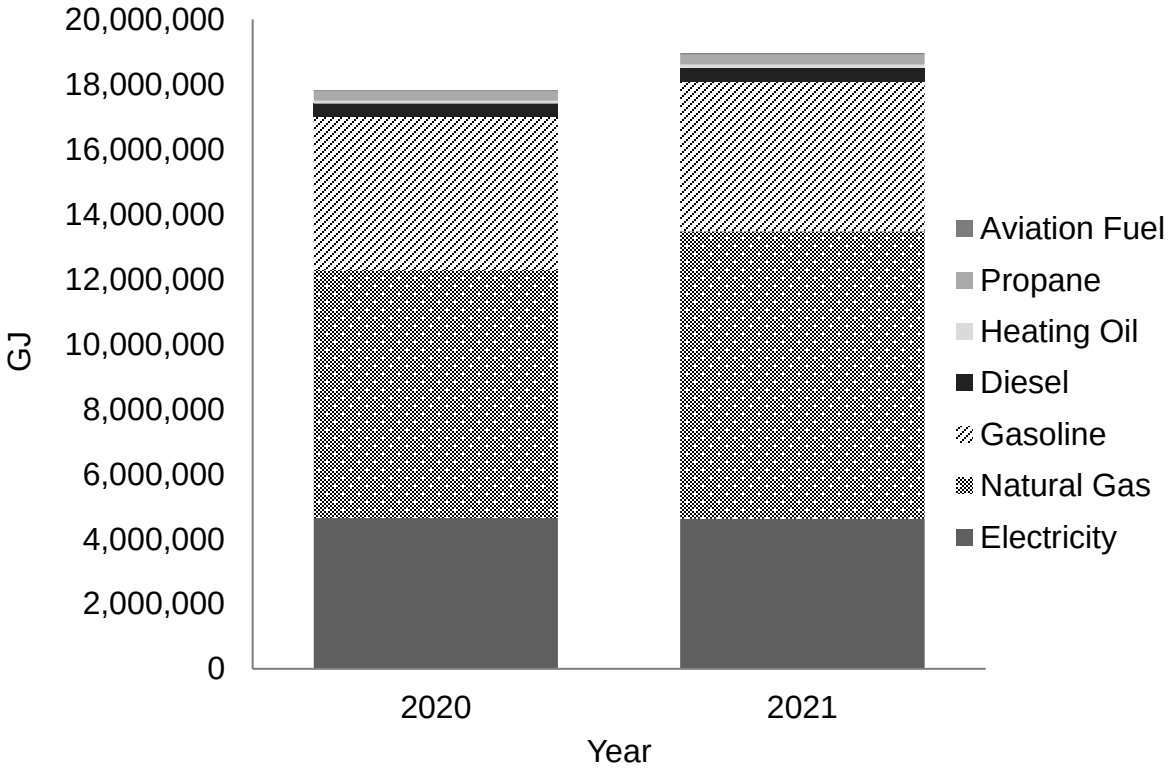
2021 Expenditures by sector (total: $338,611,027) and historical trend



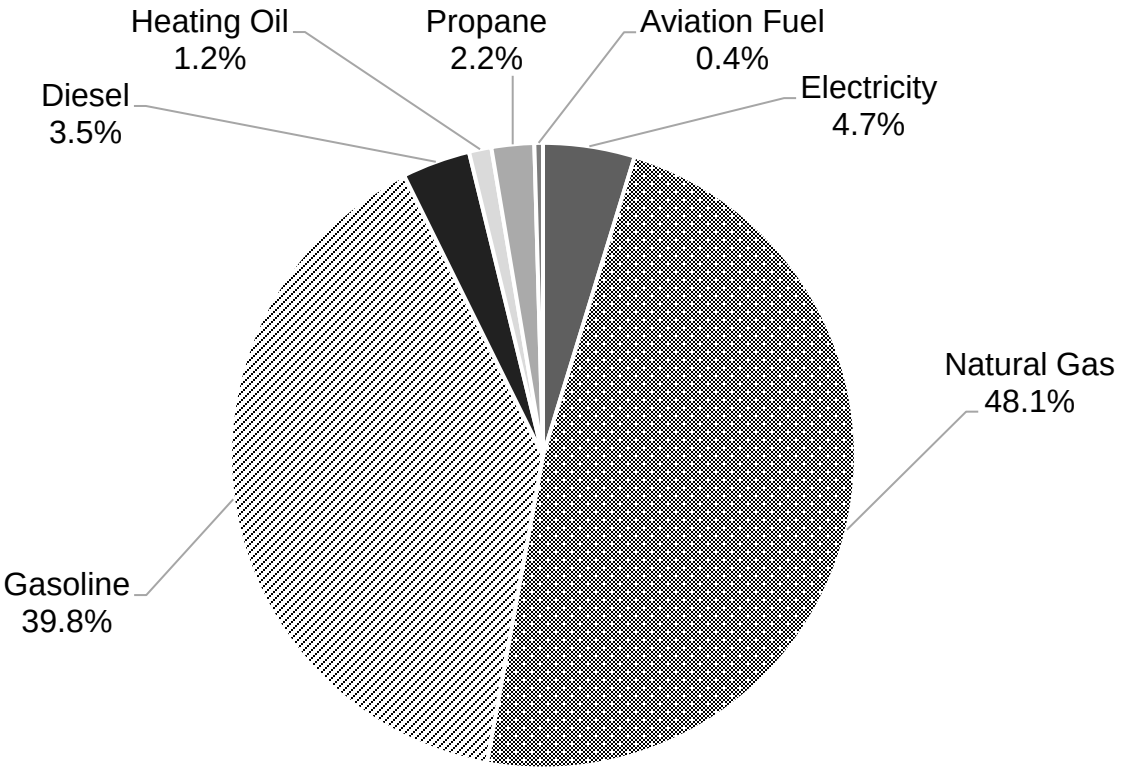


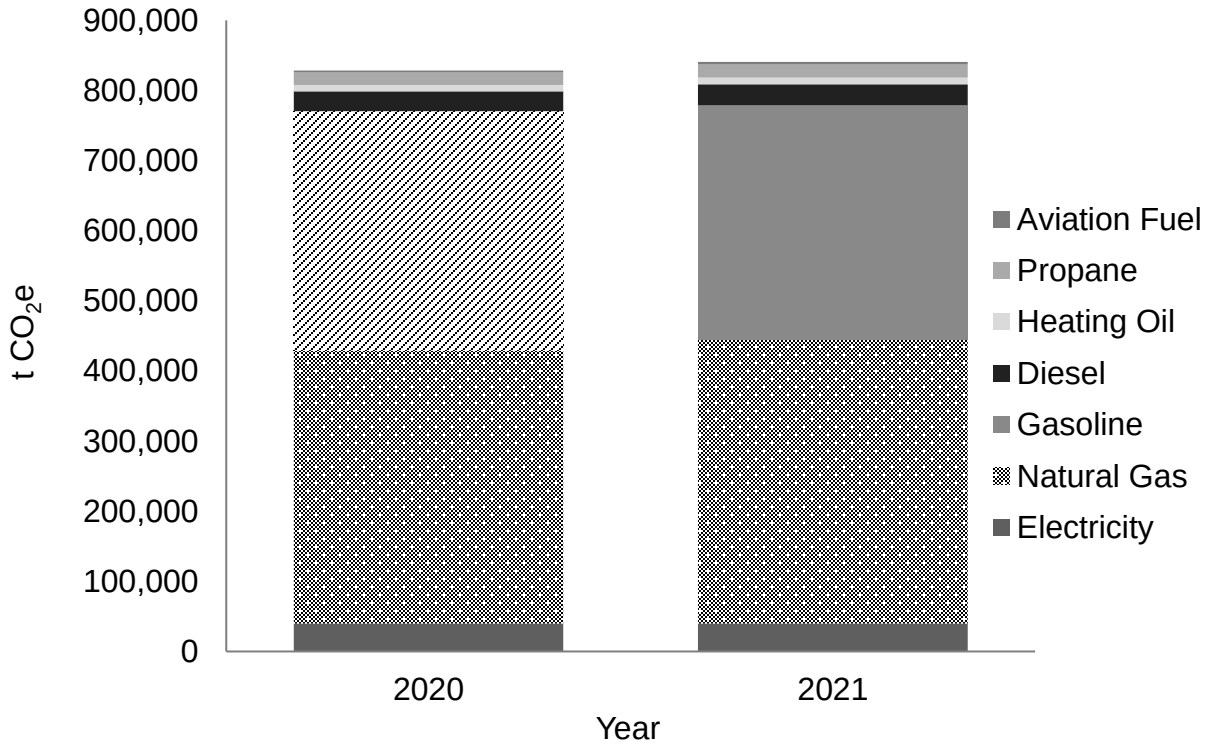
2021 Energy Consumption by source (total: 18,958,259 GJ) and historical trend



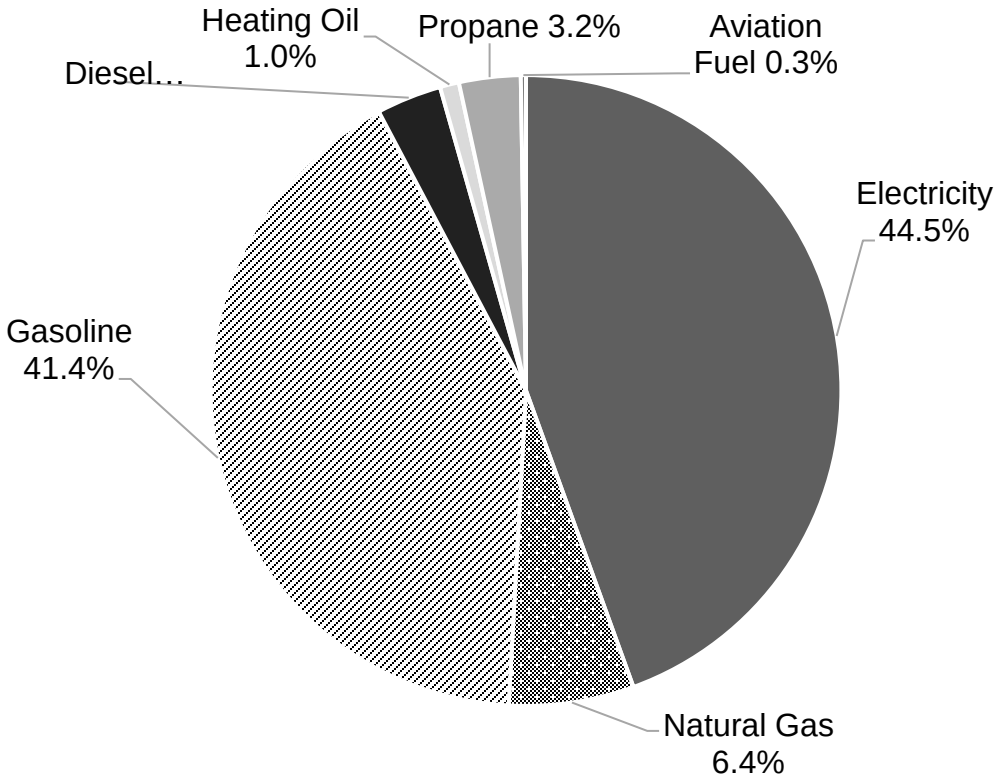


2021 GHG Emissions by source (total: 840,784 tonnes CO_2e) and historical trend





2021 Expenditures by source (total: $338,611,027) and historical trend



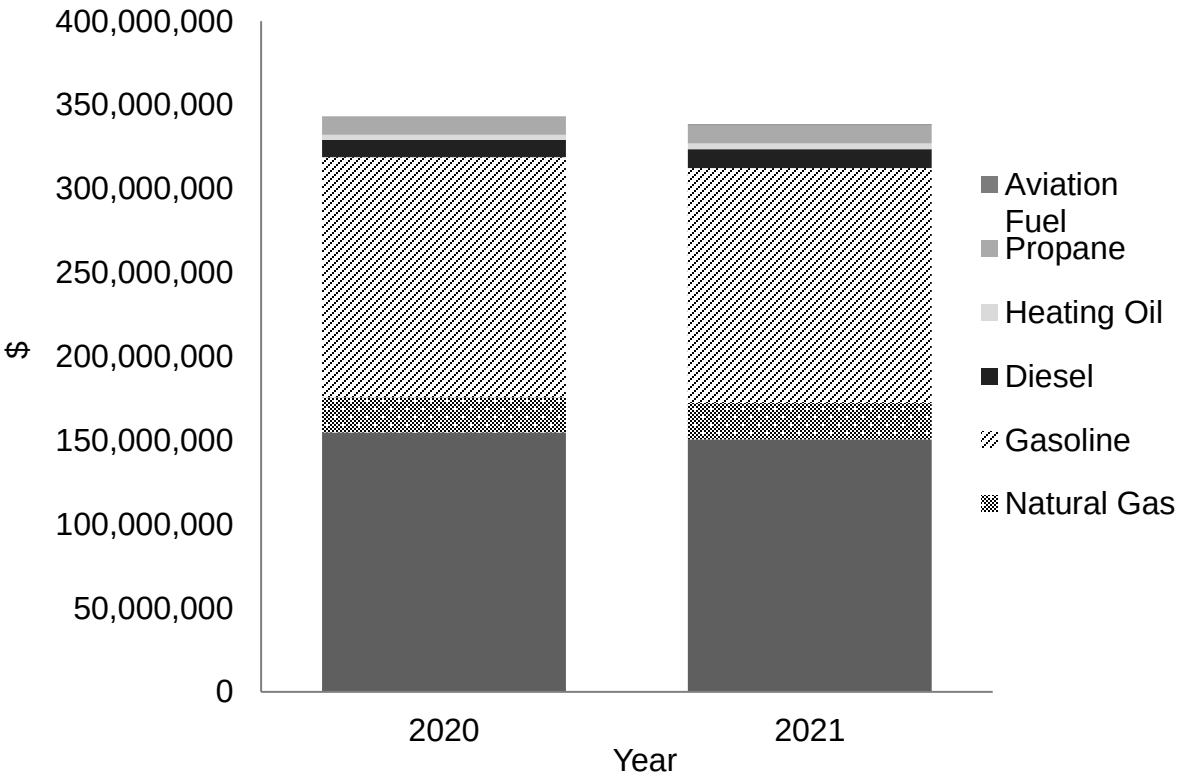


Table 1. Summary of energy consumption (GJ), GHG emissions (t CO_2e), and expenditures ($) for 2020 - 2021 across all sectors.

	2020			2021					
Sector	**Energy Consumption (GJ)**	**GHG Emissions (t CO_2e)**	**Expenditure ($)**	**Energy Consumption (GJ)**	**GHG Emissions (t CO_2e)**	**Expenditure ($)**	**Energy Consumption Change (GJ)**	**GHG Emissions Change (tCO_2e)**	**Change ($)**
Residential	4,408,943	154,942	80,167,789	5,196,202	149,614	81,508,730	787,260	-5,328	1,340,941
ICI	8,252,902	300,932	108,880,086	8,668,892	323,229	104,747,723	415,990	22,297	-4,132,363
Transportation	5,157,630	372,596	154,119,780	5,093,165	367,941	152,354,575	-64,465	-4,655	-1,765,205
Solid Waste	0	26,053	0	0	27,743	0	0	1,690	0
Wastewater	0	10	0	0	11	0	0	0	0
Agriculture & Forests	0	157,496	0	0	156,971	0	0	-525	0
TOTAL	17,819,475	1,012,031	343,167,655	18,958,259	1,025,510	338,611,027	1,138,785	13,479	-4,556,627

Table 2. Summary of energy consumption (GJ), GHG emissions (t CO_2e), and expenditures ($) for 2020 - 2021 for energy sources.

	2020			2021					
Energy Source	**Energy Consumption (GJ)**	**GHG Emissions (t CO_2e)**	**Expenditure ($)**	**Energy Consumption (GJ)**	**GHG Emissions (t CO_2e)**	**Expenditure ($)**	**Energy Consumption Change (GJ)**	**GHG Emissions Change (tCO_2e)**	**Change ($)**
Electricity	4,647,528	40,020	154,787,206	4,621,816	39,799	150,575,329	-25,712	-221	-4,211,876
Natural Gas	7,633,788	388,720	20,834,305	8,846,885	404,779	21,695,015	1,213,097	16,059	860,710
Gasoline	4,720,662	341,755	143,176,784	4,621,973	334,610	140,166,412	-98,688	-7,145	-3,010,372
Diesel	402,088	28,155	10,297,834	422,973	29,617	11,296,299	20,886	1,462	998,466
Heating Oil	86,428	9,344	3,174,767	90,031	9,734	3,307,122	3,603	390	132,356
Propane	294,101	17,789	10,251,597	306,362	18,531	10,678,985	12,261	742	427,389
Aviation Fuel	34,880	2,686	645,162	48,218	3,714	891,863	13,338	1,027	246,701
TOTAL	17,819,475	828,471	343,167,655	18,958,259	840,784	338,611,027	1,138,785	12,314	-4,556,627

Report Takeaways

- Annual community GHGs have increased by 1.3% since 2020, a total of 13,479 tonnes, however emissions remained 8.5% lower than 2018 baseline levels.

- It was expected that GHG emissions would likely increase as businesses and institutions that were closed in 2020 re-opened in 2021; this was reflected in a 7.4% increase in emissions from the ICI sector, and a 5.2% increase in emissions from diesel.

- It was expected that gasoline emissions in 2021 would increase from 2020, similar to other sectors, as businesses following pandemic shutdowns. Unexpectedly, emissions from gasoline instead decreased by 2.1% from 2020. There are likely a number of factors contributing to the small decrease, some of which may include increased use of Kingston transit services, transitioning to more fuel-efficient vehicles and electric vehicles, or the societal shift in workplace management that has seen more people remain working from home which can significantly reduce commutes and gasoline use.

- Heating degree days (HDD) decreased by around 3% from 2020 and the Residential sector saw a similar reduction in GHG emissions at 3.4%. While there were 10% fewer cooling degree days (CDD), electricity emissions were largely unchanged from 2020 and only decreased 0.5%, likely a result of more businesses and institutions opening.

- Natural gas remains the largest energy sector in terms of total emissions, accounting for nearly half of all emissions (48%) at the Community scale. Emissions from natural gas also account for 64% of all ICI emissions, and the majority (80.7%) of all Residential emissions

References

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