Regional District of Nanaimo – Municipalities and Electoral Areas

2007 and 2023 Reporting Years Energy & GHG Emissions Inventory

Prepared for:

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SUMMARY

Climate change has emerged as the next unprecedented social, economic, and environmental challenge facing society today. It poses a serious threat to quality of life, jobs, and physical and natural assets. Scientists believe that the human-production of greenhouse gas (GHG) emissions since pre-industrial times have already surpassed the Earth's "carrying capacity" of natural systems and pose significant future risks to human well-being.

Recognizing the role that Regional District of Nanaimo (RDN) plays in achieving a significant and immediate reduction in GHG emissions, the RDN has completed a 2007 and 2023 GHG emissions inventory with the intent of using this information to establish short and long-term GHG emission reduction targets.

To understand what climate commitments the Region can make, the RDN seeks a better understanding of the energy and GHG emissions at the regional level, as well as at the local government level which includes 4 municipalities and 7 electoral areas. The following document presents a summary of energy and GHG emissions at both the RDN and local government level for the 2007 and 2023 Reporting Years.

It should be noted that the 2007-2021 years have all been updated to reflect changes to emission factors and the release of transportation data by the Province of BC. A 2023 complimentary inventory report describes the changes, methodologies and data sources applied to derive the estimate of GHG emissions for the RDN and its members. A summary of the 2007 and 2023 GHG emissions and energy use by local government is presented in **Table 1** and **Table 2** respectively.

Table 1. Summary of GHG Emissions By RDN Local Government Area

Local Government	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
City of Nanaimo	790,655	858,491	8.6%
Town of Qualicum Beach	64,425	70,695	9.7%
District of Lantzville	25,998	29,146	12.1%
City of Parksville	88,119	109,866	24.7%
Electoral Area A	63,227	86,623	37.0%
Electoral Area B	36,550	48,578	32.9%
Electoral Area C	23,645	38,068	61.0%
Electoral Area E	47,702	71,566	50.0%
Electoral Area F	59,857	89,608	49.7%
Electoral Area G	61,690	88,012	42.7%
Electoral Area H	29,846	44,068	47.6%
Total RDN GHG Emissions	**1,291,714**	**1,534,721**	**18.8%**

Table 2. Summary of Energy Use By RDN Local Government Area

Local Government	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)
City of Nanaimo	14,756,790	16,849,176	14.2%
Town of Qualicum Beach	1,220,092	1,409,688	15.5%
District of Lantzville	467,676	560,983	20.0%
City of Parksville	1,707,119	2,234,347	30.9%
Electoral Area A	1,090,627	1,580,517	44.9%
Electoral Area B	721,022	985,199	36.6%
Electoral Area C	392,640	677,081	72.4%
Electoral Area E	866,545	1,348,411	55.6%
Electoral Area F	1,033,566	1,643,589	59.0%
Electoral Area G	1,082,577	1,630,161	50.6%
Electoral Area H	567,137	867,630	53.0%
Total RDN Energy Consumption	**23,905,790**	**29,786,781**	**24.6%**

1 INTRODUCTION

1.1 GHG Emissions & Climate Change

There is overwhelming evidence that global climate change resulting from emissions of carbon dioxide and other greenhouse gases (GHGs) is having a significant impact on the ecology of the planet. In addition, climate change is expected to have serious negative impacts on global economic growth and development.

Beyond the costs associated with delayed action, there are cost savings to be realized through efforts to conserve energy and to use it more efficiently, and economic opportunities available to communities that develop local energy supply and infrastructure. Actions to encourage energy efficiency and conservation and to promote implementation of renewable energy will assist local governments in developing energy resilient communities, in addition to mitigating climate change. Local governments are at the forefront of global action on climate change, setting both ambitious commitments and targets while going about the difficult task of reducing emissions. Per the latest report from the C40 Cities Climate Leadership Group, ICLEI Local Governments for Sustainability, UN Habitat, and others, most GHG reduction commitments are set for 2030, 2040 or 2050 and range from a 10% to 100% reduction (**Figure 1**).

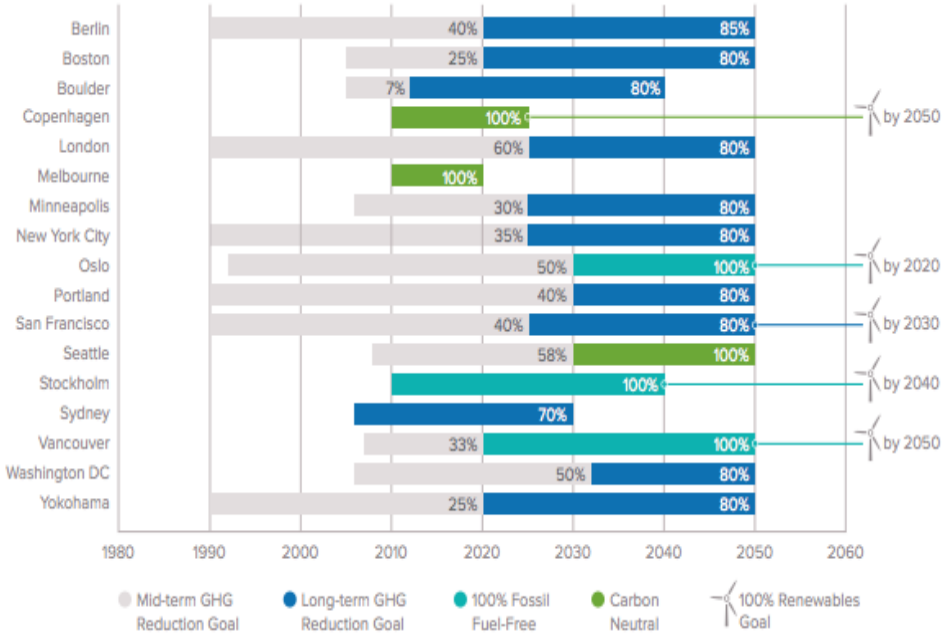

Figure 1. Summary of Long-Term Global GHG Emission Reduction Targets[1]

[1] http://www.c40.org/

1.2 GPC Protocol

To make informed decisions on reducing energy use and GHG emissions at the regional and local government scale, community managers must have a good understanding of these sources, the activities that drive them, and their relative contribution to the total. This requires the completion of an energy and GHG emissions inventory. To allow for credible and meaningful reporting locally and internationally, the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (the GPC Protocol) was developed as a partnership between ICLEI-Local Governments for Sustainability, The World Resources Institute (WRI) and C40 Cities Climate Leadership Group (C40), with additional collaboration by the World Bank, United Nations Environment Program (UNEP) and UN-Habitat. The GPC Protocol has now become recognized as the standardized way for local governments to collect and report their actions on climate change. Over 9,000 cities have committed to using the GPC Protocol.

The Protocol has two established levels of reporting: BASIC and BASIC+ which are defined as the following:

- The BASIC level covers scope 1 and scope 2 emissions from stationary energy and in-boundary transportation, as well as scope 1 and scope 3 emissions from waste.
- The BASIC+ level covers the same scopes as BASIC and includes more in-depth and data dependent methodologies. Specifically, it expands the reporting scope to include emissions from industrial process and product use (IPPU), agriculture, forestry and other land-use (AFOLU), and transboundary transportation.

1.3 Variance from Community Energy and Emissions Inventories (CEEI)

The RDN has historically relied on annual Provincial Community Energy and Emissions Inventories (CEEI) to track community GHG emissions. Because the current CEEI does not fully meet the requirements of the GPC Protocol BASIC+ reporting requirements, the RDN has prepared its own GHG emissions inventory which relies on the CEEI data as well as external data sources. A high-level summary of the differences between the CEEI and GPC Protocol inventories are presented in **Table 3**.

Table 3. Summary of GHG Inventory Scope Differences

Reporting Sector	2023 CEEI	GPC BASIC	GPC BASIC+
Residential Buildings	✓	✓	✓
Commercial And Institutional Buildings And Facilities	✓	✓	✓
Manufacturing Industries And Construction	✓	✓	✓
Energy Industries		✓	✓
Energy Generation Supplied To The Grid		✓	✓
Agriculture, Forestry And Fishing Activities		✓	✓
Energy Industries		✓	✓
Fugitive Emissions From Mining, Processing, Storage, And Transportation Of Coal		✓	✓

Reporting Sector	2023 CEEI	GPC BASIC	GPC BASIC+
Fugitive Emissions From Oil And Natural Gas Systems		✓	✓
On-Road Transportation	✓	✓	✓
Railways		✓	✓
Waterborne Navigation		✓	✓
Aviation		✓	✓
Off-Road Transportation		✓	✓
Solid Waste	✓	✓	✓
Biological Waste	✓	✓	✓
Incinerated And Burned Waste		✓	✓
Wastewater		✓	✓
Emissions From Industrial Processes			✓
Emissions From Product Use			✓
Emissions From Livestock	✓		✓
Emissions From Land			✓
Emissions From Aggregate Sources And Non-CO_2 Emission Sources On Land	✓		✓

1.4 Purpose of Document

The purpose of this document is to provide the 2007 and 2023 GPC BASIC+ energy and GHG emissions inventories at the regional and local government level. This document compliments a 2023 inventory report which describes the methodologies, data quality assessments, and data sources applied to derive the estimate of GHG emissions for the RDN region and local governments.

2 INVENTORY SCOPE

2.1 GPC BASIC+ Inventory Scope

The RDN has elected to prepare a BASIC+ GHG emissions inventory to align with global best practices in community GHG emissions and to provide its members with the more comprehensive GHG emissions inventory database.

In accordance with the GPC Protocol, the 2007 and 2023 BASIC+ GHG inventories presented herein accounts for GHG emissions from the following Reporting Sectors:

- **Stationary Energy** – These are GHG emissions from fuel combustion, fugitive emissions, and some off-road transportation sources (e.g., construction equipment, residential mowers, etc.). They include the emissions from energy to heat and cool residential, commercial, institutional, and light/heavy industrial buildings, as well as the activities that occur within these residences and facilities.
- **Transportation** – These are GHG emissions from the combustion of fuels as a result of vehicular on-road, off-road, including marine, railways, aviation, and other off-road, and trans-boundary journeys. At the request of the Nanaimo Airport all aviation GHG emissions have been excluded from the GHG emissions inventory until the airport quantifies and reports on these emissions.
- **Waste** – These are GHG emissions from the disposal and management of solid waste, the biological treatment of waste, and wastewater treatment and discharge. Waste does not directly consume energy, but releases GHG emissions because of decomposition, burning, and other management methods.
- **Industrial Process and Product Use (IPPU)** – These are GHG emissions from products such as refrigerants, foams or aerosol cans can release potent GHG emissions, known as product use GHG emissions. There are no known industrial process emissions significant enough to exceed Provincial or Federal GHG reporting requirements in the RDN.
- **Agriculture, Forestry and Other Land-Use (AFOLU)** – These are GHG emissions that are captured or released because of land-management activities. These activities can range from the preservation of forested lands to the development of crop land. This Sector includes GHG emissions from land-use change, manure management, livestock, and the direct and indirect release of nitrous oxides (N_2O) from soil management, urea application, fertilizer, and manure application. Due to limitations in how to quantify GHG emissions resulting from land use change (e.g., residential development) and ecosystem sequestration, these GHG emissions have been excluded from the RDNs GHG emissions inventory, but have been disclosed, until a more robust measurement methodology can be developed.

2.2 GHG Emissions Boundary

The GHG inventories are defined geographically by the RDN, which includes 4 municipalities and 7 electoral areas, as shown in **Figure 2**.

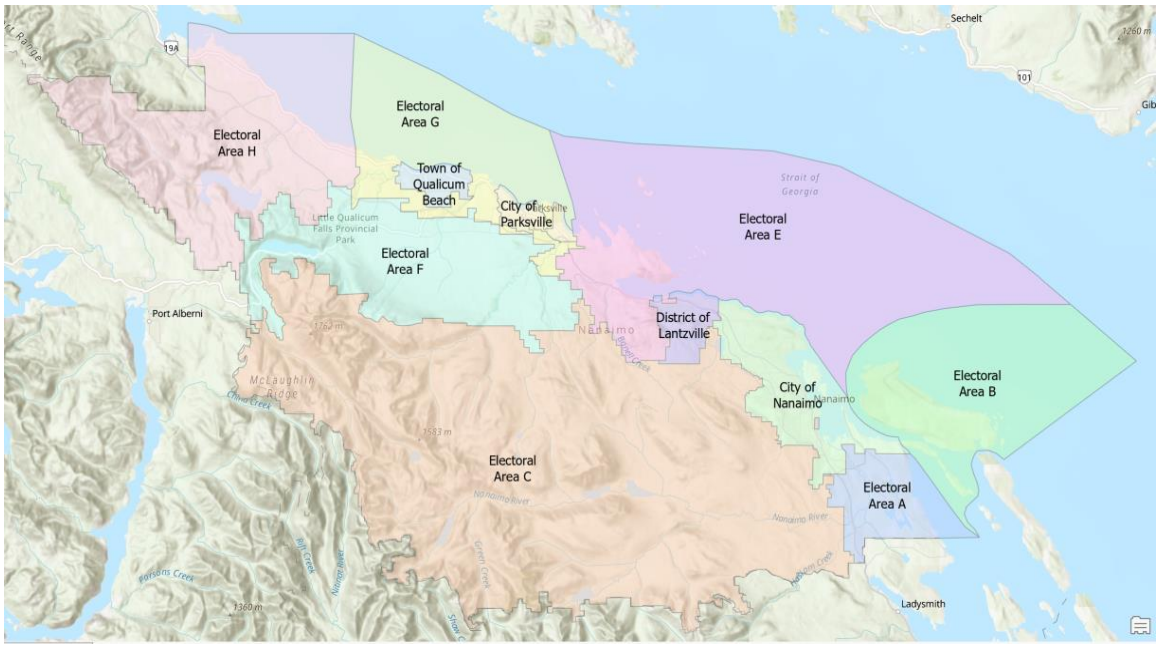

Figure 2 RDN GHG Boundary

2.3 Assumptions & Disclosures

The following inventories covers all GHG emissions for the 2007 and 2023 Reporting Years. Where current reporting year data was not available, the most recent year's data have been used, and the timescale noted accordingly. These disclosures are as follows:

- **Global Warming Potentials (GWP)**. The BC government has communicated that is adopting GWPs from the fifth IPCC report. On this basis, the RDN is applying GWPs from the fifth IPCC report.
- **Stationary Energy: Residential, Commercial and Institutional Buildings**. The 2022-2023 propane, heating oil and wood GHG emissions were estimated using linear regression methods because the data was not available from the province past 2021. The data used in the estimates included historical propane and wood energy data published in the 2007-2021 CEEIs, and heating degree days (HDD) published by Environment and Climate Change Canada.
- **Stationary Energy: Residential, Commercial and Institutional Buildings in Electoral Areas**. The 2022 and 2023 building natural gas data was not available for the Electoral Areas at the time of reporting but was available for the other RDN municipalities. To estimate the Electoral Areas natural gas usage for the 2022 and 2023 reporting years, the 2021 Electoral Areas natural gas values was grown based on the change in total natural gas use for the RDN non-Electoral Areas municipalities between the 2022 and 2023 reporting years.

- **Stationary Energy: Other Off-Road.** The ECCC 2024 NIR prepared for the Province of BC for the 2021 reporting year was used to estimate GHG emissions for:
    - Off-road agriculture and forestry GHG emissions
    - Off-road commercial and institutional GHG emissions
    - Off-road manufacturing, mining, and construction GHG emissions
    - Off-road residential GHG emissions

  These GHG emissions were assigned to the RDN on a per capita basis.
- **Stationary Energy: Fugitives**. Fugitive emissions data was not available for the RDN. As such, the Victoria Capital Regional District's reported fugitive emissions per connection for the 2020 reporting year was used to derive 2007 and 2023 estimates.
- **Transportation: On-Road**. The 2023 vehicle registration data was not available at the time of reporting. To estimate the GHG emissions, the number of registered vehicles for the 2022 reporting year was grown using the reported population change between 2022 and 2023. Insurance Corporation of BC (ICBC) compiles data on an April 1 to March 31 basis, and thus the 2007 and 2023 on-road GHG emission estimates are based on the number of registrations from April 1 – March 31 and may not accurately represent the actual vehicle population for each given reporting year.
- **Transportation: Waterborne**.
    - The number of recreational boats was estimated from the total number of pleasure craft and large vessels registered in the RDN as tracked by Transport Canada. Recreational vessel fuel consumption rates are based on the study entitled "Marine Vessel Air Emissions in BC and Washington State Outside of the Greater Victoria Regional District (GVRD) and FVRD for the Year 2000".
    - Cruise ship emissions are based on the number of reported vessels at the Nanaimo Port for the 2023 reporting year and the Greater Victoria Harbor Authority's 2018 estimate of GHG emissions per cruise ship.
    - Deep vessel shipment GHG emissions are based on 2023 Nanaimo Port data and the Port of Vancouver's 2015 estimate of GHG emissions per tonne of cargo throughput.
- **Waste: Incineration & Opening Burning.** Open burning GHG emissions are estimated using 2015 data reported by the Comox Valley Regional District as no value has been publicly reported by the RDN. The GHG emissions are adjusted to 2007 and 2023 using population data and are assumed to only occur in the EA's.
- **AFOLU: Land-Use.** The land cover change analysis requires a consistent land-use category attribution and spatial data. Landsat spatial data was available for the 2005, 2010, 2015 and 2020 reporting years only. Since annual data is not available, the change between land cover data years (2005-2010, 2010-2015, 2015-2020) for all areas was averaged and may not represent actual changes in land-use each year.

The above disclosures are not meant to be methodological statements or explanations. Further details surrounding all GHG emissions sources quantification methods, assumptions, and assessment of uncertainties are contained in a complimentary GHG emissions methodology document and are not presented herein.

2.4 Updates to Prior Year GHG Emission Inventories

Since the release of the last GHG emissions inventory for the 2021 reporting period, there have been several updates to data sources which impact all inventories from 2007 to 2021. The most noteworthy is the Province of BC's release of updated (2007, 2010, 2012) and newly published (2008, 2009, 2011, 2013-2021) vehicle count data, VKT and fuel consumption data for all BC municipalities for use in the CEEIs.[2] As the vehicle count data is showing stability across all years and is expected to continue, and the Province has low uncertainty associated with it, this new data was incorporated into the 2007-2023 GHG emissions inventories which results in a change in base year GHG emissions for all RDN municipalities. The Province also updated wood and fuel oil GHG emission factors – these too were applied to all GHG inventories. While the change does not have a material impact on the 2007 base year, it does have a material impact on the 2012-2021 reporting years.

Table 4 presents the prior 2007 and the updated 2007 base year GHG emissions reported as tonnes of carbon dioxide equivalent (tCO2e).

Table 4. Original And Updated BASIC+ Base Year

Sector	GPC Protocol: 2007 GHG Base Year (tCO_2e)	Updated GPC Protocol: 2007 GHG Base Year (tCO_2e)
Residential Buildings	178,457	198,330
Commercial & Institutional Buildings	88,577	88,577
Manufacturing Industries & Construction	131,220	131,220
Energy Industries	462	462
Non-Specified Sources	-	-
Agriculture, Forestry & Fishing activities	34,815	34,815
Fugitive Emissions	583	583
In-Boundary On-road Transportation	680,030	644,726
Trans-Boundary On-road Transportation	93,773	88,904
Waterborne Navigation	6,518	6,518
Aviation	Not Estimated*	Not Estimated*
Railway	1,248	1,248
Off-road Transportation	24,215	24,215
Solid Waste	45,315	45,315
Biological Treatment of Waste	394	394
Incineration & Open Burning	126	126
Wastewater Treatment & Discharge	1,965	1,965
IPPU	20,388	20,388
Land-Use Change	(294,814)	(294,814)
Livestock	3,818	3,818

[2] 2021 Community Energy and Emissions Inventory data - Province of British Columbia (gov.bc.ca)

Sector	GPC Protocol: 2007 GHG Base Year (tCO_2e)	Updated GPC Protocol: 2007 GHG Base Year (tCO_2e)
Non-CO_2 Land Emission Sources	109	109
Total Without Land Use GHG Emissions	**1,312,013**	**1,291,714**
Total With Land Use GHG Emissions	**1,017,198**	**996,899**

***** *At the request of the Nanaimo Airport all aviation GHG emissions have been excluded from the GHG emissions inventory until the airport quantifies and reports on these emissions.*

REGIONAL DISTRICT OF NANAIMO ENERGY & GHG EMISSIONS

2.5 Base Year (2007) Energy & GHG Emissions

In 2007, the RDN's GHG BASIC+ emissions totaled 1,291,714 tCO_2e. On a per capita basis this amounts of 9.1 tCO_2e per person.

Excluding sequestration GHG emissions, the on-road transportation GHG emission sources contributed 79.8% to the GHG inventory of which 66.6% came from passenger vehicles, light trucks, and SUVs and 20.2% came from heavy duty / commercial vehicles.

As the second largest source, stationary energy accounted for 35.1% of the total GHG emissions. Of these GHG emissions, 63.4% were related to the powering and heating of residential and commercial buildings and 36.6% were related to industry. In terms of stationary energy sources GHG emissions, 47.5% of total stationary energy GHG emissions came from the combustion of natural gas, 17.1% from heating oil, 11.7% from electricity use, 6.4% from wood and propane use for heating, and the remainder (17.2%) from other-off activities like residential lawn mowing.

Off-road transportation, which includes marine, rail and other off-road emission sources contributed 2.5% to the overall GHG inventory. Solid waste, organic waste treatment methods, and wastewater treatment and discharge accounted for 3.7% of the total community GHG emissions. Industrial process and product use GHG emissions accounted for 1.6% of total GHG emissions.

A summary of the GHG emissions by sector and energy use by source is presented in the following table.

Table 5. Base Year (2007) RDN Regional GHG Energy & GHG Emissions by Source

Source	Type	Consumption	Units	Energy (GJ)	GHG Emissions (tCO_2e)
Stationary Energy					
Residential Buildings	Electricity	935,819	MWh	3,368,922	33,409
	Natural Gas	1,081,681	GJ	1,081,681	53,912
	Fuel Oil	30,781	L	793,335	77,762
	Propane	3,463	L	136,836	8,322
	Wood	950,343	GJ	950,343	20,749
	Diesel	1,464,583	L	56,650	4,176
Commercial & Industrial Buildings	Electricity	549,908	MWh	1,979,653	19,632
	Natural Gas	1,105,187	GJ	1,105,187	55,083
	Fuel Oil	-	L	-	-
	Diesel	4,861,808	L	188,055	13,862
	Natural Gas	330,804	GJ	330,804	24,384

Source	Type	Consumption	Units	Energy (GJ)	GHG Emissions (tCO_2e)
Manufacturing Industries & Construction	Diesel	2,143,548	GJ	2,143,548	106,836
Energy Industries[3]					462
Agriculture, Forestry And Fishing Activities	Diesel	12,210,671	L	472,309	34,815
Natural Gas Fugitive Emissions					
Total				**12,607,322**	**453,987**
On-Road Transportation					
Electric Vehicles	Electricity	62	MWh	62	1
Hydrogen Vehicles	Hydrogen	893,430	L	0	0
Passenger Vehicles	Gasoline + Diesel	155,936,088	L	5,409,462	363,850
Light Trucks, Vans, SUVs	Gasoline + Diesel	92,721,768	L	3,223,764	219,565
Heavy Duty Vehicles	Gasoline + Diesel	58,389,091	L	2,196,962	147,873
Propane Vehicles	Propane	315,572	L	8,057	486
Natural Gas Vehicles	Natural Gas	24,922	kg	1,341	78
Motorcycles	Gasoline	742,861	L	25,748	1,778
Off-Road Vehicles	Gasoline + Diesel	No Data	L	No Data	No Data
Total On-Road Transportation				**10,865,395**	**733,631**
Off-Road Transportation					
Marine, Rail and Other Off-Road Vehicles	Gasoline + Diesel	11,196,615	L	433,073	31,982
Total Off-Road Transportation				**433,073**	**31,982**
Waste					
Solid Waste					45,315
Composting					394
Waste Incineration and Open Burning					126
Wastewater					1,965
Total Waste					**47,799**
Agriculture Forestry & Other Land Use (AFOLU)					
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-304,136
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					9,322
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					3,927
Total AFOLU					**3,927**
Industrial Process & Product Use (IPPU)					
Process Use Emissions					20,388

[3] Generation of power from the combustion of landfill gas.

Source	Type	Consumption	Units	Energy (GJ)	GHG Emissions (tCO_2e)
Total IPPU					**20,388**
Total				**23,905,790**	**1,291,714**
Total Per Capita				**168.3**	**9.1**

Energy consumption and GHG emissions by source are shown in **Figure 3**, **Figure 4** and **Figure 5**.

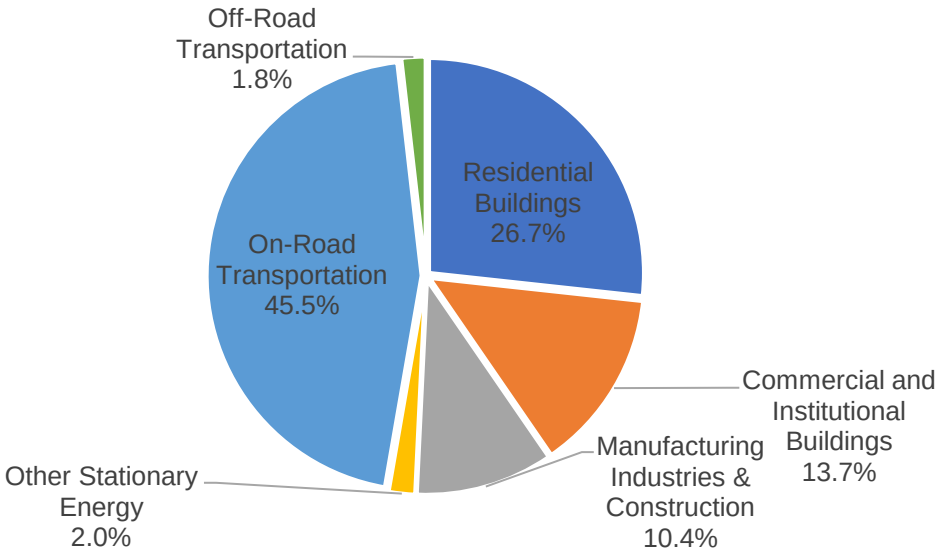

Figure 3. 2007 Regional Energy Consumption By Sector

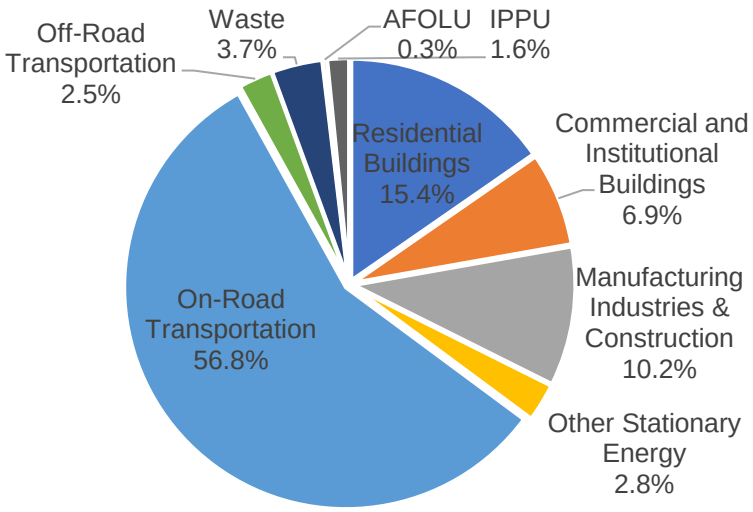

Figure 4. 2007 Regional GHG Emissions By Sector

GHG emissions by fuel type is presented in **Figure 5**. Note that non-energy related emissions are not included in this chart.

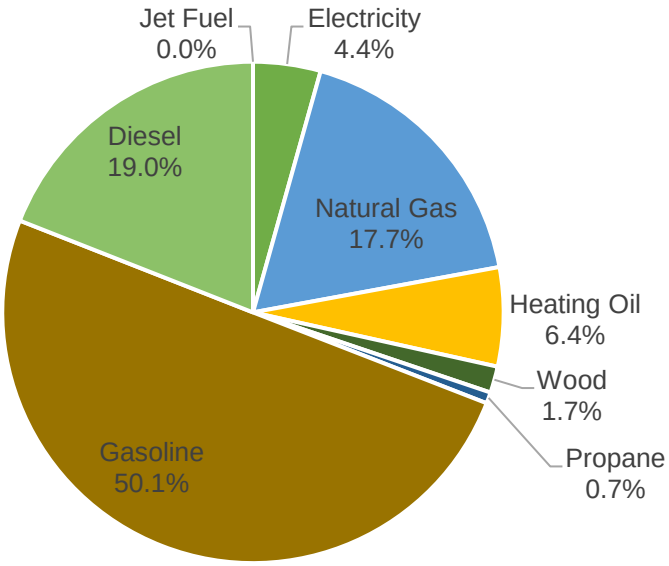

Figure 5. 2007 Regional GHG Emissions By Fuel Type

2.6 Reporting Year (2023) Energy & GHG Emissions

In 2007, the RDN's GHG BASIC+ emissions totaled 1,534,721 tCO_2e. On a per capita basis this amounts of 8.4 tCO_2e per person.

Excluding sequestration GHG emissions, on-road transportation GHG emission sources contributed 56.7% to the GHG inventory to which 67.4% came from passenger vehicles, light trucks, and SUVs and 32.6% came from heavy duty / commercial vehicles.

As the second largest source, stationary energy accounted for 33.4% of the total GHG emissions. Of these GHG emissions, 55.1% were related to the powering and heating of residential and commercial buildings and 44.9% were related to industry. In terms of stationary energy sources GHG emissions, 53.5% of total stationary energy GHG emissions came from the combustion of natural gas, 14.4% from heating oil, 3.3% from electricity use, 5.4% from wood and propane use for heating and the remainder (23.3%) from other-off activities like residential lawn mowing.

Off-road transportation, which includes marine, aviation, and other off-road emission sources contributed 3.1% to the overall GHG inventory. Solid waste, organic waste treatment methods, and wastewater treatment and discharge accounted for 4.0% of the total community GHG emissions. Industrial process and product use GHG emissions accounted for 2.5% of total GHG emissions.

A summary of the GHG emissions by sector and energy use by source is presented in the following table.

Table 6. Reporting Year (2023) RDN Regional GHG Energy & GHG Emissions by Sector

Source	Type	Consumption	Units	Energy (GJ)	GHG Emissions (tCO_2e)
Stationary Energy					
Residential Buildings	Electricity	959,719	MWh	3,454,960	10,845
	Natural Gas	1,653,274	GJ	1,653,274	79,588
	Fuel Oil	29,281	L	754,667	73,972
	Propane	3,295	L	130,169	7,942
	Wood	904,023	GJ	904,023	19,738
	Diesel	1,137,694	L	44,006	2,821
Commercial & Industrial Buildings	Electricity	559,319	MWh	2,013,531	6,320
	Natural Gas	1,061,998	GJ	1,061,998	51,124
	Fuel Oil	-	L	-	-
	Diesel	11,408,804	L	441,293	28,293
Manufacturing Industries & Construction	Natural Gas	482,865	GJ	482,865	31,092
	Diesel	2,799,196	GJ	2,799,196	143,403
Energy Industries					582
Agriculture, Forestry And Fishing Activities	Diesel	22,459,274	L	868,725	55,697
Natural Gas Fugitive Emissions					
Total				**14,608,707**	**512,568**
On-Road Transportation					
Electric Vehicles	Electricity	1,771	MWh	1,771	6
Hydrogen Vehicles	Hydrogen	1,670,315	L	0	0
Passenger Vehicles	Gasoline + Diesel	163,013,644	L	5,655,292	332,916
Light Trucks, Vans, SUVs	Gasoline + Diesel	119,853,551	L	4,161,953	245,207
Heavy Duty Vehicles	Gasoline + Diesel	118,103,929	L	4,494,258	283,751
Propane Vehicles	Propane	1,437,543	L	36,700	2,084
Natural Gas Vehicles	Natural Gas	1,723,473	kg	93	5
Motorcycles	Gasoline	3,051,978	L	105,782	6,388
Off-Road Vehicles	Gasoline + Diesel	239,435	L	9,206	590
Total On-Road Transportation				**14,465,055**	**870,947**
Off-Road Transportation					
Marine, Rail and Other Off-Road Vehicles	Gasoline + Diesel	18,441,846	L	713,020	47,017
Total Off-Road Transportation				**713,020**	**47,017**
Waste					
Solid Waste					53,826
Composting					4,015
Waste Incineration and Open Burning					160

Source	Type	Consumption	Units	Energy (GJ)	GHG Emissions (tCO_2e)
Wastewater					3,097
Total Waste					**61,098**
Agriculture Forestry & Other Land Use (AFOLU)					
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-270,915
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					9,322
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					4,273
Total AFOLU					**4,273**
Industrial Process & Product Use (IPPU)					
Process Use Emissions					38,817
Total IPPU					**38,817**
Total				**29,786,781**	**1,534,721**
Total Per Capita				**162.7**	**8.4**

Energy consumption and GHG emissions by source are shown in **Figure 6**, **Figure 7** and **Figure 8**.

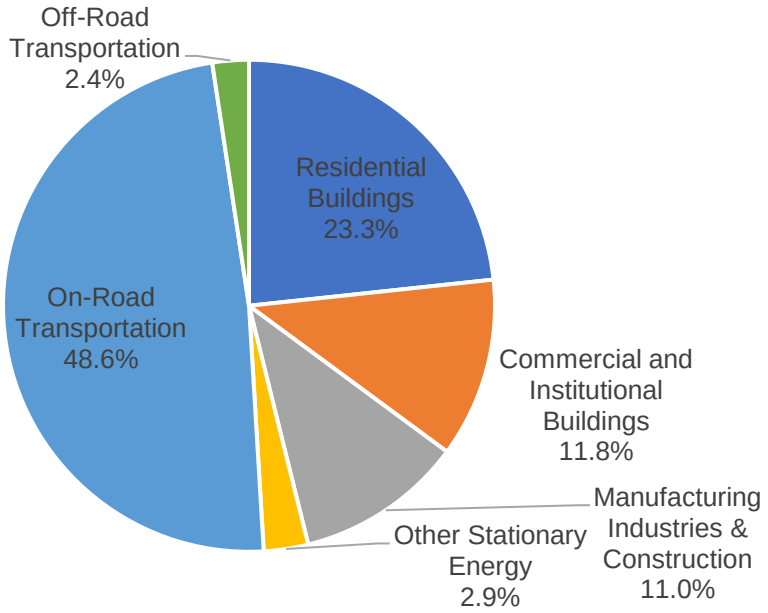

Figure 6. 2023 Regional Energy Consumption By Sector

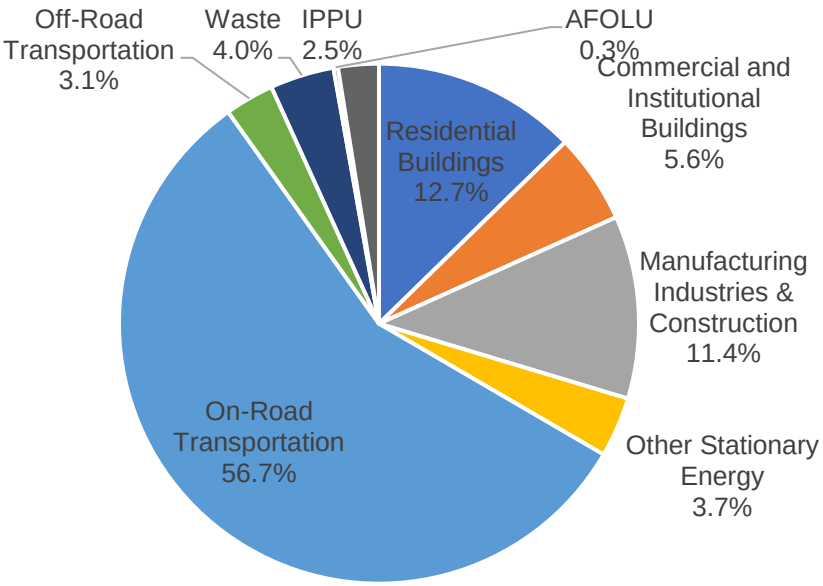

Figure 7. 2023 Regional GHG Emissions By Sector

GHG emissions by fuel type is presented in **Figure 8**. Note that non-energy related emissions are not included in this chart.

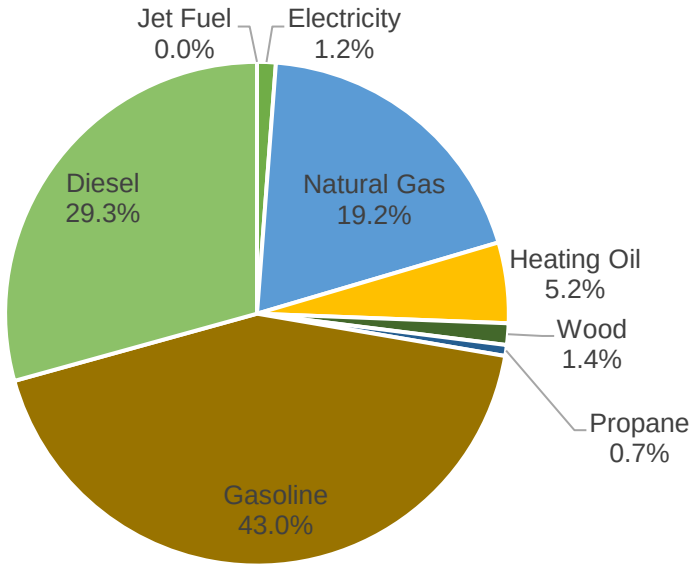

Figure 8. 2023 Regional GHG Emissions By Fuel Type

2.7 Energy & GHG Emissions Trends

Table 7 presents the changes between the 2007 and 2023 reporting years. Compared to the 2007 GHG emissions inventory, the 2023 GHG emissions have increased by 18.8% on an absolute basis and declined 7.8% on an per capita basis. The majority of the increase in absolute GHG emissions (80.7%) between the two years is related to an increase in transportation and building GHG emissions. Other off-road, waste and IPPU GHG emissions accounting for the remaining 19.3% increase.

Overall, GHG emissions related to transportation have increased due to an increase in overall vehicle populations – the potential related increase in GHG emissions has been offset by commuting behavior changes (people working from home and driving less), improved vehicle fuel efficiency and a shift away from inefficient vehicles towards electric vehicles and other modal shifts.

The table below shows that residential and commercial building energy consumption and GHG emissions increased. While there was an increase in electricity consumption, there was an offsetting reduction in electricity GHG emissions due to the greening of the electrical grid and a change in how the province quantifies electricity GHG emissions in BC (the impact was carried through to prior years up to 2010).[4] Natural gas consumption has increased across all sectors which has resulted in an increase in GHG emissions.

There was an increase in solid waste, incineration and open burning and composting emissions which is directly related to an increase in population. However, some of the increase in solid waste GHG emissions is mitigated through the capture and beneficial re-use of landfill gas and through organic waste diversion programs. Organic waste diversion and composting programs do result in some direct GHG emissions, but the overall impact tend to result in a net reduction as the process avoids releasing more fugitive emissions from the landfill. It should be noted that these benefits are not immediate and are only really noticed over a decadal time span. Wastewater GHG emissions have increased which is expected as the overall population of the RDN has increased since 2007.

Although not accounted for the totals, the land-use change emissions estimates show a decline in available storage of carbon. A refinement in data and methodological processes is required to identify as to what would be root cause.

Industrial process and product use GHG emissions (e.g., solvent use, refrigerant release from air conditioning systems) have increased between 2007 and 2023. The increase is largely driven by the methodology deployed which relied on assigning these GHG emissions on a per capita basis and more so, the direct result of Environment Canada and Climate Change (ECCC) refining their estimation methodology which resulted in a more than doubling of the estimate.

[4] The updated methodology measures "net imports" instead of "gross imports" to more accurately reflect the carbon intensity of electricity consumed in BC. Electricity emission intensity factors for grid-connected entities - Province of British Columbia (gov.bc.ca)

Table 7. Change in RDN GHG Energy & GHG Emissions

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	3,368,922	3,454,960	2.6%	33,409	10,845	-67.5%
	Natural Gas	1,081,681	1,653,274	52.8%	53,912	79,588	47.6%
	Fuel Oil	793,335	754,667	-4.9%	77,762	73,972	-4.9%
	Propane	136,836	130,169	-4.9%	8,322	7,942	-4.6%
	Wood	950,343	904,023	-4.9%	20,749	19,738	-4.9%
	Diesel	56,650	44,006	-22.3%	4,176	2,821	-32.4%
Commercial & Industrial Buildings	Electricity	1,979,653	2,013,531	1.7%	19,632	6,320	-67.8%
	Natural Gas	1,105,187	1,061,998	-3.9%	55,083	51,124	-7.2%
	Fuel Oil	-	-	-	-	-	-
	Diesel	188,055	441,293	134.7%	13,862	28,293	104.1%
Manufacturing Industries & Construction	Diesel	330,804	482,865	46.0%	24,384	31,092	27.5%
	Natural Gas	2,143,548	2,799,196	30.6%	106,836	143,403	34.2%
Energy Industries				-	462	582	25.9%
Agriculture, Forestry And Fishing Activities	Diesel	472,309	868,725	83.9%	34,815	55,697	60.0%
Natural Gas Fugitive Emissions				-	583	1,151	97.4%
Total		**12,607,322**	**14,608,707**	**15.9%**	**453,987**	**512,568**	**12.9%**
On-Road Transportation							
Electric Vehicles	Electricity	62	1,771	2732.9%	1	6	796.7%
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	5,409,462	5,655,292	4.5%	363,850	332,916	-8.5%

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Light Trucks, Vans, SUVs	Gasoline + Diesel	3,223,764	4,161,953	29.1%	219,565	245,207	11.7%
Heavy Duty Vehicles	Gasoline + Diesel	2,196,962	4,494,258	104.6%	147,873	283,751	91.9%
Propane Vehicles	Propane	8,057	36,700	355.5%	486	2,084	328.7%
Natural Gas Vehicles	Natural Gas	1,341	93	-93.1%	78	5	-93.5%
Motorcycles	Gasoline	25,748	105,782	310.8%	1,778	6,388	259.3%
Off-Road Vehicles	Gasoline + Diesel	-	9,206	-	-	590	-
Total On-Road Transportation		**10,865,395**	**14,465,055**	**33.1%**	**733,631**	**870,947**	**18.7%**
Off-Road Transportation							
Marine, Rail and Other Off-Road Vehicles	Gasoline + Diesel	433,073	713,020	64.6%	31,982	47,017	47.0%
Total Off-Road Transportation		**433,073**	**713,020**	**64.6%**	**31,982**	**47,017**	**47.0%**
Waste							
Solid Waste					45,315	53,826	18.8%
Composting					394	4,015	920.2%
Incineration & Open Burning					126	160	27.4%
Wastewater					1,965	3,097	57.6%
Total Waste					**47,799**	**61,098**	**27.8%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered					-304,136	-275,068	-9.6%
Land-Use: Emissions Released					9,322	9,322	0.0%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					3,927	4,293	9.3%
Total AFOLU					**3,927**	**4,293**	**9.3%**
Industrial Process & Product Use (IPPU)							

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Process Use Emissions					20,388	38,817	90.4%
Total IPPU					**20,388**	**38,817**	**90.4%**
Total		**23,905,790**	**29,786,781**	**24.6%**	**1,291,714**	**1,534,721**	**18.8%**
Total Per Capita		**168.3**	**162.7**	**-3.3%**	**9.1**	**8.4**	**-7.8%**

Table 8 presents the changes between the 2007 and 2023 years for each RDN local government.

Table 8. Change in Member GHG Energy & GHG Emissions

Member	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
City of Nanaimo	14,756,790	16,849,176	14.2%	790,655	858,491	8.6%
Town of Qualicum Beach	1,220,092	1,409,688	15.5%	64,425	70,695	9.7%
District of Lantzville	467,676	560,983	20.0%	25,998	29,146	12.1%
City of Parksville	1,707,119	2,234,347	30.9%	88,119	109,866	24.7%
Electoral Area A	1,090,627	1,580,517	44.9%	63,227	86,623	37.0%
Electoral Area B	721,022	985,199	36.6%	36,550	48,578	32.9%
Electoral Area C	392,640	677,081	72.4%	23,645	38,068	61.0%
Electoral Area E	866,545	1,348,411	55.6%	47,702	71,566	50.0%
Electoral Area F	1,033,566	1,643,589	59.0%	59,857	89,608	49.7%
Electoral Area G	1,082,577	1,630,161	50.6%	61,690	88,012	42.7%
Electoral Area H	567,137	867,630	53.0%	29,846	44,068	47.6%
Total	**23,905,790**	**29,786,781**	**24.6%**	**1,291,714**	**1,534,721**	**18.8%**

3 CITY OF NANIAMO

3.1 2023 Profile

Profile	
Population	108,277
Dwellings	45,343
Registered Vehicles	83,290
Energy (Thousands of GJ)	16,849
GHG Emissions (tCO_2e)	858,491

3.2 2007 & 2023 Energy & GHG Emissions

Table 9 presents a summary comparison of the City of Nanaimo's 2007 and 2023 energy and GHG emissions.

Table 9. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	1,626,461	1,747,761	7.5%	16,129	5,486	-66.0%
	Natural Gas	760,754	947,029	24.5%	37,917	45,590	20.2%
	Fuel Oil	364,316	346,559	-4.9%	35,710	33,970	-4.9%
	Propane	62,892	59,828	-4.9%	3,825	3,650	-4.6%
	Wood	435,979	414,729	-4.9%	9,519	9,055	-4.9%
	Diesel	32,653	25,564	-21.7%	2,407	1,639	-31.9%
Commercial & Industrial Buildings	Electricity	1,403,744	1,259,659	-10.3%	13,921	3,954	-71.6%
	Natural Gas	885,085	757,877	-14.4%	44,113	36,484	-17.3%

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	133,347	276,071	107.0%	9,829	17,700	80.1%
Manufacturing Industries & Construction	Diesel	204,818	298,967	46.0%	15,098	19,250	27.5%
	Natural Gas	2,143,548	2,799,196	30.6%	106,836	143,403	34.2%
Energy Industries				-	462	582	25.9%
Agriculture, Forestry And Fishing Activities	Diesel	19,237	28,127	46.2%	1,418	1,803	27.2%
Natural Gas Fugitive Emissions				-	402	851	111.7%
Total		**8,072,834**	**8,961,367**	**11.0%**	**297,585**	**323,417**	**8.7%**
On-Road Transportation							
Electric Vehicles	Electricity	43	814	1809.3%	0	3	504.3%
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	3,169,827	3,353,573	5.8%	213,204	197,385	-7.4%
Light Trucks, Vans, SUVs	Gasoline + Diesel	1,784,451	2,084,455	16.8%	121,533	122,753	1.0%
Heavy Duty Vehicles	Gasoline + Diesel	1,437,719	1,923,551	33.8%	96,871	121,241	25.2%
Propane Vehicles	Propane	5,168	19,513	277.5%	312	1,108	255.3%
Natural Gas Vehicles	Natural Gas	775	77	-90.1%	45	4	-90.7%
Motorcycles	Gasoline	14,224	46,499	226.9%	982	2,808	185.9%
Off-Road Vehicles	Gasoline + Diesel	-	9,206	-	-	590	-
Total On-Road Transportation		**6,412,206**	**7,437,689**	**16.0%**	**432,948**	**445,891**	**3.0%**
Off-Road Transportation							
Marine, Rail and Other Off-Road Vehicles	Gasoline + Diesel	271,750	450,120	65.6%	20,084	30,060	49.7%
Total Off-Road Transportation		**271,750**	**450,120**	**65.6%**	**20,084**	**30,060**	**49.7%**

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Waste							
Solid Waste					26,315	31,793	20.8%
Composting					0	1,462	-
Incineration & Open Burning					0	0	-
Wastewater					1,094	1,831	67.3%
Total Waste					**27,410**	**35,086**	**28.0%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-6,697	-6,386	-4.6%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					2,081	2,081	0.0%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					4	3	-33.7%
Total AFOLU					**4**	**3**	**-33.7%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					12,623	24,034	90.4%
Total IPPU					**12,623**	**24,034**	**90.4%**
Total		**14,756,790**	**16,849,176**	**14.2%**	**790,655**	**858,491**	**8.6%**
Total Per Capita		**180.2**	**155.6**	**-13.6%**	**9.7**	**7.9**	**-17.9%**

3.3 2010 & 2023 Energy & GHG Emissions

At the request of the City, a 2010 and 2023 reporting year comparison is also provided. **Table 10** presents a summary comparison of the City of Nanaimo's 2010 and 2023 energy and GHG emissions.

Table 10. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2010 Energy (GJ)	2023 Energy (GJ)	Change (%)	2010 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	1,634,874	1,747,761	6.9%	16,213	5,486	-66.2%
	Natural Gas	1,108,974	947,029	-14.6%	55,272	45,590	-17.5%
	Fuel Oil	352,672	346,559	-1.7%	34,569	33,970	-1.7%
	Propane	60,882	59,828	-1.7%	3,703	3,650	-1.4%
	Wood	422,044	414,729	-1.7%	9,215	9,055	-1.7%
	Diesel	32,379	25,564	-21.0%	2,239	1,639	-26.8%
Commercial & Industrial Buildings	Electricity	1,295,178	1,259,659	-2.7%	12,844	3,954	-69.2%
	Natural Gas	578,712	757,877	31.0%	28,843	36,484	26.5%
	Fuel Oil	-	-	-	-	-	-
	Diesel	149,878	276,071	84.2%	10,363	17,700	70.8%
Manufacturing Industries & Construction	Diesel	150,999	298,967	98.0%	10,440	19,250	84.4%
	Natural Gas	1,581,933	2,799,196	76.9%	78,845	143,403	81.9%
Energy Industries				-	464	582	25.3%
Agriculture, Forestry And Fishing Activities	Diesel	16,069	28,127	75.0%	1,111	1,803	62.3%
Natural Gas Fugitive Emissions				-	668	851	27.3%
Total		**7,384,593**	**8,961,367**	**21.4%**	**264,788**	**323,417**	**22.1%**
On-Road Transportation							
Electric Vehicles	Electricity	37	814	2106.1%	0	3	598.3%
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	3,338,090	3,353,573	0.5%	208,598	197,385	-5.4%

Source	Type	2010 Energy (GJ)	2023 Energy (GJ)	Change (%)	2010 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Light Trucks, Vans, SUVs	Gasoline + Diesel	1,938,340	2,084,455	7.5%	122,662	122,753	0.1%
Heavy Duty Vehicles	Gasoline + Diesel	1,458,918	1,923,551	31.8%	92,058	121,241	31.7%
Propane Vehicles	Propane	6,769	19,513	188.2%	383	1,108	189.2%
Natural Gas Vehicles	Natural Gas	851	77	-91.0%	46	4	-91.0%
Motorcycles	Gasoline	15,924	46,499	192.0%	1,031	2,808	172.3%
Off-Road Vehicles	Gasoline + Diesel	-	9,206	-	-	590	-
Total On-Road Transportation		**6,758,929**	**7,437,689**	**10.0%**	**424,779**	**445,891**	**5.0%**
Off-Road Transportation							
Marine, Rail and Other Off-Road Vehicles	Gasoline + Diesel	276,987	450,120	62.5%	19,643	30,060	53.0%
Total Off-Road Transportation		**276,987**	**450,120**	**62.5%**	**19,643**	**30,060**	**53.0%**
Waste							
Solid Waste					30,532	31,793	4.1%
Composting					0	1,462	-
Incineration & Open Burning					0	0	-
Wastewater					1,129	1,831	62.1%
Total Waste					**31,661**	**35,086**	**10.8%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-6,639	-6,386	-3.8%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					2,081	2,081	0.0%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					4	3	-27.8%
Total AFOLU					**4**	**3**	**-27.8%**
Industrial Process & Product Use (IPPU)							

Source	Type	2010 Energy (GJ)	2023 Energy (GJ)	Change (%)	2010 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Process Use Emissions					19,593	24,034	22.7%
Total IPPU					**19,593**	**24,034**	**22.7%**
Total		**14,420,509**	**16,849,176**	**16.8%**	**760,469**	**858,491**	**12.9%**
Total Per Capita		**170.0**	**155.6**	**-8.5%**	**9.0**	**7.9**	**-11.6%**

3.4 GHG Emissions Trends

The following table presents a historical trend of GHG emissions from 2007 to 2023. All values are in tonnes of CO_2e.

Table 11. Summary of Historical GHG Emissions

Sector	2007	2010	2012	2015	2016	2017	2018	2019	2020	2021	2022	2023
Residential Buildings	105,507	121,209	133,393	112,451	118,624	133,783	127,240	133,376	142,850	107,198	107,672	99,390
Commercial & Institutional Buildings	67,863	52,050	54,949	55,113	59,753	70,600	64,976	71,252	72,476	55,458	57,084	58,138
Manufacturing Industries & Construction	121,934	89,285	90,094	148,564	156,632	164,699	145,190	142,935	153,839	152,259	162,571	162,654
Energy Industries	462	464	594	350	497	511	546	589	631	688	628	582
Non-Specified Sources	-	-	-	-	-	-	-	-	-	-	-	-
Agriculture, Forestry & Fishing activities	1,418	1,111	1,152	1,584	1,475	1,694	1,983	1,866	1,621	1,631	1,835	1,803
Fugitive Emissions	402	668	700	748	773	801	835	862	851	851	851	851
In-Boundary On-road Transportation	335,895	329,557	329,996	335,262	341,486	312,843	317,537	309,780	272,933	327,442	317,983	339,822
Trans-Boundary On-road Transportation	97,054	95,223	95,350	96,871	98,669	90,393	96,252	85,211	77,823	96,457	99,252	106,069
Waterborne Navigation	5,759	6,967	7,522	8,948	10,494	8,933	9,390	8,389	6,831	8,524	8,953	8,795
Aviation	-	-	-	-	-	-	-	-	-	-	-	-
Railway	367	371	460	415	403	457	486	504	476	471	479	479
Off-road Transportation	13,958	12,305	11,800	14,346	17,753	19,431	20,000	19,856	21,067	20,691	21,045	20,786
Solid Waste	26,315	30,532	-	27,591	-	-	30,393	29,269	27,751	25,737	25,651	31,793
Biological Treatment of Waste	-	-	-	963	-	-	1,025	1,374	1,641	1,585	1,571	1,462
Incineration & Open Burning	-	-	-	-	-	-	-	-	-	-	-	-
Wastewater Treatment & Discharge	1,094	1,129	-	1,589	1,329	1,847	1,414	1,181	1,730	1,875	1,259	1,831
IPPU	12,623	19,593	21,340	24,292	26,008	25,780	28,356	28,356	28,619	28,533	24,417	24,034
Land-Use Change	(4,616)	(4,558)	(4,519)	(4,461)	(4,441)	(4,422)	(4,402)	(4,383)	(4,363)	(4,344)	(4,324)	(4,305)
Livestock	-	-	-	-	-	-	-	-	-	-	-	-
Non-CO_2 Land Emission Sources	4	4	4	4	4	4	5	4	5	3	3	3
Total	**790,655**	**760,469**	**747,354**	**829,092**	**833,902**	**831,778**	**845,627**	**834,806**	**811,142**	**829,404**	**831,252**	**858,491**
Total Without Harmac Emissions	**683,819**	**681,624**	**668,509**	**695,083**	**691,695**	**684,387**	**721,753**	**711,934**	**673,442**	**693,770**	**687,849**	**715,088**

4 TOWN OF QUALICUM BEACH

4.1 2023 Profile

Profile	
Population	9,599
Dwellings	4,785
Registered Vehicles	8,252
Energy (Thousands of GJ)	1,409
GHG Emissions (tCO_2e)	70,695

4.2 2007 & 2023 Energy & GHG Emissions

Table 12 presents a summary comparison of the Town of Qualicum Beach's 2007 and 2023 energy and GHG emissions.

Table 12. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	234,141	207,571	-11.3%	2,322	652	-71.9%
	Natural Gas	137,270	168,250	22.6%	6,842	8,100	18.4%
	Fuel Oil	26,581	25,285	-4.9%	2,605	2,478	-4.9%
	Propane	4,582	4,359	-4.9%	279	266	-4.6%
	Wood	31,861	30,308	-4.9%	696	662	-4.9%
	Diesel	3,470	2,266	-34.7%	256	145	-43.2%
Commercial & Industrial Buildings	Electricity	80,892	76,874	-5.0%	802	241	-69.9%
	Natural Gas	53,761	75,450	40.3%	2,679	3,632	35.6%

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	7,684	16,848	119.3%	566	1,080	90.7%
Manufacturing Industries & Construction	Diesel	13,432	19,607	46.0%	990	1,262	27.5%
	Natural Gas	-	-	-	-	-	-
Energy Industries				-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	4,290	4,761	11.0%	316	305	-3.5%
Natural Gas Fugitive Emissions				-	67	68	0.9%
Total		**597,964**	**631,579**	**5.6%**	**18,421**	**18,892**	**2.6%**
On-Road Transportation							
Electric Vehicles	Electricity	1	108	7847.8%	0	0	2415.7%
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	376,614	380,533	1.0%	25,331	22,397	-11.6%
Light Trucks, Vans, SUVs	Gasoline + Diesel	171,142	243,292	42.2%	11,656	14,331	23.0%
Heavy Duty Vehicles	Gasoline + Diesel	52,020	118,022	126.9%	3,495	7,443	113.0%
Propane Vehicles	Propane	126	1,533	1117.0%	8	87	1045.2%
Natural Gas Vehicles	Natural Gas	16	5	-72.2%	1	0	-73.9%
Motorcycles	Gasoline	612	4,516	637.3%	42	273	544.9%
Off-Road Vehicles	Gasoline + Diesel	-	-	-	-	-	-
Total On-Road Transportation		**600,532**	**748,009**	**24.6%**	**40,532**	**44,531**	**9.9%**
Off-Road Transportation							
Marine, Rail and Other Off-Road Vehicles	Gasoline + Diesel	21,596	30,100	39.4%	1,593	1,942	21.9%
Total Off-Road Transportation		**21,596**	**30,100**	**39.4%**	**1,593**	**1,942**	**21.9%**

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Waste							
Solid Waste					2,775	2,864	3.2%
Composting					0	525	-
Incineration & Open Burning					0	0	-
Wastewater					275	364	32.1%
Total Waste					**3,050**	**3,753**	**23.0%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-1,564	-1,494	-4.5%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					214	214	0.0%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					1	1	-48.4%
Total AFOLU					**1**	**1**	**-48.4%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					828	1,576	90.4%
Total IPPU					**828**	**1,576**	**90.4%**
Total		**1,220,092**	**1,409,688**	**15.5%**	**64,425**	**70,695**	**9.7%**
Total Per Capita		**140.2**	**146.9**	**4.7%**	**7.4**	**7.4**	**-0.5%**

4.3 GHG Emissions Trends

The following table presents a historical trend of GHG emissions from 2007 to 2023. All values are in tonnes of CO_2e.

Table 13. Summary of Historical GHG Emissions

Sector	2007	2010	2012	2015	2016	2017	2018	2019	2020	2021	2022	2023
Residential Buildings	12,999	11,033	11,389	10,466	10,681	11,338	10,680	11,299	12,215	11,036	13,296	12,303
Commercial & Institutional Buildings	4,048	3,995	4,227	4,005	4,106	4,555	4,339	4,561	4,380	4,257	4,533	4,954
Manufacturing Industries & Construction	990	685	773	1,133	1,165	1,343	1,588	1,434	1,105	1,090	1,257	1,262
Energy Industries	-	-	-	-	-	-	-	-	-	-	-	-
Non-Specified Sources	-	-	-	-	-	-	-	-	-	-	-	-
Agriculture, Forestry & Fishing activities	316	239	242	317	291	328	377	347	295	290	319	305
Fugitive Emissions	67	58	59	63	63	64	64	69	68	68	68	68
In-Boundary On-road Transportation	31,446	32,590	33,309	33,826	34,218	33,890	32,890	30,977	34,575	38,133	35,062	33,938
Trans-Boundary On-road Transportation	9,086	9,417	9,624	9,774	9,887	9,792	9,969	8,521	9,859	11,233	10,944	10,593
Waterborne Navigation	110	102	107	97	100	11	100	96	51	80	89	100
Aviation	-	-	-	-	-	-	-	-	-	-	-	-
Railway	-	-	-	-	-	-	-	-	-	-	-	-
Off-road Transportation	1,483	1,260	1,180	1,384	1,715	1,850	1,867	1,824	1,923	1,894	1,896	1,843
Solid Waste	2,775	3,180	-	2,691	-	-	2,894	2,732	2,550	2,349	2,348	2,864
Biological Treatment of Waste	-	-	-	229	-	-	227	226	243	263	279	525
Incineration & Open Burning	-	-	-	-	-	-	-	-	-	-	-	-
Wastewater Treatment & Discharge	275	233	-	325	201	252	300	313	268	280	273	364
IPPU	828	1,285	1,466	1,891	2,101	2,001	2,113	2,113	2,045	1,954	1,601	1,576
Land-Use Change	(1,351)	(1,337)	(1,329)	(1,315)	(1,311)	(1,307)	(1,302)	(1,298)	(1,293)	(1,289)	(1,285)	(1,280)
Livestock	-	-	-	-	-	-	-	-	-	-	-	-
Non-CO_2 Land Emission Sources	1	1	1	1	1	1	1	1	1	1	1	1
Total	**64,425**	**64,077**	**62,376**	**66,201**	**64,528**	**65,424**	**67,408**	**64,513**	**69,578**	**72,930**	**71,965**	**70,695**

5 DISTRICT OF LANTZVILLE

5.1 2023 Profile

Profile	
Population	4,197
Dwellings	1,575
Registered Vehicles	3,648
Energy (Thousands of GJ)	561
GHG Emissions (tCO_2e)	29,146

5.2 2007 & 2023 Energy & GHG Emissions

Table 14 presents a summary comparison of the District of Lantzville's 2007 and 2023 energy and GHG emissions.

Table 14. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	101,518	98,920	-2.6%	1,007	311	-69.2%
	Natural Gas	23,570	45,208	91.8%	1,175	2,176	85.3%
	Fuel Oil	11,634	11,067	-4.9%	1,140	1,085	-4.9%
	Propane	2,004	1,907	-4.9%	122	116	-4.6%
	Wood	13,955	13,275	-4.9%	305	290	-4.9%
	Diesel	1,491	991	-33.5%	110	64	-42.2%
Commercial & Industrial Buildings	Electricity	13,254	14,187	7.0%	131	45	-66.1%
	Natural Gas	5,448	7,348	34.9%	272	354	30.3%

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	1,259	3,109	147.0%	93	199	114.8%
Manufacturing Industries & Construction	Diesel	7,756	11,321	46.0%	572	729	27.5%
	Natural Gas	-	-	-	-	-	-
Energy Industries				-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	1,893	2,915	54.0%	140	187	34.0%
Natural Gas Fugitive Emissions				-	10	13	24.4%
Total		**183,781**	**210,248**	**14.4%**	**5,076**	**5,568**	**9.7%**
On-Road Transportation							
Electric Vehicles	Electricity	1	37	4713.5%	0	0	1423.6%
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	136,116	113,144	-16.9%	9,155	6,663	-27.2%
Light Trucks, Vans, SUVs	Gasoline + Diesel	94,964	114,294	20.4%	6,468	6,738	4.2%
Heavy Duty Vehicles	Gasoline + Diesel	42,737	107,175	150.8%	2,878	6,780	135.6%
Propane Vehicles	Propane	61	289	375.3%	4	16	347.2%
Natural Gas Vehicles	Natural Gas	55	1	-98.4%	3	0	-98.5%
Motorcycles	Gasoline	680	2,634	287.4%	47	159	238.9%
Off-Road Vehicles	Gasoline + Diesel	-	-	-	-	-	-
Total On-Road Transportation		**274,614**	**337,574**	**22.9%**	**18,555**	**20,356**	**9.7%**
Off-Road Transportation							
Marine, Rail and Other Off-Road Vehicles	Gasoline + Diesel	9,280	13,161	41.8%	684	849	24.1%
Total Off-Road Transportation		**9,280**	**13,161**	**41.8%**	**684**	**849**	**24.1%**

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Waste							
Solid Waste					1,184	1,212	2.3%
Composting					0	222	-
Incineration & Open Burning					0	0	-
Wastewater					20	29	45.1%
Total Waste					**1,204**	**1,463**	**21.5%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-3,433	-3,219	-6.2%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					166	166	0.0%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					0	0	-30.5%
Total AFOLU					**0**	**0**	**-30.5%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					478	910	90.4%
Total IPPU					**478**	**910**	**90.4%**
Total		**467,676**	**560,983**	**20.0%**	**25,998**	**29,146**	**12.1%**
Total Per Capita		**125.1**	**133.7**	**6.9%**	**7.0**	**6.9**	**-0.1%**

5.3 GHG Emissions Trends

The following table presents a historical trend of GHG emissions from 2007 to 2023. All values are in tonnes of CO_2e.

Table 15. Summary of Historical GHG Emissions

Sector	2007	2010	2012	2015	2016	2017	2018	2019	2020	2021	2022	2023
Residential Buildings	3,858	3,649	3,862	3,347	3,412	3,681	3,434	3,619	3,979	3,299	4,079	4,041
Commercial & Institutional Buildings	496	497	552	503	526	618	626	670	716	649	642	598
Manufacturing Industries & Construction	572	395	435	595	600	707	854	789	623	630	726	729
Energy Industries	-	-	-	-	-	-	-	-	-	-	-	-
Non-Specified Sources	-	-	-	-	-	-	-	-	-	-	-	-
Agriculture, Forestry & Fishing activities	140	110	115	159	149	172	202	190	166	168	189	187
Fugitive Emissions	10	11	12	12	12	12	12	13	13	13	13	13
In-Boundary On-road Transportation	14,396	14,937	15,191	14,748	14,942	14,851	15,282	14,863	13,578	14,809	14,400	15,514
Trans-Boundary On-road Transportation	4,159	4,316	4,389	4,261	4,317	4,291	4,632	4,088	3,871	4,363	4,495	4,842
Waterborne Navigation	47	44	44	40	41	4	42	40	21	33	38	44
Aviation	-	-	-	-	-	-	-	-	-	-	-	-
Railway	-	-	-	-	-	-	-	-	-	-	-	-
Off-road Transportation	637	543	490	569	704	756	776	756	800	788	802	806
Solid Waste	1,184	1,371	-	1,123	-	-	1,183	1,136	1,056	978	976	1,212
Biological Treatment of Waste	-	-	-	96	-	-	93	94	100	109	116	222
Incineration & Open Burning	-	-	-	-	-	-	-	-	-	-	-	-
Wastewater Treatment & Discharge	20	20	-	27	22	31	23	19	28	30	20	29
IPPU	478	742	825	993	1,082	1,052	1,136	1,136	1,125	1,101	925	910
Land-Use Change	(3,267)	(3,227)	(3,200)	(3,160)	(3,147)	(3,133)	(3,120)	(3,107)	(3,093)	(3,080)	(3,066)	(3,053)
Livestock	-	-	-	-	-	-	-	-	-	-	-	-
Non-CO_2 Land Emission Sources	0	0	0	0	0	0	0	0	0	0	0	0
Total	**25,998**	**26,636**	**25,915**	**26,473**	**25,809**	**26,175**	**28,294**	**27,414**	**26,078**	**26,969**	**27,421**	**29,146**

6 CITY OF PARKSVILLE

6.1 2023 Profile

Profile	
Population	14,497
Dwellings	7,137
Registered Vehicles	11,767
Energy (Thousands of GJ)	2,234
GHG Emissions (tCO_2e)	109,866

6.2 2007 & 2023 Energy & GHG Emissions

Table 16 presents a summary comparison of the City of Parksville's 2007 and 2023 energy and GHG emissions.

Table 16. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	260,043	270,336	4.0%	2,579	849	-67.1%
	Natural Gas	142,347	284,542	99.9%	7,095	13,698	93.1%
	Fuel Oil	58,858	55,989	-4.9%	5,769	5,488	-4.9%
	Propane	10,154	9,659	-4.9%	618	589	-4.6%
	Wood	70,490	67,054	-4.9%	1,539	1,464	-4.9%
	Diesel	4,574	3,423	-25.2%	337	219	-34.9%
Commercial & Industrial Buildings	Electricity	203,311	200,889	-1.2%	2,016	631	-68.7%
	Natural Gas	139,064	196,035	41.0%	6,931	9,437	36.2%

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	19,313	44,028	128.0%	1,424	2,823	98.3%
Manufacturing Industries & Construction	Diesel	22,912	33,443	46.0%	1,689	2,153	27.5%
	Natural Gas	-	-	-	-	-	-
Energy Industries				-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	3,991	6,921	73.4%	294	444	50.8%
Natural Gas Fugitive Emissions				-	92	122	31.8%
Total		**935,057**	**1,172,320**	**25.4%**	**30,383**	**37,917**	**24.8%**
On-Road Transportation							
Electric Vehicles	Electricity	5	112	2357.6%	0	0	677.9%
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	433,481	446,658	3.0%	29,155	26,288	-9.8%
Light Trucks, Vans, SUVs	Gasoline + Diesel	194,908	349,695	79.4%	13,275	20,596	55.1%
Heavy Duty Vehicles	Gasoline + Diesel	111,324	206,678	85.7%	7,460	13,029	74.7%
Propane Vehicles	Propane	526	1,771	236.5%	32	101	216.6%
Natural Gas Vehicles	Natural Gas	69	5	-92.7%	4	0	-93.1%
Motorcycles	Gasoline	1,157	8,464	631.7%	80	511	540.0%
Off-Road Vehicles	Gasoline + Diesel	-	-	-	-	-	-
Total On-Road Transportation		**741,470**	**1,013,383**	**36.7%**	**50,005**	**60,525**	**21.0%**
Off-Road Transportation							
Marine, Rail and Other Off-Road Vehicles	Gasoline + Diesel	30,592	48,644	59.0%	2,256	3,138	39.1%
Total Off-Road Transportation		**30,592**	**48,644**	**59.0%**	**2,256**	**3,138**	**39.1%**

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Waste							
Solid Waste					3,655	4,276	17.0%
Composting					0	784	-
Incineration & Open Burning					0	0	-
Wastewater					407	537	32.0%
Total Waste					**4,061**	**5,598**	**37.8%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-942	-887	-5.8%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					431	432	0.2%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					1	1	-22.4%
Total AFOLU					**1**	**1**	**-22.4%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					1,412	2,688	90.4%
Total IPPU					**1,412**	**2,688**	**90.4%**
Total		**1,707,119**	**2,234,347**	**30.9%**	**88,119**	**109,866**	**24.7%**
Total Per Capita		**148.8**	**154.1**	**3.6%**	**7.7**	**7.6**	**-1.3%**

6.3 GHG Emissions Trends

The following table presents a historical trend of GHG emissions from 2007 to 2023. All values are in tonnes of CO_2e.

Table 17. Summary of Historical GHG Emissions

Sector	2007	2010	2012	2015	2016	2017	2018	2019	2020	2021	2022	2023
Residential Buildings	17,936	17,121	17,662	16,210	16,565	17,892	17,137	18,052	19,317	18,096	23,674	22,307
Commercial & Institutional Buildings	10,371	10,580	11,130	10,620	11,395	12,414	11,835	12,579	12,648	12,125	12,692	12,890
Manufacturing Industries & Construction	1,689	1,168	1,280	1,737	1,747	2,063	2,500	2,316	1,834	1,860	2,144	2,153
Energy Industries	-	-	-	-	-	-	-	-	-	-	-	-
Non-Specified Sources	-	-	-	-	-	-	-	-	-	-	-	-
Agriculture, Forestry & Fishing activities	294	237	250	354	334	387	459	437	384	391	446	444
Fugitive Emissions	92	98	99	105	107	110	113	123	122	122	122	122
In-Boundary On-road Transportation	38,796	40,455	41,910	44,290	44,839	44,282	43,619	41,198	35,963	44,537	43,384	46,127
Trans-Boundary On-road Transportation	11,210	11,689	12,109	12,797	12,956	12,795	13,222	11,332	10,254	13,120	13,542	14,398
Waterborne Navigation	145	140	150	137	141	15	144	140	75	120	132	150
Aviation	-	-	-	-	-	-	-	-	-	-	-	-
Railway	156	158	196	177	172	195	207	215	203	201	204	204
Off-road Transportation	1,955	1,729	1,660	1,948	2,419	2,637	2,696	2,663	2,814	2,833	2,831	2,783
Solid Waste	3,655	4,248	-	3,766	-	-	4,124	3,945	3,722	3,438	3,512	4,276
Biological Treatment of Waste	-	-	-	320	-	-	323	327	354	385	418	784
Incineration & Open Burning	-	-	-	-	-	-	-	-	-	-	-	-
Wastewater Treatment & Discharge	407	344	-	480	296	372	443	463	395	414	403	537
IPPU	1,412	2,192	2,428	2,899	3,150	3,073	3,326	3,326	3,304	3,242	2,731	2,688
Land-Use Change	(511)	(501)	(494)	(484)	(480)	(477)	(473)	(470)	(466)	(463)	(460)	(456)
Livestock	-	-	-	-	-	-	-	-	-	-	-	-
Non-CO_2 Land Emission Sources	1	1	1	1	1	1	1	1	1	1	1	1
Total	**88,119**	**90,160**	**88,874**	**95,841**	**94,122**	**96,237**	**100,149**	**97,116**	**91,391**	**100,883**	**106,236**	**109,866**

7 ELECTORAL AREA A

7.1 2023 Profile

Profile	
Population	8,727
Dwellings	3,264
Registered Vehicles	7,697
Energy (Thousands of GJ)	1,581
GHG Emissions (tCO_2e)	86,623

7.2 2007 & 2023 Energy & GHG Emissions

Table 18 presents a summary comparison of the RDN's Electoral Area A's 2007 and 2023 energy and GHG emissions.

Table 18. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	186,826	173,883	-6.9%	1,853	546	-70.5%
	Natural Gas	2,890	32,034	1008.4%	144	1,542	970.6%
	Fuel Oil	54,079	48,793	-9.8%	5,301	4,783	-9.8%
	Propane	9,319	8,409	-9.8%	567	513	-9.5%
	Wood	64,850	58,511	-9.8%	1,416	1,277	-9.8%
	Diesel	2,705	2,060	-23.8%	199	132	-33.7%
Commercial & Industrial Buildings	Electricity	45,364	71,057	56.6%	450	223	-50.4%
	Natural Gas	3,556	3,890	9.4%	177	187	5.6%

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	4,309	15,573	261.4%	318	998	214.3%
Manufacturing Industries & Construction	Diesel	15,512	22,642	46.0%	1,143	1,458	27.5%
	Natural Gas	-	-	-	-	-	-
Energy Industries				-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	146,290	245,444	67.8%	10,783	15,736	45.9%
Natural Gas Fugitive Emissions				-	2	15	749.0%
Total		**535,701**	**682,295**	**27.4%**	**22,353**	**27,411**	**22.6%**
On-Road Transportation							
Electric Vehicles	Electricity	2	122	4856.0%	0	0	1468.7%
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	242,904	238,480	-1.8%	16,339	14,046	-14.0%
Light Trucks, Vans, SUVs	Gasoline + Diesel	183,723	240,027	30.6%	12,514	14,152	13.1%
Heavy Duty Vehicles	Gasoline + Diesel	104,294	374,722	259.3%	7,008	23,697	238.1%
Propane Vehicles	Propane	408	2,381	483.0%	25	135	448.6%
Natural Gas Vehicles	Natural Gas	80	2	-98.0%	5	0	-98.2%
Motorcycles	Gasoline	1,704	7,650	348.9%	118	462	292.6%
Off-Road Vehicles	Gasoline + Diesel	-	-	-	-	-	-
Total On-Road Transportation		**533,116**	**863,383**	**62.0%**	**36,008**	**52,493**	**45.8%**
Off-Road Transportation							
Marine, Rail and Other Off-Road Vehicles	Gasoline + Diesel	21,810	34,838	59.7%	1,608	2,245	39.6%
Total Off-Road Transportation		**21,810**	**34,838**	**59.7%**	**1,608**	**2,245**	**39.6%**

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Waste							
Solid Waste					2,138	2,397	12.1%
Composting					95	179	88.9%
Incineration & Open Burning					24	28	18.8%
Wastewater					12	25	115.3%
Total Waste					**2,268**	**2,628**	**15.9%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-7,608	-6,869	-9.7%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					1,231	1,231	0.0%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					34	25	-24.8%
Total AFOLU					**34**	**25**	**-24.8%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					956	1,820	90.4%
Total IPPU					**956**	**1,820**	**90.4%**
Total		**1,090,627**	**1,580,517**	**44.9%**	**63,227**	**86,623**	**37.0%**
Total Per Capita		**160.8**	**181.1**	**12.6%**	**9.3**	**9.9**	**6.5%**

7.3 GHG Emissions Trends

The following table presents a historical trend of GHG emissions from 2007 to 2023. All values are in tonnes of CO_2e.

Table 19. Summary of Historical GHG Emissions

Sector	2007	2010	2012	2015	2016	2017	2018	2019	2020	2021	2022	2023
Residential Buildings	9,480	10,117	10,557	9,273	9,394	10,148	9,509	9,854	10,378	8,910	9,416	8,793
Commercial & Institutional Buildings	945	993	1,085	1,082	1,158	1,293	1,228	1,317	1,526	1,092	1,356	1,409
Manufacturing Industries & Construction	1,143	791	867	1,179	1,186	1,400	1,696	1,570	1,242	1,259	1,452	1,458
Energy Industries	-	-	-	-	-	-	-	-	-	-	-	-
Non-Specified Sources	-	-	-	-	-	-	-	-	-	-	-	-
Agriculture, Forestry & Fishing activities	10,783	8,629	9,083	12,792	12,021	13,925	16,452	15,628	13,712	13,929	15,839	15,736
Fugitive Emissions	2	13	13	13	13	14	14	15	15	15	15	15
In-Boundary On-road Transportation	27,936	29,669	31,145	33,015	33,411	32,953	33,167	32,159	28,485	38,538	38,016	40,006
Trans-Boundary On-road Transportation	8,072	8,573	8,999	9,539	9,654	9,522	10,054	8,846	8,122	11,352	11,866	12,487
Waterborne Navigation	86	81	85	77	78	8	79	76	41	64	74	91
Aviation	-	-	-	-	-	-	-	-	-	-	-	-
Railway	367	371	460	415	403	457	486	504	476	471	479	479
Off-road Transportation	1,156	998	943	1,094	1,329	1,441	1,474	1,452	1,541	1,516	1,586	1,675
Solid Waste	2,138	2,495	-	2,146	-	-	2,254	2,157	2,029	1,882	1,880	2,397
Biological Treatment of Waste	95	96	97	98	-	-	97	118	135	136	138	179
Incineration & Open Burning	24	24	24	25	25	25	25	25	26	26	26	28
Wastewater Treatment & Discharge	12	13	-	15	14	24	21	20	23	23	20	25
IPPU	956	1,484	1,645	1,967	2,139	2,085	2,256	2,256	2,239	2,196	1,849	1,820
Land-Use Change	(6,377)	(6,238)	(6,146)	(6,007)	(5,961)	(5,915)	(5,869)	(5,822)	(5,776)	(5,730)	(5,684)	(5,638)
Livestock	-	-	-	-	-	-	-	-	-	-	-	-
Non-CO_2 Land Emission Sources	34	32	32	34	35	34	37	36	38	28	25	25
Total	**63,227**	**64,377**	**65,036**	**72,764**	**70,862**	**73,329**	**78,849**	**76,032**	**70,030**	**81,439**	**84,037**	**86,623**

8 ELECTORAL AREA B

8.1 2023 Profile

Profile	
Population	5,250
Dwellings	3,076
Registered Vehicles	4,630
Energy (Thousands of GJ)	985
GHG Emissions (tCO_2e)	48,578

8.2 2007 & 2023 Energy & GHG Emissions

Table 20 presents a summary comparison of the RDN's Electoral Area B's 2007 and 2023 energy and GHG emissions.

Table 20. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	179,192	163,875	-8.5%	1,777	514	-71.1%
	Natural Gas	2,772	30,190	989.1%	138	1,453	951.9%
	Fuel Oil	51,870	46,137	-11.1%	5,084	4,522	-11.1%
	Propane	8,939	7,951	-11.0%	544	485	-10.8%
	Wood	62,201	55,326	-11.1%	1,358	1,208	-11.1%
	Diesel	1,615	1,239	-23.2%	119	79	-33.2%
Commercial & Industrial Buildings	Electricity	43,511	66,967	53.9%	431	210	-51.3%
	Natural Gas	3,411	3,666	7.5%	170	176	3.8%

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	4,133	14,677	255.1%	305	941	208.8%
Manufacturing Industries & Construction	Diesel	8,093	11,813	46.0%	597	761	27.5%
	Natural Gas	-	-	-	-	-	-
Energy Industries				-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	25,912	47,638	83.8%	1,910	3,054	59.9%
Natural Gas Fugitive Emissions				-	2	14	734.2%
Total		**391,648**	**449,480**	**14.8%**	**12,435**	**13,419**	**7.9%**
On-Road Transportation							
Electric Vehicles	Electricity	1	74	4869.3%	0	0	1472.9%
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	145,721	143,451	-1.6%	9,802	8,449	-13.8%
Light Trucks, Vans, SUVs	Gasoline + Diesel	110,218	144,382	31.0%	7,507	8,513	13.4%
Heavy Duty Vehicles	Gasoline + Diesel	62,069	225,318	263.0%	4,171	14,249	241.7%
Propane Vehicles	Propane	245	1,432	484.6%	15	81	450.1%
Natural Gas Vehicles	Natural Gas	48	0	-100.0%	3	0	-100.0%
Motorcycles	Gasoline	1,022	4,601	350.1%	71	278	293.6%
Off-Road Vehicles	Gasoline + Diesel	-	-	-	-	-	-
Total On-Road Transportation		**319,324**	**519,258**	**62.6%**	**21,568**	**31,571**	**46.4%**
Off-Road Transportation							
Marine, Rail and Other Off-Road Vehicles	Gasoline + Diesel	10,049	16,461	63.8%	741	1,062	43.3%
Total Off-Road Transportation		**10,049**	**16,461**	**63.8%**	**741**	**1,062**	**43.3%**

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Waste							
Solid Waste					1,283	1,442	12.4%
Composting					1	108	13351.6%
Incineration & Open Burning					14	17	19.1%
Wastewater					4	5	29.7%
Total Waste					**1,302**	**1,571**	**20.7%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-8,224	-7,913	-3.8%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					222	222	0.0%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					6	5	-18.1%
Total AFOLU					**6**	**5**	**-18.1%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					499	950	90.4%
Total IPPU					**499**	**950**	**90.4%**
Total		**721,022**	**985,199**	**36.6%**	**36,550**	**48,578**	**32.9%**
Total Per Capita		**178.1**	**187.7**	**5.4%**	**9.0**	**9.3**	**2.5%**

8.3 GHG Emissions Trends

The following table presents a historical trend of GHG emissions from 2007 to 2023. All values are in tonnes of CO_2e.

Table 21. Summary of Historical GHG Emissions

Sector	2007	2010	2012	2015	2016	2017	2018	2019	2020	2021	2022	2023
Residential Buildings	9,020	9,703	10,137	8,844	8,940	9,633	8,995	9,297	9,759	8,369	8,854	8,263
Commercial & Institutional Buildings	906	959	1,049	1,039	1,110	1,236	1,169	1,249	1,443	1,029	1,278	1,328
Manufacturing Industries & Construction	597	413	449	597	597	710	866	807	644	657	757	761
Energy Industries	-	-	-	-	-	-	-	-	-	-	-	-
Non-Specified Sources	-	-	-	-	-	-	-	-	-	-	-	-
Agriculture, Forestry & Fishing activities	1,910	1,552	1,651	2,365	2,235	2,604	3,095	2,958	2,611	2,669	3,054	3,054
Fugitive Emissions	2	12	12	13	13	13	14	15	14	14	14	14
In-Boundary On-road Transportation	16,733	17,512	18,204	19,017	19,152	18,804	19,144	18,758	16,765	22,954	22,863	24,061
Trans-Boundary On-road Transportation	4,835	5,060	5,260	5,495	5,534	5,433	5,803	5,160	4,780	6,762	7,136	7,510
Waterborne Navigation	51	48	50	44	44	5	46	45	24	38	45	54
Aviation	-	-	-	-	-	-	-	-	-	-	-	-
Railway	-	-	-	-	-	-	-	-	-	-	-	-
Off-road Transportation	690	587	550	628	759	833	861	857	918	912	954	1,008
Solid Waste	1,283	1,475	-	1,238	-	-	1,302	1,259	1,197	1,121	1,131	1,442
Biological Treatment of Waste	1	4	11	57	-	-	56	69	80	81	83	108
Incineration & Open Burning	14	14	14	14	14	14	14	15	15	15	16	17
Wastewater Treatment & Discharge	4	4	-	4	4	4	4	4	5	5	5	5
IPPU	499	774	852	997	1,077	1,057	1,152	1,152	1,152	1,138	965	950
Land-Use Change	(8,001)	(7,943)	(7,904)	(7,846)	(7,827)	(7,807)	(7,788)	(7,768)	(7,749)	(7,730)	(7,710)	(7,691)
Livestock	-	-	-	-	-	-	-	-	-	-	-	-
Non-CO_2 Land Emission Sources	6	6	6	6	7	6	7	7	7	5	5	5
Total	**36,550**	**38,124**	**38,244**	**40,358**	**39,488**	**40,353**	**42,528**	**41,651**	**39,414**	**45,770**	**47,160**	**48,578**

9 ELECTORAL AREA C

9.1 2023 Profile

Profile	
Population	3,901
Dwellings	1,294
Registered Vehicles	3,441
Energy (Thousands of GJ)	677
GHG Emissions (tCO_2e)	38,068

9.2 2007 & 2023 Energy & GHG Emissions

Table 22 presents a summary comparison of the RDN's Electoral Area C's 2007 and 2023 energy and GHG emissions. 4

Table 22. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	61,813	68,932	11.5%	613	216	-64.7%
	Natural Gas	956	12,699	1228.1%	48	611	1182.7%
	Fuel Oil	17,893	18,924	5.8%	1,754	1,855	5.8%
	Propane	3,083	3,261	5.8%	188	199	6.1%
	Wood	21,456	22,693	5.8%	468	495	5.8%
	Diesel	1,026	921	-10.2%	76	59	-21.9%
Commercial & Industrial Buildings	Electricity	15,009	28,169	87.7%	149	88	-40.6%
	Natural Gas	1,177	1,542	31.1%	59	74	26.6%

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	1,426	6,174	333.0%	105	396	276.6%
Manufacturing Industries & Construction	Diesel	7,138	10,419	46.0%	526	671	27.5%
	Natural Gas	-	-	-	-	-	-
Energy Industries				-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	57,531	105,247	82.9%	4,241	6,748	59.1%
Natural Gas Fugitive Emissions				-	1	6	917.3%
Total		**188,508**	**278,982**	**48.0%**	**8,226**	**11,419**	**38.8%**
On-Road Transportation							
Electric Vehicles	Electricity	1	55	5863.2%	0	0	1787.5%
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	90,239	106,600	18.1%	6,070	6,279	3.4%
Light Trucks, Vans, SUVs	Gasoline + Diesel	68,253	107,292	57.2%	4,649	6,326	36.1%
Heavy Duty Vehicles	Gasoline + Diesel	38,438	167,436	335.6%	2,583	10,589	310.0%
Propane Vehicles	Propane	152	1,064	601.5%	9	60	560.1%
Natural Gas Vehicles	Natural Gas	30	0	-100.0%	2	0	-100.0%
Motorcycles	Gasoline	633	3,419	440.1%	44	206	372.4%
Off-Road Vehicles	Gasoline + Diesel	-	-	-	-	-	-
Total On-Road Transportation		**197,746**	**385,867**	**95.1%**	**13,356**	**23,460**	**75.7%**
Off-Road Transportation							
Marine, Rail and Other Off-Road Vehicles	Gasoline + Diesel	6,387	12,233	91.5%	471	789	67.6%
Total Off-Road Transportation		**6,387**	**12,233**	**91.5%**	**471**	**789**	**67.6%**

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Waste							
Solid Waste					794	1,071	34.9%
Composting					0	80	356328.1%
Incineration & Open Burning					9	13	42.9%
Wastewater					3	4	51.6%
Total Waste					**806**	**1,168**	**44.9%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-178,548	-157,497	-11.8%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					1,537	1,537	0.0%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					345	394	14.0%
Total AFOLU					**345**	**394**	**14.0%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					440	838	90.4%
Total IPPU					**440**	**838**	**90.4%**
Total		**392,640**	**677,081**	**72.4%**	**23,645**	**38,068**	**61.0%**
Total Per Capita		**152.6**	**173.6**	**13.7%**	**9.2**	**9.8**	**6.2%**

9.3 GHG Emissions Trends

The following table presents a historical trend of GHG emissions from 2007 to 2023. All values are in tonnes of CO_2e.

Table 23. Summary of Historical GHG Emissions

Sector	2007	2010	2012	2015	2016	2017	2018	2019	2020	2021	2022	2023
Residential Buildings	3,146	3,537	3,744	3,276	3,315	3,673	3,528	3,743	4,033	3,482	3,679	3,436
Commercial & Institutional Buildings	313	346	384	381	408	467	455	499	592	433	538	558
Manufacturing Industries & Construction	526	364	387	481	471	573	715	682	556	579	668	671
Energy Industries	-	-	-	-	-	-	-	-	-	-	-	-
Non-Specified Sources	-	-	-	-	-	-	-	-	-	-	-	-
Agriculture, Forestry & Fishing activities	4,241	3,443	3,661	5,238	4,949	5,765	6,849	6,543	5,774	5,901	6,750	6,748
Fugitive Emissions	1	4	4	5	5	5	5	6	6	6	6	6
In-Boundary On-road Transportation	10,362	11,699	12,754	13,285	13,352	13,092	13,525	13,436	12,165	16,860	16,990	17,880
Trans-Boundary On-road Transportation	2,994	3,380	3,685	3,839	3,858	3,783	4,100	3,696	3,469	4,967	5,303	5,581
Waterborne Navigation	32	33	35	31	31	3	33	33	18	29	33	40
Aviation	-	-	-	-	-	-	-	-	-	-	-	-
Railway	-	-	-	-	-	-	-	-	-	-	-	-
Off-road Transportation	439	402	385	438	529	588	616	622	674	678	709	749
Solid Waste	794	985	-	864	-	-	920	902	869	824	840	1,071
Biological Treatment of Waste	0	0	3	40	-	-	40	49	58	59	62	80
Incineration & Open Burning	9	9	10	10	10	10	10	11	11	11	12	13
Wastewater Treatment & Discharge	3	3	-	3	3	3	3	3	3	3	4	4
IPPU	440	683	734	803	848	853	951	951	973	982	851	838
Land-Use Change	(177,011)	(173,064)	(170,432)	(166,485)	(165,169)	(163,854)	(162,538)	(161,222)	(159,907)	(158,591)	(157,275)	(155,960)
Livestock	332	332	349	375	383	383	383	383	383	383	383	383
Non-CO_2 Land Emission Sources	13	13	13	14	14	14	16	15	16	12	11	11
Total	**23,645**	**25,234**	**26,147**	**29,081**	**28,175**	**29,213**	**32,148**	**31,573**	**29,599**	**35,210**	**36,839**	**38,068**

10 ELECTORAL AREA E

10.1 2023 Profile

Profile	
Population	7,892
Dwellings	3,357
Registered Vehicles	6,960
Energy (Thousands of GJ)	1,348
GHG Emissions (tCO_2e)	71,566

10.2 2007 & 2023 Energy & GHG Emissions

Table 24 presents a summary comparison of the RDN's Electoral Area E's 2007 and 2023 energy and GHG emissions.

Table 24. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	178,267	178,860	0.3%	1,768	561	-68.2%
	Natural Gas	2,758	32,951	1094.9%	137	1,586	1054.1%
	Fuel Oil	51,602	49,768	-3.6%	5,058	4,878	-3.6%
	Propane	8,892	8,577	-3.6%	541	523	-3.2%
	Wood	61,879	59,681	-3.6%	1,351	1,303	-3.6%
	Diesel	2,195	1,863	-15.1%	162	119	-26.2%
Commercial & Industrial Buildings	Electricity	43,286	73,090	68.9%	429	229	-46.6%
	Natural Gas	3,393	4,001	17.9%	169	193	13.9%

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	4,112	16,019	289.6%	303	1,027	238.8%
Manufacturing Industries & Construction	Diesel	12,121	17,692	46.0%	893	1,139	27.5%
	Natural Gas	-	-	-	-	-	-
Energy Industries				-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	52,841	100,348	89.9%	3,895	6,434	65.2%
Natural Gas Fugitive Emissions				-	2	15	815.3%
Total		**421,347**	**542,850**	**28.8%**	**14,709**	**18,009**	**22.4%**
On-Road Transportation							
Electric Vehicles	Electricity	2	111	5439.3%	0	0	1653.3%
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	196,525	215,655	9.7%	13,220	12,702	-3.9%
Light Trucks, Vans, SUVs	Gasoline + Diesel	148,644	217,054	46.0%	10,124	12,798	26.4%
Heavy Duty Vehicles	Gasoline + Diesel	84,591	338,921	300.7%	5,684	21,433	277.0%
Propane Vehicles	Propane	330	2,153	551.6%	20	122	513.2%
Natural Gas Vehicles	Natural Gas	65	2	-96.7%	4	0	-96.9%
Motorcycles	Gasoline	1,379	6,917	401.7%	95	418	338.8%
Off-Road Vehicles	Gasoline + Diesel	-	-	-	-	-	-
Total On-Road Transportation		**431,536**	**780,814**	**80.9%**	**29,147**	**47,473**	**62.9%**
Off-Road Transportation							
Marine, Rail and Other Off-Road Vehicles	Gasoline + Diesel	13,662	24,747	81.1%	1,008	1,597	58.5%
Total Off-Road Transportation		**13,662**	**24,747**	**81.1%**	**1,008**	**1,597**	**58.5%**

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Waste							
Solid Waste					1,730	2,167	25.3%
Composting					16	162	881.4%
Incineration & Open Burning					19	25	32.8%
Wastewater					32	57	80.5%
Total Waste					**1,797**	**2,412**	**34.2%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-10,471	-8,910	-14.9%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					785	785	0.0%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					294	653	122.3%
Total AFOLU					**294**	**653**	**122.3%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					747	1,422	90.4%
Total IPPU					**747**	**1,422**	**90.4%**
Total		**866,545**	**1,348,411**	**55.6%**	**47,702**	**71,566**	**50.0%**
Total Per Capita		**157.4**	**170.9**	**8.5%**	**8.7**	**9.1**	**4.6%**

10.3 GHG Emissions Trends

The following table presents a historical trend of GHG emissions from 2007 to 2023. All values are in tonnes of CO_2e.

Table 25. Summary of Historical GHG Emissions

Sector	2007	2010	2012	2015	2016	2017	2018	2019	2020	2021	2022	2023
Residential Buildings	9,017	9,546	10,026	9,031	9,224	10,060	9,512	9,947	10,566	9,090	9,610	8,972
Commercial & Institutional Buildings	901	940	1,033	1,056	1,140	1,285	1,231	1,331	1,557	1,123	1,395	1,449
Manufacturing Industries & Construction	893	618	676	916	920	1,088	1,319	1,223	969	984	1,134	1,139
Energy Industries	-	-	-	-	-	-	-	-	-	-	-	-
Non-Specified Sources	-	-	-	-	-	-	-	-	-	-	-	-
Agriculture, Forestry & Fishing activities	3,895	3,183	3,400	4,898	4,639	5,416	6,450	6,177	5,465	5,598	6,420	6,434
Fugitive Emissions	2	12	12	13	13	14	14	16	15	15	15	15
In-Boundary On-road Transportation	22,613	24,237	25,596	28,065	28,707	28,623	29,086	28,453	25,382	34,586	34,380	36,180
Trans-Boundary On-road Transportation	6,534	7,003	7,396	8,109	8,295	8,270	8,817	7,826	7,237	10,188	10,731	11,293
Waterborne Navigation	69	66	71	66	67	7	70	68	37	58	67	82
Aviation	-	-	-	-	-	-	-	-	-	-	-	-
Railway	-	-	-	-	-	-	-	-	-	-	-	-
Off-road Transportation	938	817	784	940	1,153	1,262	1,301	1,293	1,382	1,371	1,435	1,515
Solid Waste	1,730	2,037	-	1,823	-	-	1,973	1,904	1,807	1,689	1,700	2,167
Biological Treatment of Waste	16	31	47	83	-	-	85	104	120	122	125	162
Incineration & Open Burning	19	20	20	21	21	21	22	22	23	23	24	25
Wastewater Treatment & Discharge	32	39	-	42	35	37	40	45	55	54	47	57
IPPU	747	1,159	1,283	1,528	1,659	1,620	1,755	1,755	1,745	1,714	1,445	1,422
Land-Use Change	(9,685)	(9,393)	(9,198)	(8,905)	(8,807)	(8,710)	(8,612)	(8,515)	(8,417)	(8,320)	(8,222)	(8,124)
Livestock	282	282	318	371	389	440	491	541	592	643	643	643
Non-CO_2 Land Emission Sources	12	12	12	13	14	13	15	14	15	11	10	10
Total	**47,702**	**50,002**	**50,672**	**56,973**	**56,277**	**58,156**	**62,181**	**60,720**	**56,967**	**67,270**	**69,181**	**71,566**

11 ELECTORAL AREA F

11.1 2023 Profile

Profile	
Population	9,584
Dwellings	3,895
Registered Vehicles	8,453
Energy (Thousands of GJ)	1,644
GHG Emissions (tCO_2e)	89,608

11.2 2007 & 2023 Energy & GHG Emissions

Table 26 presents a summary comparison of the RDN's Electoral Area F's 2007 and 2023 energy and GHG emissions.

Table 26. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	200,730	207,493	3.4%	1,991	651	-67.3%
	Natural Gas	3,105	38,226	1131.0%	155	1,840	1089.0%
	Fuel Oil	58,104	57,654	-0.8%	5,695	5,651	-0.8%
	Propane	10,013	9,936	-0.8%	609	606	-0.5%
	Wood	69,677	69,137	-0.8%	1,521	1,509	-0.8%
	Diesel	2,723	2,263	-16.9%	201	145	-27.7%
Commercial & Industrial Buildings	Electricity	48,741	84,791	74.0%	483	266	-44.9%
	Natural Gas	3,821	4,642	21.5%	190	223	17.3%

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	4,630	18,583	301.4%	341	1,191	249.1%
Manufacturing Industries & Construction	Diesel	17,160	25,048	46.0%	1,265	1,613	27.5%
	Natural Gas	-	-	-	-	-	-
Energy Industries				-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	71,227	147,711	107.4%	5,250	9,470	80.4%
Natural Gas Fugitive Emissions				-	2	18	842.9%
Total		**489,931**	**665,484**	**35.8%**	**17,704**	**23,186**	**31.0%**
On-Road Transportation							
Electric Vehicles	Electricity	2	134	5400.8%	0	0	1641.1%
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	240,349	261,910	9.0%	16,168	15,426	-4.6%
Light Trucks, Vans, SUVs	Gasoline + Diesel	181,791	263,609	45.0%	12,382	15,543	25.5%
Heavy Duty Vehicles	Gasoline + Diesel	102,375	411,380	301.8%	6,879	26,016	278.2%
Propane Vehicles	Propane	404	2,615	547.1%	24	148	508.9%
Natural Gas Vehicles	Natural Gas	79	0	-100.0%	5	0	-100.0%
Motorcycles	Gasoline	1,686	8,401	398.2%	116	507	335.7%
Off-Road Vehicles	Gasoline + Diesel	-	-	-	-	-	-
Total On-Road Transportation		**526,687**	**948,050**	**80.0%**	**35,574**	**57,641**	**62.0%**
Off-Road Transportation							
Marine, Rail and Other Off-Road Vehicles	Gasoline + Diesel	16,948	30,055	77.3%	1,250	1,939	55.1%
Total Off-Road Transportation		**16,948**	**30,055**	**77.3%**	**1,250**	**1,939**	**55.1%**

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Waste							
Solid Waste					2,116	2,632	24.4%
Composting					145	196	35.6%
Incineration & Open Burning					23	31	31.9%
Wastewater					7	10	40.4%
Total Waste					**2,291**	**2,869**	**25.2%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-38,177	-34,021	-10.9%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					1,358	1,358	0.0%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					1,980	1,959	-1.1%
Total AFOLU					**1,980**	**1,959**	**-1.1%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					1,058	2,014	90.4%
Total IPPU					**1,058**	**2,014**	**90.4%**
Total		**1,033,566**	**1,643,589**	**59.0%**	**59,857**	**89,608**	**49.7%**
Total Per Capita		**151.4**	**171.5**	**13.3%**	**8.8**	**9.3**	**6.7%**

11.3 GHG Emissions Trends

The following table presents a historical trend of GHG emissions from 2007 to 2023. All values are in tonnes of CO_2e.

Table 27. Summary of Historical GHG Emissions

Sector	2007	2010	2012	2015	2016	2017	2018	2019	2020	2021	2022	2023
Residential Buildings	10,172	11,492	12,153	10,542	10,636	11,615	10,999	11,516	12,250	10,541	11,143	10,404
Commercial & Institutional Buildings	1,015	1,130	1,251	1,231	1,312	1,481	1,421	1,540	1,803	1,303	1,618	1,681
Manufacturing Industries & Construction	1,265	875	946	1,239	1,232	1,473	1,806	1,694	1,357	1,393	1,606	1,613
Energy Industries	-	-	-	-	-	-	-	-	-	-	-	-
Non-Specified Sources	-	-	-	-	-	-	-	-	-	-	-	-
Agriculture, Forestry & Fishing activities	5,250	4,362	4,710	6,898	6,569	7,712	9,236	8,894	7,911	8,149	9,398	9,470
Fugitive Emissions	2	14	15	15	15	16	16	18	18	18	18	18
In-Boundary On-road Transportation	27,599	30,832	33,402	35,810	36,372	36,013	36,291	35,211	31,171	42,284	41,744	43,929
Trans-Boundary On-road Transportation	7,975	8,909	9,651	10,347	10,509	10,406	11,000	9,685	8,888	12,456	13,029	13,712
Waterborne Navigation	86	85	92	84	85	9	86	83	45	70	82	99
Aviation	-	-	-	-	-	-	-	-	-	-	-	-
Railway	-	-	-	-	-	-	-	-	-	-	-	-
Off-road Transportation	1,164	1,055	1,017	1,193	1,454	1,578	1,615	1,593	1,691	1,665	1,742	1,840
Solid Waste	2,116	2,597	-	2,332	-	-	2,469	2,364	2,226	2,066	2,064	2,632
Biological Treatment of Waste	145	144	132	107	-	-	107	129	148	149	152	196
Incineration & Open Burning	23	25	26	27	27	27	27	28	28	28	29	31
Wastewater Treatment & Discharge	7	7	-	8	8	8	8	8	8	8	9	10
IPPU	1,058	1,642	1,795	2,067	2,222	2,193	2,403	2,403	2,416	2,400	2,046	2,014
Land-Use Change	(36,819)	(36,040)	(35,520)	(34,741)	(34,481)	(34,221)	(33,962)	(33,702)	(33,442)	(33,183)	(32,923)	(32,663)
Livestock	1,964	1,964	2,006	2,070	2,091	2,061	2,032	2,003	1,973	1,944	1,944	1,944
Non-CO_2 Land Emission Sources	16	16	17	18	19	19	21	20	22	17	15	15
Total	**59,857**	**65,149**	**67,213**	**73,986**	**72,552**	**74,612**	**79,538**	**77,188**	**71,956**	**84,492**	**86,638**	**89,608**

12 ELECTORAL AREA G

12.1 2023 Profile

Profile	
Population	9,460
Dwellings	3,796
Registered Vehicles	8,343
Energy (Thousands of GJ)	1,630
GHG Emissions (tCO_2e)	88,012

12.2 2007 & 2023 Energy & GHG Emissions

Table 28 presents a summary comparison of the RDN's Electoral Area G's 2007 and 2023 energy and GHG emissions.

Table 28. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	206,655	202,248	-2.1%	2,049	635	-69.0%
	Natural Gas	3,197	37,260	1065.5%	159	1,794	1025.7%
	Fuel Oil	59,819	56,537	-5.5%	5,863	5,542	-5.5%
	Propane	10,308	9,743	-5.5%	627	594	-5.2%
	Wood	71,733	67,797	-5.5%	1,566	1,480	-5.5%
	Diesel	2,811	2,233	-20.6%	207	143	-30.9%
Commercial & Industrial Buildings	Electricity	50,179	82,648	64.7%	498	259	-47.9%
	Natural Gas	3,934	4,525	15.0%	196	218	11.1%

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	4,767	18,113	280.0%	351	1,161	230.5%
Manufacturing Industries & Construction	Diesel	14,125	20,618	46.0%	1,041	1,328	27.5%
	Natural Gas	-	-	-	-	-	-
Energy Industries				-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	78,556	155,637	98.1%	5,791	9,978	72.3%
Natural Gas Fugitive Emissions				-	2	17	792.8%
Total		**506,084**	**657,359**	**29.9%**	**18,351**	**23,150**	**26.2%**
On-Road Transportation							
Electric Vehicles	Electricity	3	133	5064.0%	0	0	1534.5%
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	252,691	258,499	2.3%	16,998	15,225	-10.4%
Light Trucks, Vans, SUVs	Gasoline + Diesel	191,126	260,176	36.1%	13,018	15,340	17.8%
Heavy Duty Vehicles	Gasoline + Diesel	108,033	406,156	276.0%	7,259	25,685	253.8%
Propane Vehicles	Propane	425	2,581	507.5%	26	147	471.6%
Natural Gas Vehicles	Natural Gas	83	1	-98.2%	5	0	-98.3%
Motorcycles	Gasoline	1,773	8,292	367.7%	122	501	309.1%
Off-Road Vehicles	Gasoline + Diesel	-	-	-	-	-	-
Total On-Road Transportation		**554,132**	**935,838**	**68.9%**	**37,428**	**56,898**	**52.0%**
Off-Road Transportation							
Marine, Rail and Other Off-Road Vehicles	Gasoline + Diesel	22,360	36,964	65.3%	1,649	2,382	44.5%
Total Off-Road Transportation		**22,360**	**36,964**	**65.3%**	**1,649**	**2,382**	**44.5%**

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Waste							
Solid Waste					2,224	2,598	16.8%
Composting					137	194	41.9%
Incineration & Open Burning					25	30	23.8%
Wastewater					108	230	112.4%
Total Waste					**2,494**	**3,052**	**22.4%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-5,945	-5,333	-10.3%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					757	767	1.4%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					898	872	-3.0%
Total AFOLU					**898**	**872**	**-3.0%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					871	1,657	90.4%
Total IPPU					**871**	**1,657**	**90.4%**
Total		**1,082,577**	**1,630,161**	**50.6%**	**61,690**	**88,012**	**42.7%**
Total Per Capita		**153.6**	**172.3**	**12.2%**	**8.8**	**9.3**	**6.3%**

12.3 GHG Emissions Trends

The following table presents a historical trend of GHG emissions from 2007 to 2023. All values are in tonnes of CO_2e.

Table 29. Summary of Historical GHG Emissions

Sector	2007	2010	2012	2015	2016	2017	2018	2019	2020	2021	2022	2023
Residential Buildings	10,472	11,251	11,819	10,517	10,699	11,607	10,920	11,362	12,013	10,323	10,911	10,188
Commercial & Institutional Buildings	1,045	1,106	1,216	1,228	1,321	1,481	1,411	1,520	1,768	1,270	1,577	1,639
Manufacturing Industries & Construction	1,041	720	796	1,107	1,122	1,315	1,581	1,452	1,140	1,147	1,322	1,328
Energy Industries	-	-	-	-	-	-	-	-	-	-	-	-
Non-Specified Sources	-	-	-	-	-	-	-	-	-	-	-	-
Agriculture, Forestry & Fishing activities	5,791	4,769	5,121	7,435	7,060	8,265	9,870	9,478	8,407	8,635	9,930	9,978
Fugitive Emissions	2	14	14	15	15	16	16	18	17	17	17	17
In-Boundary On-road Transportation	29,037	30,764	32,241	34,785	35,401	35,121	35,493	34,534	30,652	41,639	41,206	43,363
Trans-Boundary On-road Transportation	8,390	8,889	9,316	10,051	10,229	10,148	10,759	9,499	8,740	12,266	12,862	13,535
Waterborne Navigation	89	84	89	82	83	9	85	82	44	69	80	98
Aviation	-	-	-	-	-	-	-	-	-	-	-	-
Railway	358	363	449	406	394	446	474	493	465	460	468	468
Off-road Transportation	1,202	1,035	983	1,160	1,417	1,542	1,582	1,564	1,665	1,644	1,720	1,816
Solid Waste	2,224	2,589	-	2,263	-	-	2,412	2,316	2,186	2,034	2,038	2,598
Biological Treatment of Waste	137	123	116	103	-	-	104	126	146	147	150	194
Incineration & Open Burning	25	25	25	26	26	26	27	27	28	28	28	30
Wastewater Treatment & Discharge	108	139	-	233	134	174	186	149	136	189	180	230
IPPU	871	1,351	1,511	1,848	2,023	1,958	2,103	2,103	2,071	2,016	1,684	1,657
Land-Use Change	(5,188)	(5,074)	(4,997)	(4,882)	(4,844)	(4,806)	(4,768)	(4,729)	(4,691)	(4,653)	(4,614)	(4,576)
Livestock	880	880	873	863	859	859	858	857	856	856	856	856
Non-CO_2 Land Emission Sources	18	18	18	20	21	20	22	22	23	18	16	16
Total	**61,690**	**64,119**	**64,587**	**72,141**	**70,806**	**72,987**	**77,903**	**75,601**	**70,358**	**82,757**	**85,045**	**88,012**

13 ELECTORAL AREA H

13.1 2023 Profile

Profile	
Population	5,006
Dwellings	2,535
Registered Vehicles	4,415
Energy (Thousands of GJ)	868
GHG Emissions (tCO_2e)	44,068

13.2 2007 & 2023 Energy & GHG Emissions

Table 30 presents a summary comparison of the RDN's Electoral Area H's 2007 and 2023 energy and GHG emissions.

Table 30. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	133,276	135,082	1.4%	1,322	424	-67.9%
	Natural Gas	2,062	24,886	1107.0%	103	1,198	1065.8%
	Fuel Oil	38,579	37,952	-1.6%	3,781	3,720	-1.6%
	Propane	6,648	6,540	-1.6%	404	399	-1.3%
	Wood	46,262	45,510	-1.6%	1,010	994	-1.6%
	Diesel	1,388	1,182	-14.9%	102	76	-25.9%
Commercial & Industrial Buildings	Electricity	32,362	55,201	70.6%	321	173	-46.0%
	Natural Gas	2,537	3,022	19.1%	126	145	15.0%

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	3,074	12,098	293.5%	227	776	242.3%
Manufacturing Industries & Construction	Diesel	7,737	11,294	46.0%	570	727	27.5%
	Natural Gas	-	-	-	-	-	-
Energy Industries				-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	10,541	23,976	127.5%	777	1,537	97.8%
Natural Gas Fugitive Emissions				-	1	12	824.6%
Total		**284,466**	**356,742**	**25.4%**	**8,745**	**10,181**	**16.4%**
On-Road Transportation							
Electric Vehicles	Electricity	1	70	5424.2%	0	0	1648.6%
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	124,996	136,789	9.4%	8,408	8,057	-4.2%
Light Trucks, Vans, SUVs	Gasoline + Diesel	94,542	137,676	45.6%	6,439	8,117	26.1%
Heavy Duty Vehicles	Gasoline + Diesel	53,363	214,902	302.7%	3,586	13,590	279.0%
Propane Vehicles	Propane	210	1,366	549.8%	13	78	511.5%
Natural Gas Vehicles	Natural Gas	41	1	-98.7%	2	0	-98.8%
Motorcycles	Gasoline	877	4,388	400.3%	61	265	337.6%
Off-Road Vehicles	Gasoline + Diesel	-	-	-	-	-	-
Total On-Road Transportation		**274,031**	**495,191**	**80.7%**	**18,509**	**30,107**	**62.7%**
Off-Road Transportation							
Marine, Rail and Other Off-Road Vehicles	Gasoline + Diesel	8,640	15,697	81.7%	637	1,013	59.0%
Total Off-Road Transportation		**8,640**	**15,697**	**81.7%**	**637**	**1,013**	**59.0%**

Source	Type	2007 Energy (GJ)	2023 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2023 GHG Emissions (tCO_2e)	Change (%)
Waste							
Solid Waste					1,100	1,375	24.9%
Composting					0	103	41826.3%
Incineration & Open Burning					12	16	32.4%
Wastewater					4	5	43.8%
Total Waste					**1,116**	**1,499**	**34.2%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-42,527	-38,386	-9.7%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					539	539	0.0%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					362	360	-0.5%
Total AFOLU					**362**	**360**	**-0.5%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					477	908	90.4%
Total IPPU					**477**	**908**	**90.4%**
Total		**567,137**	**867,630**	**53.0%**	**29,846**	**44,068**	**47.6%**
Total Per Capita		**162.9**	**173.3**	**6.4%**	**8.6**	**8.8**	**2.7%**

13.3 GHG Emissions Trends

The following table presents a historical trend of GHG emissions from 2007 to 2023. All values are in tonnes of CO_2e.

Table 31. Summary of Historical GHG Emissions

Sector	2007	2010	2012	2015	2016	2017	2018	2019	2020	2021	2022	2023
Residential Buildings	6,723	7,406	7,892	7,141	7,305	7,887	7,381	7,643	8,040	6,899	7,296	6,810
Commercial & Institutional Buildings	674	731	815	837	906	1,010	957	1,025	1,187	848	1,054	1,094
Manufacturing Industries & Construction	570	394	428	563	561	669	819	767	613	628	724	727
Energy Industries	-	-	-	-	-	-	-	-	-	-	-	-
Non-Specified Sources	-	-	-	-	-	-	-	-	-	-	-	-
Agriculture, Forestry & Fishing activities	777	658	719	1,071	1,026	1,211	1,459	1,413	1,263	1,309	1,517	1,537
Fugitive Emissions	1	9	10	10	11	11	11	12	12	12	12	12
In-Boundary On-road Transportation	14,360	15,131	15,800	17,601	18,092	18,121	18,437	18,030	16,085	21,934	21,804	22,945
Trans-Boundary On-road Transportation	4,149	4,372	4,565	5,086	5,228	5,236	5,589	4,960	4,586	6,461	6,806	7,162
Waterborne Navigation	44	41	44	42	43	5	44	43	23	37	43	52
Aviation	-	-	-	-	-	-	-	-	-	-	-	-
Railway	-	-	-	-	-	-	-	-	-	-	-	-
Off-road Transportation	593	508	487	593	731	800	825	820	877	870	910	961
Solid Waste	1,100	1,274	-	1,145	-	-	1,251	1,208	1,146	1,071	1,078	1,375
Biological Treatment of Waste	0	2	7	52	-	-	54	66	76	77	79	103
Incineration & Open Burning	12	12	12	13	13	14	14	14	14	15	15	16
Wastewater Treatment & Discharge	4	4	-	4	4	4	4	4	4	4	5	5
IPPU	477	740	811	940	1,012	997	1,090	1,090	1,093	1,084	922	908
Land-Use Change	(41,988)	(41,212)	(40,694)	(39,917)	(39,659)	(39,400)	(39,141)	(38,882)	(38,623)	(38,364)	(38,106)	(37,847)
Livestock	360	360	358	356	355	356	356	357	357	358	358	358
Non-CO_2 Land Emission Sources	2	2	3	3	3	3	3	3	4	3	2	2
Total	**29,846**	**31,644**	**31,951**	**35,458**	**35,289**	**36,323**	**38,295**	**37,454**	**35,381**	**41,610**	**42,625**	**44,068**