

DECEMBER 21

GREENHOUSE GAS INVENTORY

CARTERTON DISTRICT COUNCIL - 2020



TE KAUNIHERA-Ā-ROHE O TARATAHI
CARTERTON
DISTRICT COUNCIL

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1 Summary

Note #1: The emissions factors provided by MfE were updated in 2020. Therefore, emissions for 2018 and 2019 were updated.

Note #2: The district was in lock down level 3 and 4 between the 23rd of March 2020 and 14th May 2020 due to Covid-19 pandemic.

	Scope	t Co ₂ e - 2018	t Co ₂ e - 2019	t Co ₂ e - 2020	Uncertainties
CORPORATE SERVICES		13.77	14.11	15.17	[13.99 ; 14.70]
<i>Electricity</i>	Scope 2	3.10	2.92	3.07	*
<i>T&D losses¹</i>	Scope 3	0.27	0.25	0.26	*
<i>Transport - Diesel</i>	Scope 1	0	0	0	*
<i>Transport - Petrol</i>	Scope 1	7.50	7.89	8.06	*
<i>Transport - Flights</i>	Scope 3	0.60	0.75	0.83	*
<i>Office waste</i>	Scope 3	2.30	2.30	2.95	+/-40% [1.77 ; 2.48]
<i>Refrigerant</i>	Scope 1	0	0	0	*
COMMUNITY SERVICES		76.85	68.88	30.29	30.29*
<i>Electricity</i>	Scope 2	66.08	60.50	27.0	*
<i>T&D losses</i>	Scope 3	5.67	5.19	2.32	*
<i>Transport - Diesel</i>	Scope 1	5.11	3.19	0.97	
<i>Transport - Petrol</i>	Scope 1	0	0	0	
OPERATIONS		112.73	127.31	78.54	78.54*
<i>Electricity - Other</i>	Scope 2	3.04	3.18	1.57	*
<i>Electricity - Streetlights</i>	Scope 2	64.89	49.70	20.38	*
<i>T&D losses</i>	Scope 3	5.82	4.53	1.88	*
<i>Transport - Diesel</i>	Scope 1	30.82	55.71	48.09	*
<i>Transport - Petrol</i>	Scope 1	8.16	14.19	6.62	*
WATER		101.57	103.36	117.36	[82.10 ; 159.31]

¹ Transport and Distribution

<i>Transport - Diesel</i>	Scope 1	42.72	40.23	40.33	*
<i>Transport - Petrol</i>	Scope 1	0	0	0	*
<i>Water supply</i>	Scope 3	21.64	24.97	25.55	*
<i>Wastewater treatment</i>	Scope 3	37.21	38.16	51.48	+/-10% activity data +/-40% CH ₄ factor +/-90% N ₂ O factor [16.22 ; 93.43]
PARKS AND RESERVES		50.49	29.11	28.89	[23.25 ; 23.46]
<i>Electricity</i>	Scope 2	5.22	0.86	6.57	*
<i>T&D losses</i>	Scope 3	0.45	0.07	0.56	*
<i>Transport - Diesel</i>	Scope 1	42.09	25.42	20.11	*
<i>Transport - Petrol</i>	Scope 1	0.74	0.77	0.78	*
<i>Green waste - Landfill</i>	Scope 3	1.99	1.99	0	+/-40% 0
<i>Green waste - Composted</i>	Scope 3	0	0	0.86	+/-40% [0.51 ; 0.72]
REGULATORY		12.00	10.35	11.04	11.04*
<i>Transport - Diesel</i>	Scope 1	6.52	5.93	2.63	*
<i>Transport - Petrol</i>	Scope 1	5.48	4.42	8.40	*
GROSS EMISSIONS		367.40	353.13	275.99	[239.21 ; 317.33]

* Uncertainties exist but are not quantifiable

Table 1: Emissions by business units

	t Co ₂ e - 2018	t Co ₂ e - 2019	t Co ₂ e - 2020	Uncertainties
Scope 1	149.12	157.74	136.89	136.89*
Scope 2	142.33	117.16	52.91	52.91*
Scope 3	75.95	78.22	86.20	[49.41 ; 127.53]
GROSS EMISSIONS	367.40	353.13	275.99	[239.21 ; 317.33]

* Uncertainties exist but are not quantifiable

Table 2: Emissions by scopes

	t Co ₂ e - 2018	t Co ₂ e - 2019	t Co ₂ e - 2020	Uncertainties
ELECTRICITY	154.53	127.21	57.44	57.44*
<i>Streetlights</i>	64.89	49.70	20.38	*
<i>Other</i>	77.44	67.46	32.53	*
<i>T&D losses</i>	12.20	10.05	4.54	*
TRANSPORT	149.72	158.49	137.71	137.72*
<i>Petrol</i>	21.87	27.27	23.86	*
<i>Diesel</i>	127.25	130.47	113.02	*
<i>Flights</i>	0.60	0.75	0.83	*
WASTEWATER	37.21	38.16	51.48	+/-10% activity data +/-40% CH ₄ factor +/-90% N ₂ O factor [16.22 ; 93.43]
WATER SUPPLY	21.64	24.97	25.55	25.55*
WASTE	4.29	4.29	3.80	+/-40% [2.28 ; 5.32]
REFRIGERANT	0.00	0.00	0.00	*
GROSS EMISSIONS	367.40	353.13	275.99	[239.21 ; 317.33]

* Uncertainties exist but are not quantifiable

Table 3: Emissions by sources

	t Co ₂ e - 2018	t Co ₂ e - 2019	t Co ₂ e - 2020
GROSS EMISSIONS	367.40	353.13	275.99
<i>Forestry (removals)</i>	-7,237.39	-7,237.39	-7,237.39
<i>Forestry (harvest emissions)</i>	0.00	0.00	0.00
TOTAL	-7,237.39	-7,237.39	-7,237.39
NET EMISSIONS	-6,869.99	-6,884.27	-6,961.40

Table 4: Forestry

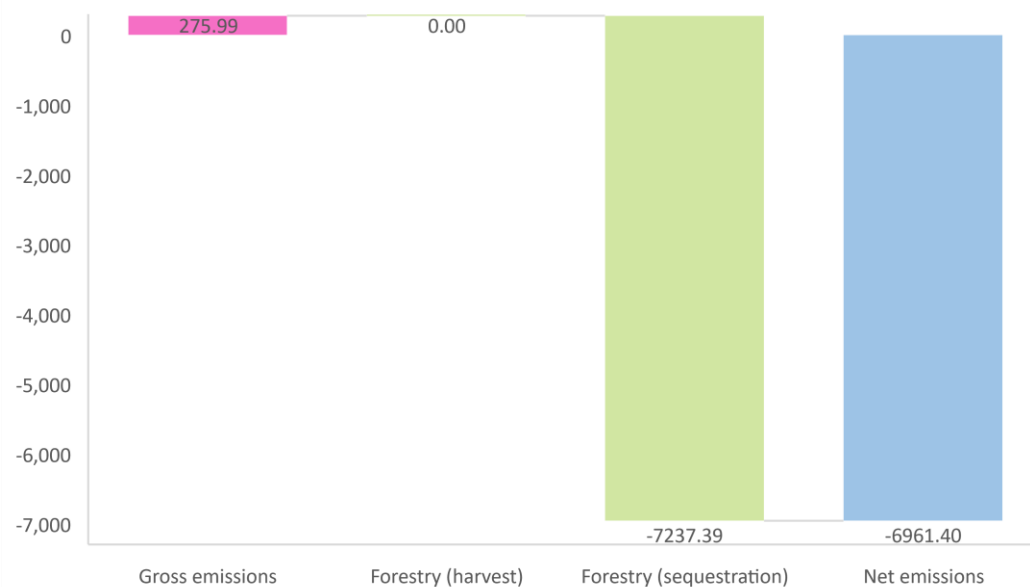


Figure 1: Gross versus Net emissions including forestry (tCO₂e)

	2018	2019	2020
Gross emissions per FTE (t CO₂e) 2018: 59.8 FTE 2019: 61.2 FTE 2020: 66.3 FTE	6.14	5.77	4.16
Gross emissions per capita (kg CO₂e) 2018: 9,440 2019: 9,690 2020: 9,888	38.92	36.44	27.91

Table 5: Emissions per FTE and per head of population

2 Introduction

This report is the annual greenhouse gas (GHG) emissions² inventory report for Carterton District Council. The inventory is a complete and accurate quantification of the amount of GHG emissions that can be directly attributed to the organisation's operations within the declared boundary and scope for the specified reporting period.

The inventory has been prepared in accordance with the requirements of the *Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (2004)* and *ISO 14064-1:2006 Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals*³.

3 Organisation Description

Carterton District Council (CDC) is the territorial authority for the Carterton District. CDC is located in the heart of the Wairarapa. The 30th of June 2020, CDC employed 66.3 FTEs (Full Time-Equivalent) and is responsible for water and wastewater, waste, local roads (excluding State Highway), streetlighting, parks and reserves, community facilities and performing statutory duties such as regulatory compliance.

The council is organised as shown below:

- Corporate services,
- Community services,
- Operations,
- Water,
- Parks and reserves,
- Regulatory.

² Throughout this document 'emissions' means GHG emissions.

³ Throughout this document 'GHG Protocol' means the GHG Protocol Corporate Accounting and Reporting Standard and 'ISO 14064- 1:2006' means the international standard Specification with Guidance at the Organizational Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals.

4 Inventory boundaries

This inventory covers a period from January 2020 to December 2020.

4.1 Organisational boundaries

4.1.1 Organisational boundaries included for this reporting period

Organisational boundaries were set with reference to the methodology described in the GHG Protocol and ISO 14064-1:2006 standards. The GHG Protocol allows two distinct approaches to consolidate GHG emissions: the equity share and control (financial or operational) approaches. We used an operational control approach to account for emissions.

This GHG inventory includes all the council's business units as shown in Figure 2: Organisational structure below.

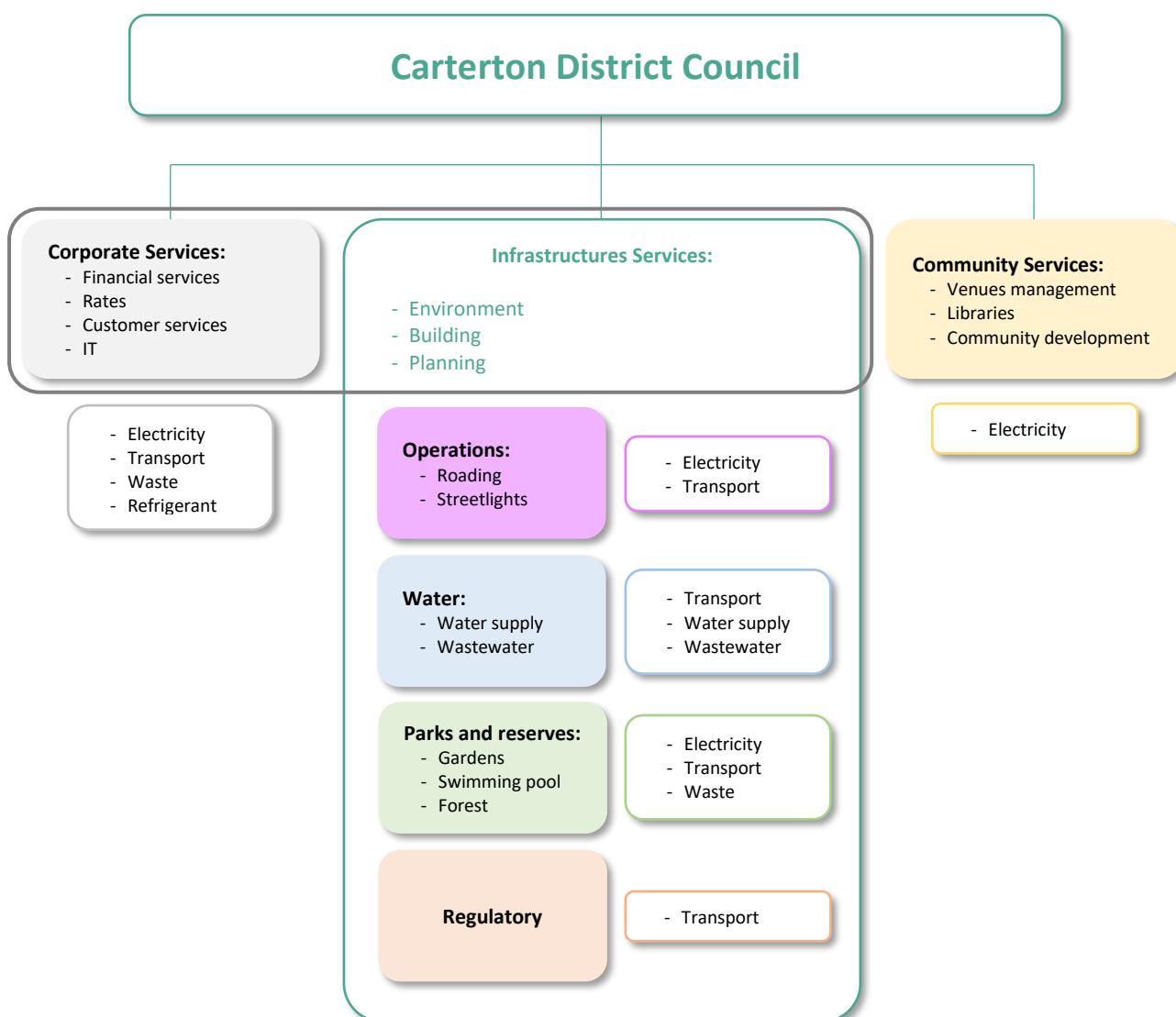


Figure 2: Organisational structure and emission sources

Environment, Building and Planning from Infrastructure services share the same building as Corporate services. Therefore, they have been aggregated under the same business unit "Corporate services".

4.1.2 Organisational business units excluded from inventory

Business unit	GHG emission source	Scope	Reason for exclusion
Community services - Properties	Electricity	Scope 2	Tenants pay their own power accounts
Operations - Waste management	Waste from the community	Scope 3	Outside of CDC operational control Contractor: Earth Care
Operations - Roading	Emissions from road maintenance	Scope 3	Outside of CDC operational control Contractor: Fulton Hogan

Table 6: Business units and GHG emission source excluded from this inventory

4.2 Reporting boundaries

4.2.1 GHG emission sources inclusions

The GHG emissions sources included in this inventory were identified with reference to the methodology in the *GHG Protocol and ISO14064-1:2006 standards*. As adapted from the *GHG Protocol*, these emissions were classified under the following categories:

- **Direct GHG emissions (Scope 1):** emissions from sources that are owned or controlled by the company (emissions from vehicles, refrigerant leaks)
- **Electricity indirect GHG emissions (Scope 2):** emissions from the generation of purchased electricity consumed by the company.
- **Other indirect GHG emissions (Scope 3):** emissions that occur as a consequence of the company's activities but from sources not owned or controlled by the company (waste, wastewater, energy transport and distribution losses, ...).

This inventory considers:

- Corporate services:
 - Electricity
 - Transport and distribution losses
 - Transport – Diesel
 - Transport – Petrol
 - Transport – Flights
 - Waste
 - Refrigerant
- Community services:
 - Electricity
 - Transport and distribution losses
 - Transport – Diesel
 - Transport – Petrol
- Operations:
 - Electricity – Other
 - Electricity – Streetlights
 - Transport and distribution losses
 - Transport – Diesel
 - Transport – Petrol

- Water:
 - Transport – Diesel
 - Transport – Petrol
 - Water supply
 - Wastewater treatment
- Parks and reserves:
 - Electricity
 - Transport and distribution losses
 - Transport – Diesel
 - Transport – Petrol
 - Green waste
- Regulatory:
 - Transport – Diesel
 - Transport – Petrol

4.2.2 GHG emission source exclusions

For more information, refer to Table 6: Business units and GHG emission source excluded from this inventory.

5 Data collection and uncertainties

Table 7 gives an overview of how data were collected for each GHG emissions source, the source of the data and an explanation of any uncertainties or assumptions.

A calculation methodology has been used for quantifying the emissions inventory using emissions source activity data multiplied by emission or removal factors. All emission factors (and uncertainties) were sourced from the Ministry for the Environment’s 2020 *Measuring Emissions: A Guide for Organisations*.

Business Unit	GHG emission source	Scope	Data source	Data collection unit	Uncertainty (description)
Corporate services	Electricity	Scope 2	Electricity company	kWh	Low It is assumed that the meter readings were done correctly
	Transport and distribution losses	Scope 3			
Corporate services	Transport - Diesel	Scope 1	Fuel company	L	Low It is assumed that the supplier reports are complete and accurate
	Transport - Petrol	Scope 1			
	Transport - Flights	Scope 3	Finance team	Km	Low/Moderate It is assumed that the employees’ reports are complete and accurate
Corporate services	Waste	Scope 3	Council officer	Kg	Moderate Estimation made by the staff in charge of the waste collection
Corporate services	Refrigerant	Scope 1	A/C company	Kg	Low It is assumed that the supplier data is complete and accurate
Community services	Electricity	Scope 2	Electricity company	kWh	Low It is assumed that the meter readings were done correctly
	Transport and distribution losses	Scope 3			
	Transport - Diesel	Scope 1		L	Low

Business Unit	GHG emission source	Scope	Data source	Data collection unit	Uncertainty (description)
	Transport - Petrol	Scope 1	Fuel company		It is assumed that the supplier reports are complete and accurate
Operations	Electricity - other	Scope 2	Electricity company	kWh	Low It is assumed that the meter readings were done correctly
	Electricity - Streetlights	Scope 2			
	Transport and distribution losses	Scope 3			
Operations	Transport - Diesel	Scope 1	Fuel company	L	Low It is assumed that the supplier reports are complete and accurate
	Transport - Petrol	Scope 1			
Water	Water supply	Scope 3	Council officer	m ³	Low It is assumed that the data source is an appropriate representation of activities
	Wastewater treatment	Scope 3	Council officer	m ³	Low It is assumed that the data source is an appropriate representation of activities
Parks and reserves	Electricity	Scope 2	Electricity company	kWh	Low It is assumed that the meter readings were done correctly
	Transport and distribution losses	Scope 3			
Parks and reserves	Transport - Diesel	Scope 1	Fuel company	L	Low It is assumed that the supplier reports are complete and accurate
	Transport - Petrol	Scope 1			
Parks and reserves	Green waste	Scope 3	Council officer	Kg	Moderate Estimation made by the staff in charge of the green waste
Regulatory	Transport - Diesel	Scope 1	Fuel company	L	Low It is assumed that the supplier reports are complete and accurate
	Transport - Petrol	Scope 1			

Table 7: GHG emission sources, data collection and uncertainty

6 GHG emission calculations and results

6.1 Evolution of the GHG emissions

6.1.1 Base year

The first greenhouse gas inventory done for Carterton District Council was made in 2018 (January to December). It set up the baseline.

6.1.2 Evolution of the GHG emissions and significant emissions changes

Note #1: The emissions factors provided by MfE were updated in 2020. Therefore, emissions for 2018 and 2019 were updated.

Note #2: The district was in lock down level 3 and 4 between the 23rd of March 2020 and 14th May 2020 due to Covid-19 pandemic.

The gross emissions decreased by 25% between 2018 and 2020.

The emissions from the business units Corporate Services and Water Supply and Wastewater Treatment increased by 10% and 16%. The emissions from the business units Community Services, Operation, Parks and Reserves and Regulatory decreased by 61%, 30%, 53% and 8%.

The scope 3 increased (13%) and scope 1 and 2 decreased (8% and 63% respectively).

The emissions from Electricity, Transport and Waste decreased (63%, 8% and 11% respectively) while the emissions coming from Wastewater and Water Supply increased (38% and 18% respectively).

Net emissions increased by over 1%. Because CDC is a carbon negative organisation due to its forest, having a net emissions increase is positive (we sequestered more carbon than the previous years).

	Evolution 2018 - 2020
Corporate Services	+10.16%
Community Services	-60.59%
Operations	-30.33%
Water supply and Wastewater treatment	+15.54%
Parks and Reserves	-53.26%
Regulatory	-8.04%
GROSS EMISSIONS	-24.88%

Table 8: Changes for the emissions by business units between 2018 and 2020

	Evolution 2018 - 2020
Scope 1	-8.20%
Scope 2	-62.83%
Scope 3	+13.49%
GROSS EMISSIONS	-24.88%

Table 9: Changes for the emissions by scopes between 2018 and 2020

	Evolution 2018 - 2020
Electricity	-62.83%
Transport	-8.02%
Wastewater	+38.33%
Water supply	+18.07%
Waste	-11.40%
Refrigerant	0.00%
GROSS EMISSIONS	-24.88%

Table 10: Changes for the emissions by sources between 2018 and 2020

	Evolution 2018 - 2020
Gross emissions per FTE	-32.25%
Gross emissions per capita	-28.28%

Table 11: Changes for the emissions per FTE and per capita between 2018 and 2020

	Evolution 2018 - 2020
GROSS EMISSIONS	-24.88%
Sequestration (forest)	0%
Harvest emissions	0%
NET EMISSIONS	+1.33%

Table 12: Changes for the net emissions between 2018 and 2020

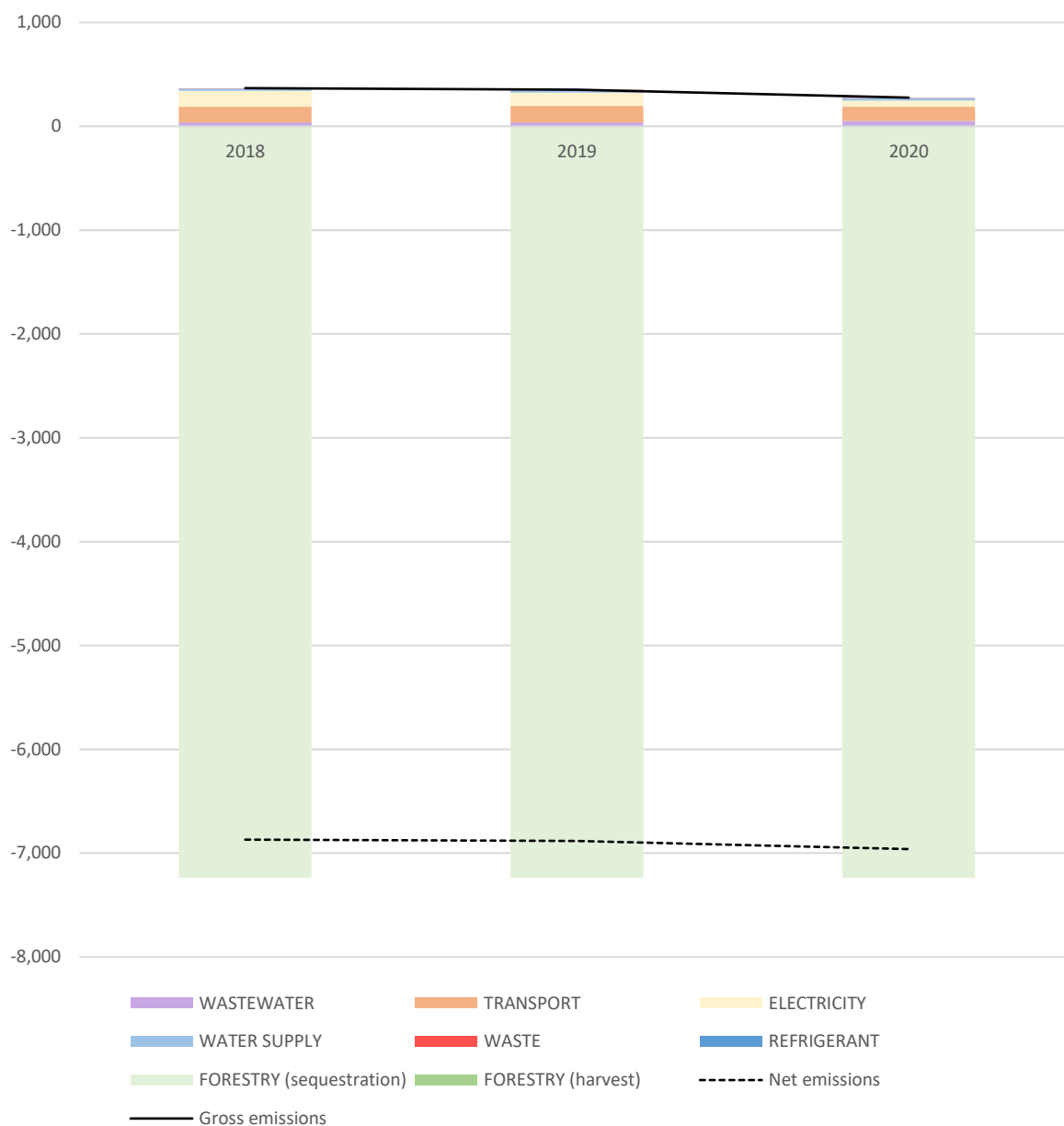


Figure 3: Annual emissions showing gross and net emissions (including forestry) since 2018

6.1.3 Evolution of the biogenic methane emissions

	2018	2019	2020	Evolution 2018 - 2020
Waste	2.30	2.30	2.95	+28%
Green waste	1.99	1.99	0.50	-74.90%
Wastewater	18.61	19.08	25.74	+38.33%
Total	28.41	28.88	29.19	+27.44%

Table 13: Biogenic methane emissions (tCH₄)

Biogenic methane from green waste was reduced due to the fact that the green waste is now being composted.

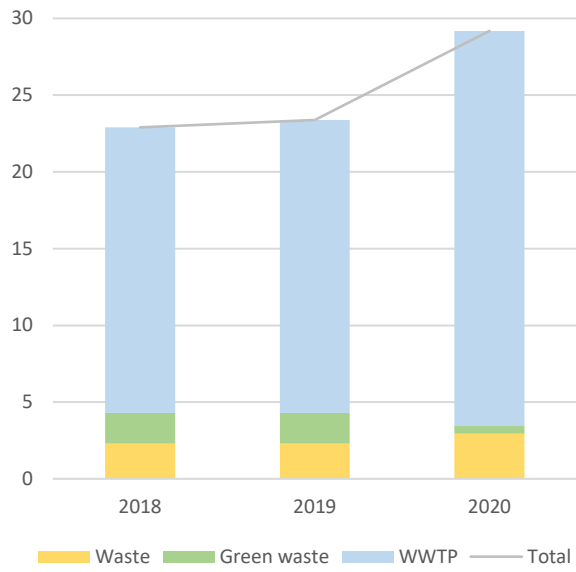


Figure 4: Biogenic methane emissions since 2018

6.2 Emissions for all seven GHGs

The seven GHG included in this inventory are:

- Carbon dioxide: CO₂
- Methane: CH₄
- Nitrous oxide: N₂O
- Hydrofluorocarbons: HFCs
- Perfluorocarbons: PFCs
- Sulfur hexafluoride: SF₆
- Nitrogen trifluoride: NF₃

	2018	2019	2020	Uncertainties
t CO₂ e	367.40	353.13	275.99	[239.21 ; 317.33]
t CO₂	315.66	301.06	214.28	214.28*
t CH₄	30.20	29.84	32.95	[19.73; 48.23]
t N₂O	21.55	22.22	28.76	[5.33 ; 56.81]
t HFCs	0	0	0	0
t PFCs	0	0	0	0
t SF₆	0	0	0	0
t NF₃	0	0	0	0

* Uncertainties exist but are not quantifiable

Table 14: Emissions for all seven GHGs

6.3 Gross emissions by scope, business unit and source

GHG emissions for Carterton District Council for 2020 are provided in the GHG Inventory summary section at the start of this report.

The following figures give an overview of where the gross emissions are occurring across the organisation.

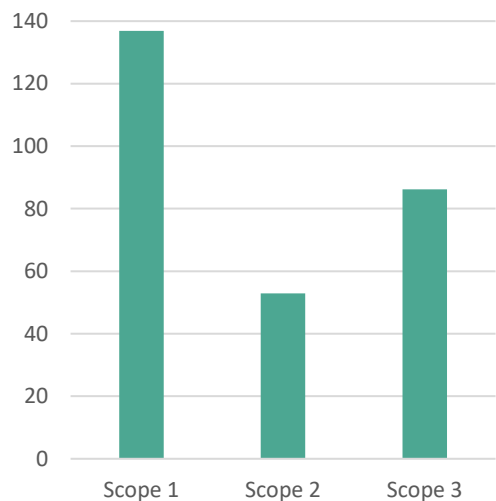


Figure 5: Gross emissions by scope (tCO₂e)

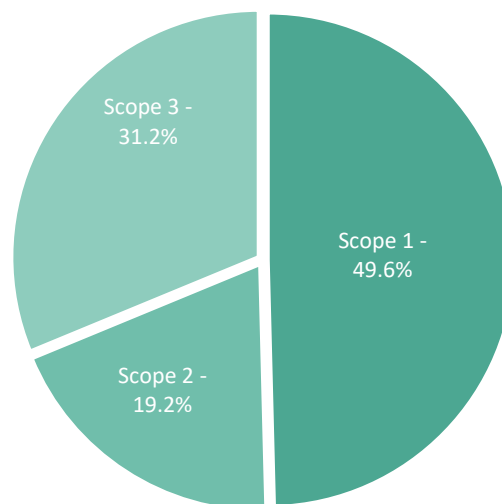


Figure 6: Gross emissions by scope (%)

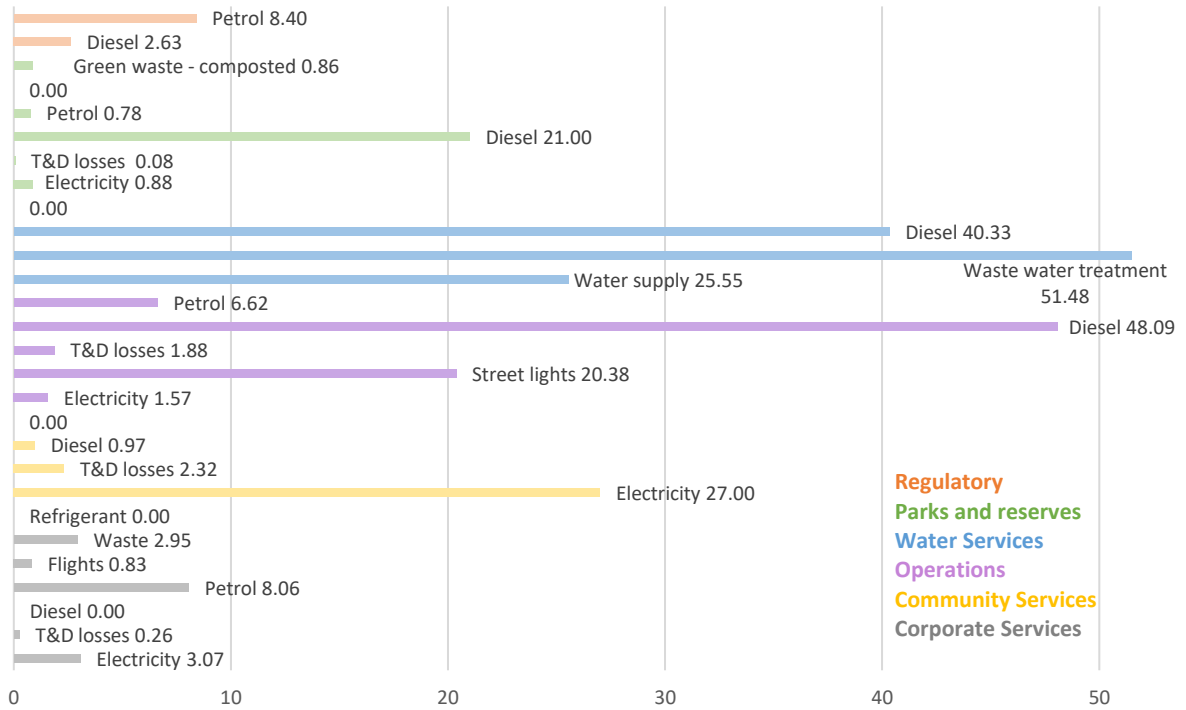


Figure 7: Gross emissions by business unit (tCO₂e)

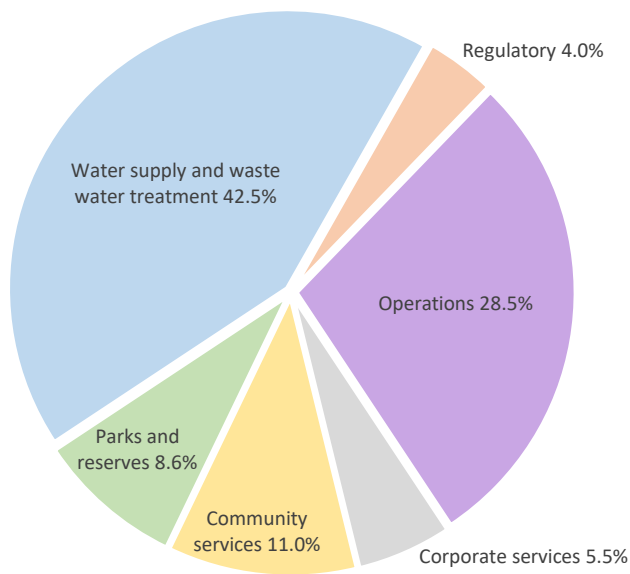


Figure 8: Gross emissions by business unit (%)

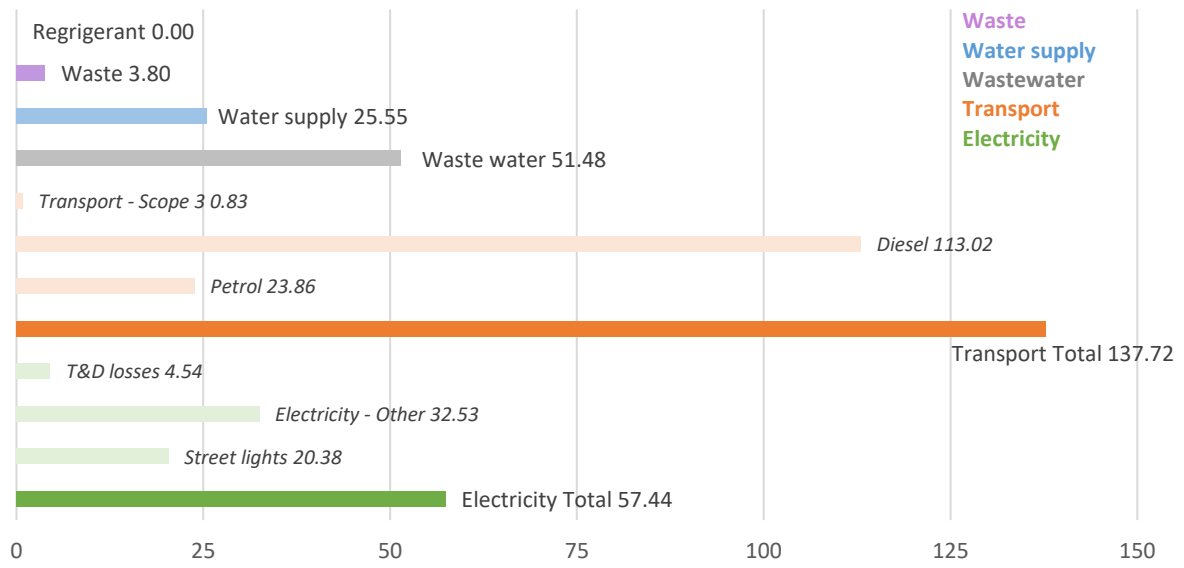


Figure 9: Gross emissions by source (tCO₂e)

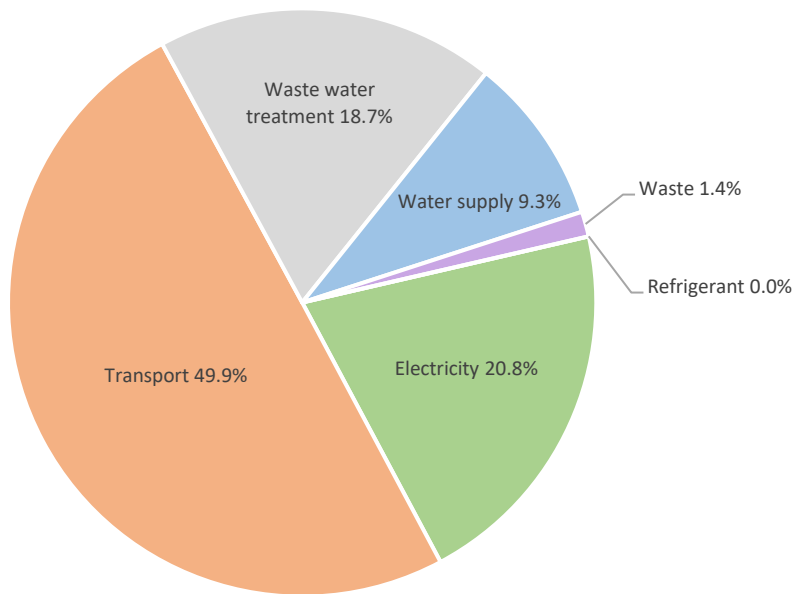


Figure 10: Gross emissions by source (%)

6.4 Emissions from biologically sequestered carbon

Carterton District Council owns a 350-ha forest in the Tararua Range which contains a net stocked area of 262.7 ha. The forest is classified as pre-1990 forest land, and consists mainly of Radiata Pine, with smaller areas of Manuka and cypress:

- Planted forest:
 - Radiata Pine – growth: 212.2 ha
 - Radiata Pine – old: 22.9 ha
 - Cypress – growth: 1.6 ha
- Natural forest:
 - Manuka – Regenerating: 26 ha

There was no harvesting in 2020.

		Units	t CO ₂ e	t CO ₂	t CH ₄	t N ₂ O
Planted forest	Growth	213.8 ha	-7,227.94	-7,227.94	n/a	n/a
	Regenerating	26 ha	-9.46	-9.46	n/a	n/a
Natural forest	Tall	0 ha	0	0	n/a	n/a
	Planted forest	0 ha	0	0	n/a	n/a
Harvest emissions	Native forest	0 ha	0	0	n/a	n/a
	TOTAL		-7,237.39	-7,237.39	n/a	n/a

Table 15: Total CO₂ sequestered and emitted by forestry in 2020

7 Liabilities

7.1 GHG stocks held

HFCs, PFCs and SF₆ represent GHGs with high global warming potentials. Their accidental release could result in a large increase in emissions for the reporting period. Therefore, any GHG stocks are included in the greenhouse gas emissions inventory to identify significant liabilities and implement procedures for minimising the risk of their accidental release.

HFCs, PFCs and SF₆ represent GHGs with high global warming potentials. Their accidental release could result in a large increase in emissions for that year, and therefore the stock holdings are reported in this inventory (Table 16: HFCs, PFCs and SF₆ held by CDC).

Source	Amount held – January 2020	Amount held – December 2020	Potential liability
R410-A	39.1 kg	39.1 kg	81.6 tCO ₂ e
R32	1.27 kg	1.27 kg	0.9 tCO ₂ e
TOTAL			82.5 tCO₂e

Table 16: HFCs, PFCs and SF₆ held by CDC

7.2 Land-use change

Organisations that own land subject to land-use change may achieve sequestration of carbon dioxide through a change in the carbon stock on that land. If a sequestration is claimed, this also represents a liability in future years should fire, flood or other management activities release the stored carbon.

Land-use change has been included in this inventory. CDC owns a 213.8 ha of growing planted forest (mainly Radiata pine), 22.9 ha of old planted forest (Radiata pine) and 26 ha of natural forest (Manuka). The potential liability of the land-use change is 245,606.7 tCO₂e.

	t CO ₂ e	t CO ₂	t CH ₄	t N ₂ O
Carbon emission (deforestation) – Planted forest	224,061.4	224,061.4	n/a	n/a
Carbon emission (deforestation) – Native forest	21,545.3	21,545.3	n/a	n/a
TOTAL	245,606.7	245,606.7	n/a	n/a

Table 17: Potential liability of the land-use change

8 Methodology and references

8.1 Methodology

To do the greenhouse gas inventory, Carterton District Council used the Interactive Workbook made by the Ministry for Environment.

It is possible to download it here: <https://www.mfe.govt.nz/consultation/interactive-workbook-download>

We simply had to input our activity data (such as litres of fuel used, or kWh consumed) in this workbook to measure our greenhouse gas emissions.

This greenhouse gas inventory was made with the factors available in April 2021.

8.2 References

Measuring Emissions: A guide for Organisations – MfE, 2020

The Greenhouse Gas Protocol: A corporate accounting and reporting standard – World Business Council for Sustainable Development and World resources Institute, 2004 (revised)

ISO14064-1:2018. Greenhouse gases – Part 1: Specification with guidance at the organisation level for quantification and reporting of greenhouse gas emissions and removals – International Organization for Standardization, 2018 (revised)

Disclaimer:

The information in this greenhouse gas inventory is true and complete to the best of our knowledge. The calculation method used (MfE workbook and MfE factors), the inclusions and exclusions of this inventory may be different from other inventories and can explain the differences. The author and publisher disclaim any liability in connection with the use of this information.