KAIPARA DISTRICT

Kaipara te Oranganui • Two Oceans Two Harbours

GHG Emissions Report

FY2019

Prepared for Kaipara District Council
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Glossary

Carbon Dioxide Equivalent (CO_2e)	A standard unit for measuring carbon footprints. The impact of each different GHG is expressed in terms of the global warming potential (GWP) of one unit of CO_2. Standard ratios are used to convert gases into equivalent amounts of CO_2; these are based on each gas's GWP.
Carbon Footprint	A measure of the amount of GHGs emitted by an organisation. Typically expressed in terms of CO_2e, and for a 12-month reporting period.
Emission Factor	A metric that converts a specific emission source - such as a litre of diesel - into terms of CO_2 or CO_2e.
Global Warming Potential	A measure of a gas's ability to cause radiative forcing in the atmosphere (or global warming) relative to the ability of CO_2. For example, sulphur hexafluoride has 23,900 times the GWP of CO_2, thus is 23,900 times more potent at contributing to global warming than CO_2.
Greenhouse Gas	Greenhouse gases are gases that influence the way in which the Earth's atmosphere traps heat. Increasing levels of GHGs in the atmosphere are causing the phenomenon of climate change.
Greenhouse Gas Protocol	This Standard provides guidance for companies preparing a GHG emissions inventory. It defines three Scopes (or operational boundaries) for accounting and reporting purposes (explained below).
Scope 1 Emissions	Direct greenhouse gas emissions that occur from sources owned or controlled by KDC, such as emissions from the combustion of diesel in the vehicle fleet.
Scope 2 Emissions	Emissions associated with the purchase of electricity that is consumed by KDC.
Scope 3 Emissions	An optional reporting category that covers all other indirect emissions. These emissions are a consequence of KDC's activities but occur from sources it does not own or control. Examples include the embodied carbon in materials, and business travel.

Executive Summary

Kaipara District Council (KDC) commissioned CarbonEES to calculate its organisational greenhouse gas (GHG) inventory for their financial year FY2018-2019.

This inventory is a calculated estimate of all GHGs emitted as a result of activities under the control of KDC between 1st July 2018 and 30th June 2019.

This report serves to highlight key emission sources for future management, establish a baseline year for the inventory, provide recommendations on carbon reducing opportunities and importantly demonstrate to key stakeholders that the KDC is actively involved in measuring, monitoring, and managing its GHG emissions.

Organisational GHG emissions for KDC for the 2018/19 reporting period are estimated to be **6,019 tonnes carbon dioxide equivalent (tCO_2e).**

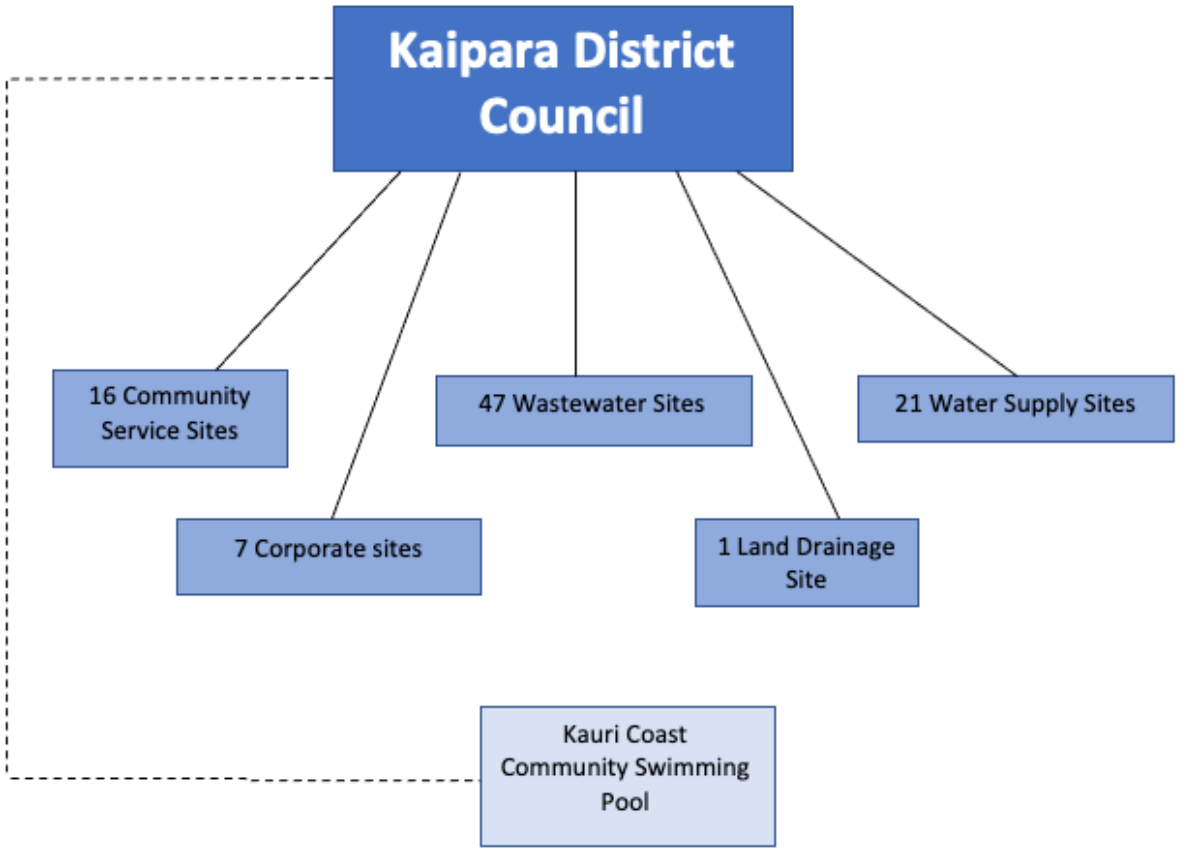
Methodology

The KDC GHG Emissions Report was developed in accordance with the "Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard" (2004). The emissions calculations for Scope 3 emission sources were informed by "Corporate Value Chain (Scope 3) Accounting and Reporting Standard" (2011). The terms used in this report are explained in the Glossary.

Boundary

The geographic boundary of the KDC is defined by the location of KDC's facilities. The organisational boundary follows an operational control approach. As such, this emissions inventory includes all sources associated with activities KDC had operational control over in the period 1st July 2018 to 30th June 2019.

Figure 1 - KDC facilities within the organisational boundary



Results

Overall, it was estimated that total GHG emissions from KDC were 6,019 tonnes of CO_2e from 2018/19.

Most of the emissions are a result of Capital goods (52%), Purchased goods and services (19%) and Waste generated in operations (16%).

A high-level breakdown of the emission sources and their related emissions is provided below.

Figure 2 – Top emissions sources and their related emissions

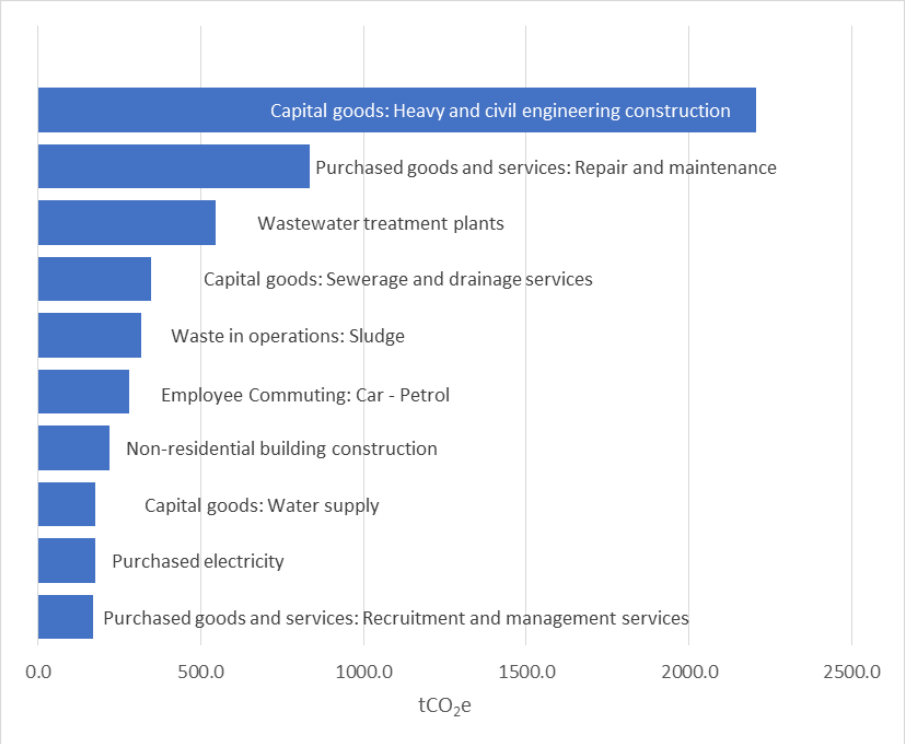


Table 1 – Emissions by scope and their proportions

Scope	tCO_2e	% of total
Scope 1 – Direct Emissions	717	12%
Scope 2 – Indirect Emissions	175	3%
Scope 3 – Other Indirect Emissions	5,126	85%
Total	**6,019**	**tCO_2e**

Opportunities and Recommendations

We see opportunities to reduce organisational emissions around Wastewater Treatment, Vehicle Fleet emissions, Sustainable Procurement, and Employee Commuting.

We recommend:

- Gathering primary Wastewater Treatment emissions data via direct methane emission measurements, then exploring process improvements and the possibility of gas capture and flaring. Additionally, exploring alternative sludge disposal methods.
- Completing vehicle use study to gather a better understanding of how existing vehicles are being used so that council can optimise its vehicle fleet and then look to purchase lower emissions vehicles.
- Implement Sustainable Procurement policies and guidelines to select relevant providers and to require larger contract providers to estimate and report their Scope 1 and Scope 2 emissions (at a minimum) and demonstrate their reduction performance.

1.0 Introduction

KDC has commissioned CarbonEES in October 2019 to calculate its organisational greenhouse gas (GHG) inventory for their financial year 2018/2019. This report contains the results and discussion around that assessment and provides recommendations on possible GHG emission reduction measures.

This GHG inventory is a calculated estimate of all GHGs emitted as a result of activities under the control of the KDC between 1st July 2018 and 30th June 2019.

There are objectives to this foot-printing project are to:

- Provide information to the KDC on their overall organisational GHG emissions for Scope 1, 2 and 3 emission sources.
- Highlight key emission sources for future management.
- Recommend high level actions that would enable the KDC to reduce its emissions.
- Provide a GHG emissions baseline to measure future performance against and to provide the context to set an organisational emissions target.

2.0 Methodology

This assessment follows the guidelines in the Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, published by the World Business Council for Sustainable Development and the World Resources Institute, 2004. This section covers the following areas: boundary definition and exclusions, emission factors, activity data, assumptions, and limitations.

Figure 3 – KDC geographic boundary

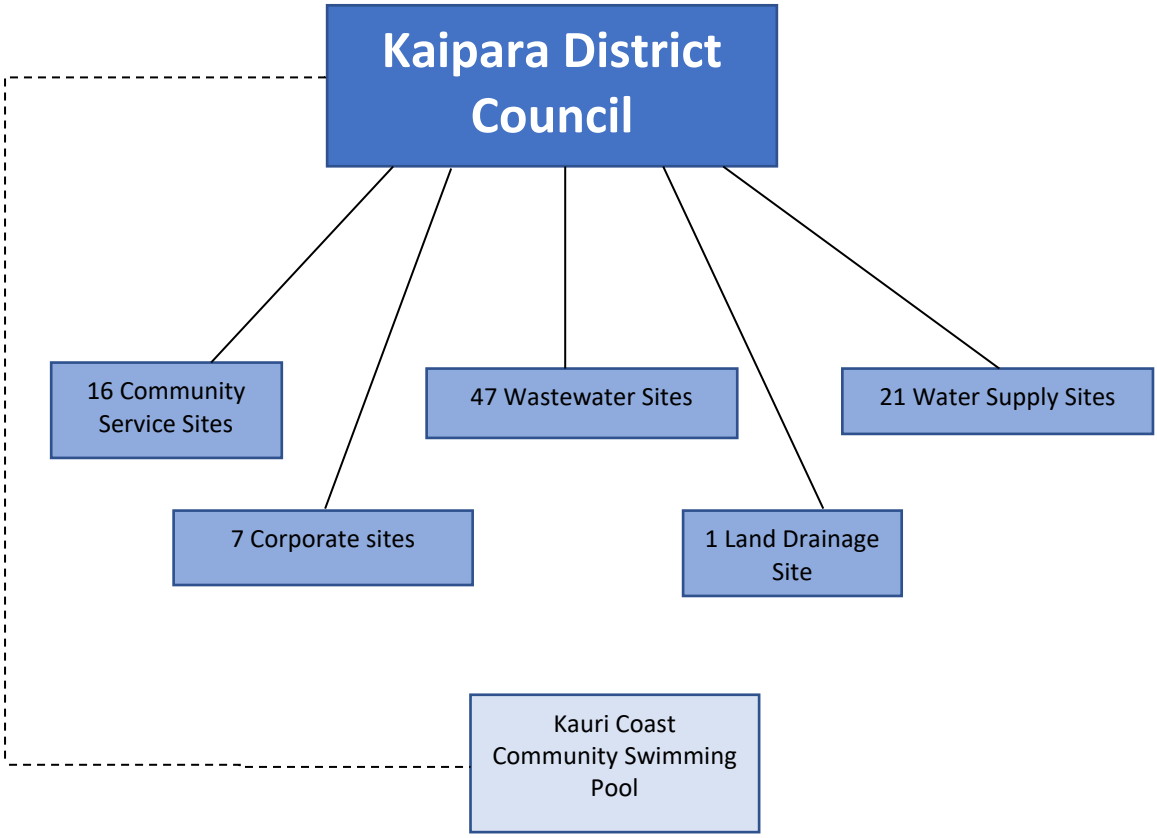
2.1 Organisational Boundary

When undertaking an emissions inventory study, it is essential to first establish the organisational boundary for the inventory. In this study, the organisational boundary is defined using the operational control approach.

As such, this emissions inventory includes all sources and sinks associated with activities where KDC has control and the full authority to introduce and implement its operating policies.

Figure 4 illustrates the organisational boundaries as defined in this report. KDC has sites for which it has operational control as shown with the sites with the solid lines, and sites for which it has an equity share but no operational control as shown by the broken line. The Kauri Coast Community Swimming pool is excluded from the operational boundary due to lack of operational control.

Figure 4 - KDC activities and other groups defined within the organisational boundary.



2.1.1 Exclusions

The following emissions have been excluded from the organisational carbon footprint.

Table 2 - Emission sources excluded from KDC footprint.

Potential emission source	Reason for Exclusion
Fugitive emissions from vehicles (Scope 1)	Consumption data unavailable. These emissions are assumed to be insignificant.
Upstream leased assets (i.e., assets leased by 3rd parties - Scope 3, Category 8)	No operational control.
Downstream transportation and distribution (Scope 3, Category 9)	Not applicable as KDC pays for the transportation and distribution of its sold golds. They are reported under Category 4.
Processing of sold products (Scope 3, Category 10)	Not applicable.
Use of sold products (Scope 3, Category 11)	Not applicable.
End-of-life treatment of sold products (Scope 3, Category 12)	Not applicable.
Downstream leased assets (i.e., assets leased to 3rd parties – Scope 3, Category 13)	No operational control.
Franchises (Scope 3, Category 14)	Not applicable.
Investments (Scope 3, Category 15)	No operational control.

2.2 Operational Boundary

Within the organisational boundary, an operational boundary of emission sources or activities is then defined. Using the operational control approach, all direct emission sources within the organisational boundary defined above are reported as Scope 1, with all remaining emissions reported as Scope 2 or 3 emissions. The table below provides more explanation on the concept of Scope.

Table 3 - Scopes as defined in the Greenhouse Gas Protocol

	Definition	Example
Scope 1: Direct emissions	Direct emissions that occur from sources owned or controlled by KDC	The combustion of fuels in the vehicle fleet
Scope 2: Electricity indirect emissions	Emissions associated with the generation of electricity that is purchased by KDC	Electricity consumed in KDC buildings
Scope 3: Other indirect emissions	Emissions that are a consequence of KDC's activities, but from sources they do not own or control	Business taxi and air travel

2.3 Inventory Emission Sources, Emission Factors and Activity Data

This section describes the activities covered within each Scope. A brief description is provided on each activity, covering where activity data was collected and where emission factors were sourced, along with a comment on the data quality (see Appendix A for details). Emission factors all include the 7 greenhouse gases (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6 and NF_3) in accordance with requirements under the GHG Protocol. Emission factors are derived from a range of sources, principally from MfE (2020) with missing factors acquired from DEFRA (2019), Motu (2014), NZ Post (2020) and Liu H. (2018). The individual sources are provided in the accompanying Excel spreadsheet.

2.3.1 Scope 1 Direct Emissions

Mobile Fuel Combustion

KDC has both petrol and diesel vehicles in its fleet. Fuel consumption data has been provided by BP and Z Energy. Emission factors were taken from MfE (2020). Both activity data and emission factors are considered to be of a high quality (M1).

Wastewater Treatment

KDC owns and operates the Mangawhai, Dargaville, Glinks Gully, Kaiwaka, Maungatoroto and Te Kopuru Wastewater Treatment plants. The process emissions (CH_4, N_2O) were estimated using Population based estimated, MfE (2020). Input data was provided by KDC and Stats NZ. The quality of this data is satisfactory (E2/E3).

Stationary Fuel Combustion

KDC burns LPG at its facilities for heating. Fuel consumption data has been provided by Gas and Tyre. Emission factors were taken from MfE (2020). Both activity data and emission factors are considered to be of a high quality (M1).

2.3.2 Scope 2 Indirect Emissions

Purchased Electricity

Electricity is used at all KDC sites for Pump, Water Treatment, Wastewater, Community Service and Corporate sites. Electricity consumption data has been provided by Genesis Energy and by KDC. Emission factors were provided by MfE (2020) for the 2018 calendar year. Both activity data and emission factors are considered to be of a high quality (M1).

2.3.3 Scope 3 Other Indirect Emissions

Purchased Goods and Services and Capital Goods

Activity data for these Scope 3 indirect emission sources are extracted from the KDC's annual report (except for purchased paper, which was provided by Office Max). Emissions under this category were estimated based on Motu (2014) emissions factors for average industry sectors and activities in New Zealand. Emissions from purchased paper were calculated using an DEFRA (2019) emission factor. The quality of this data is considered to be satisfactory (E2).

Fuel and Energy-Related Activities

As this category estimates the upstream emissions from fuel and energy use, activity data is the same as the relevant Scope 1 and 2 emissions sources (Electricity, Petrol, Diesel) already mentioned. Emissions factors were from MfE (2020) and DEFRA (2019). This data is considered to be of a high quality (M1).

Upstream Transportation and Distribution

These are the emissions from mail and courier packages sent by KDC. The consumption data and emission factors were provided by NZ Post (2020). Both activity data and emission factors are considered to be of a satisfactory (M2).

Waste Generated in Operations

Primary data for waste generated in KDC operations was unavailable. However, an estimate of waste generating in operations was made using workdays of full-time employees (FTE) during the reporting period. Emission factors were provided by MfE (2020). Activity data is seen as satisfactory, and the emission factors is of high quality (E2).

Business Travel

Air Travel – data for Domestic Air Travel has been provided by KDC. The emissions factor was sourced from MfE (2020). Both activity data and emission factors are of a high quality (M1).

Hotel Accommodation - room nights were also provided by KDC. Emissions factor was sourced from MfE (2020). Both activity data and emission factors are of a high quality (M1).

Business Travel in Personal Vehicles – Activity data was provided by KDC. Emissions factors were sourced from MfE (2020). Both activity data and emission factors are of a high quality (M1).

Employee Commuting

A voluntary staff survey (n=90) was carried out to estimate the emissions from employee commuting. Given that the survey was voluntary, and participants were not randomised there maybe be some bias towards those who are environmentally conscious. With that in mind, the response rate was high, and the sample size was roughly 73% of the full-time employees. Emissions factors for each mode of commute was sourced from MfE (2020). The quality of this data is satisfactory (E2).

3.0 Results

This section presents the results of this GHG Emissions Inventory. It offers a broad overview covering all the activities or groups combined and a detailed review at each individual activity or group. It concludes with a focus on each of the key emission sources.

3.1 All Activities and Scopes

In 2018/19, KDC's total GHG emissions is calculated as 6,019 tonnes CO_2e, of which 717 tonnes are direct emissions (Scope 1), 175 tonnes are from electricity indirect emissions (Scope 2) and 5,126 tonnes are indirect Scope 3 emissions.

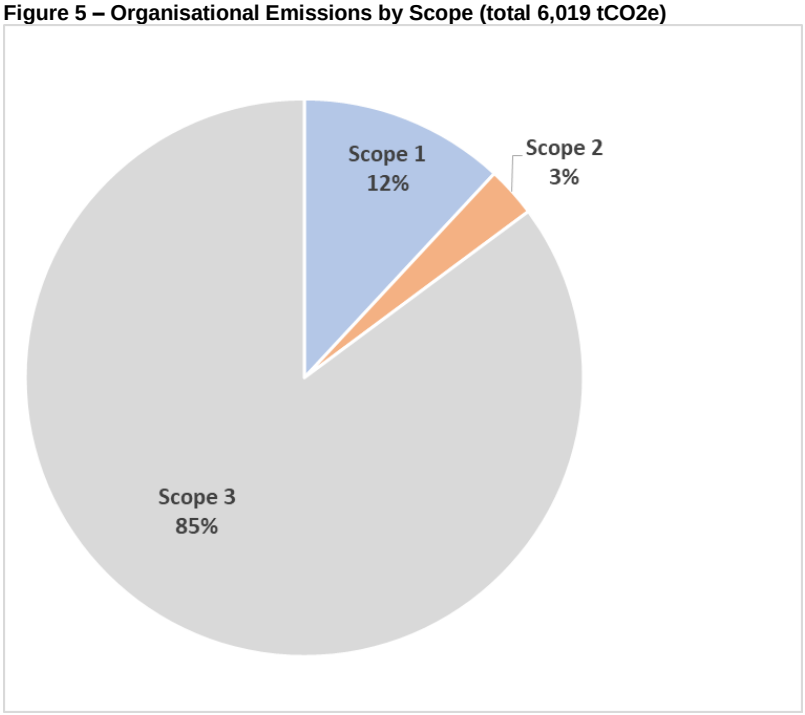
Table 4 – Emissions sources and their related emissions

Source	tCO_2e	% of total
Scope 1		
Mobile Fuel Combustion (Diesel, Petrol)	169	2.8%
Wastewater Treatment Plants	545	9.1%
Stationary Fuel Consumption (LPG)	3	0.1%
Scope 2		
Purchased Electricity	175	2.9%
Scope 3		
Purchased goods and services	1,332	22%
Capital goods	3,088	51%
Fuel and energy-related activities	55	0.9%
Upstream Transportation and Distribution	5	0.1%
Waste generated in operations	320	5.3%
Business travel	33	0.5%
Employee commuting	292	4.9%
Total	**6,019**	**tCO_2e**

3.2 Organisational Emissions

The majority of KDC's organisational emissions are Scope 3 (85%), followed by Scope 1 emissions (12%) and Scope 2 emissions (3%). As shown in the breakdowns below, Capital Goods (Scope 3) are the largest emissions source followed by Purchased Goods and Services (Scope 3).

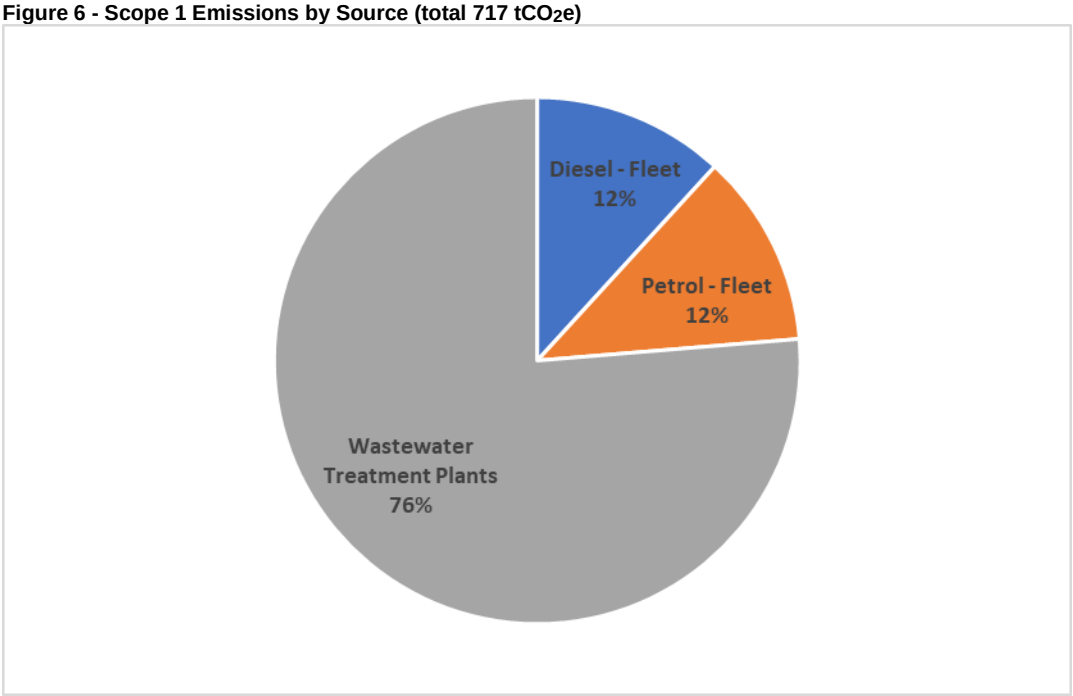
Figure 5 – Organisational Emissions by Scope (total 6,019 tCO2e)



3.2.1 Scope 1 Emissions

Scope 1 emissions represent the second largest source of emissions, accounting for 12% of the overall footprint. Most of these Scope 1 direct emissions are process emissions from the wastewater treatment plants followed by petrol and then diesel consumption in council vehicles, and lastly, by stationary LPG fuel consumption.

Figure 6 - Scope 1 Emissions by Source (total 717 tCO_2e)

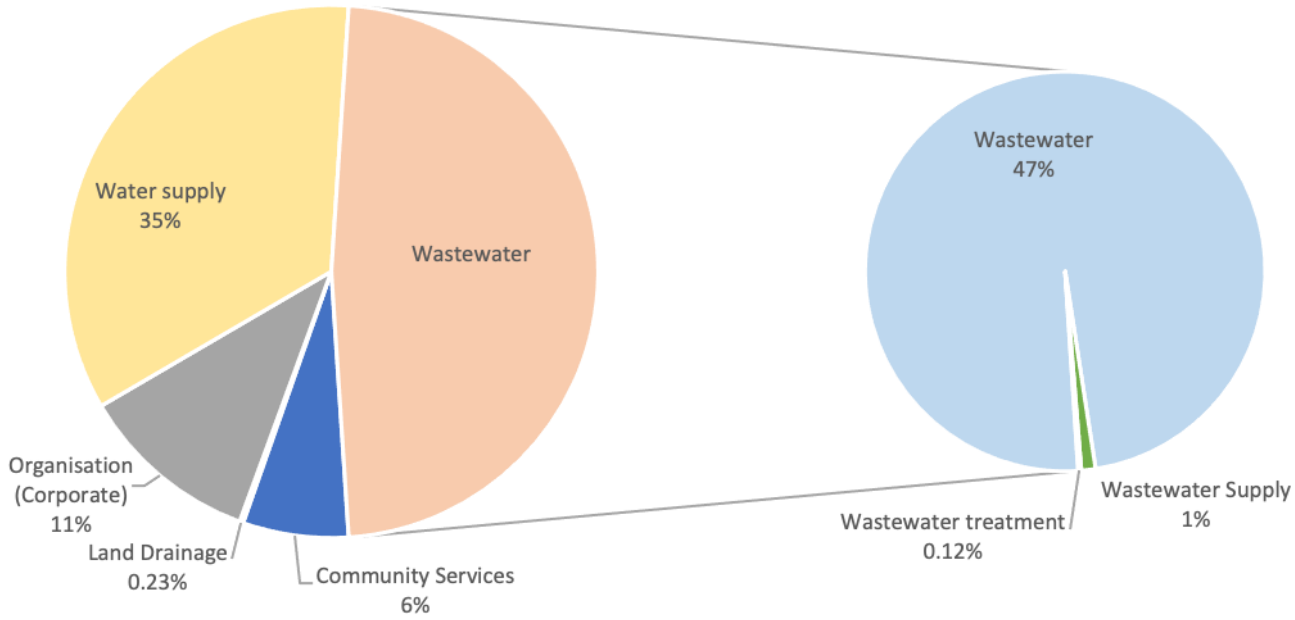


3.2.2 Scope 2 Emissions

Scope 2 emissions are from purchased electricity at all sites.

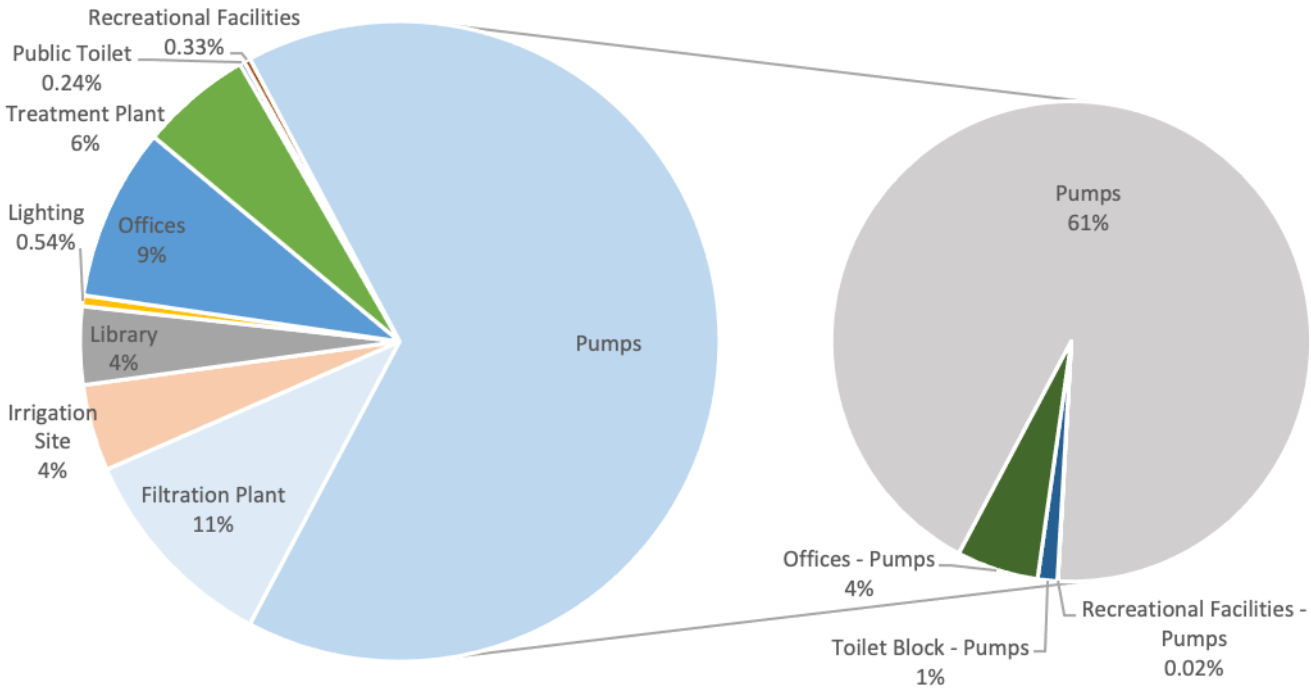
As shown in Figure 7, most of the Scope 2 emissions come from the electricity consumed by the Wastewater sites (48%) followed by Water supply sites (35%) and Corporate sites (11%). Community services (6%) and Land Drainage (0.23%) sites make up the remainder.

Figure 7 - Scope 2 Emissions by Site Type (total 175 tCO_2e)



When organised by site function Pumps produce most of the scope 2 emissions (66%) followed by Filtration Plant (11%) and Offices (9%). Treatment Plants (6%), Libraries (4%), Irrigation (4%), Lighting (0.54%), Recreational Facilities (0.33%) and Public Toilets (0.24%) make up the remainder.

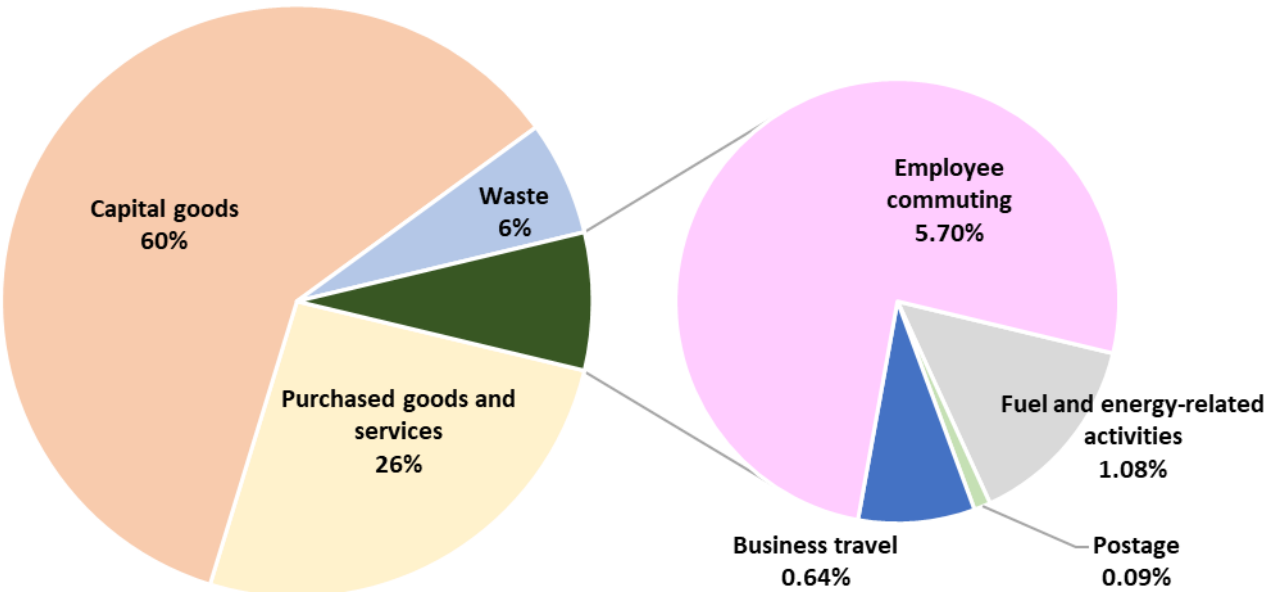
Figure 8 - Scope 2 Emissions by Site Function (total 175 tCO_2e)



3.2.3 Scope 3 Emissions

Scope 3 emissions are the other indirect emissions from KDC's activities, resulting in 5,125 tCO_2e or 85% of the total emissions of KDC.

Figure 9 - Scope 3 Emissions by Category (total 5,125 tCO_2e)



Capital goods (60%) represent the largest Scope 3 emission source followed by Purchased goods and services (26%). Five additional sources make up the remainder of Scope 3 emissions including Waste (6%), Employee commuting (5.70%), Fuel and energy-related activities (1.08%), Business travel (0.64%) and Postage (0.09%).

Figure 10 – Emissions from Capital goods (Category 2) by spend type (total 3,088 tCO_2e)

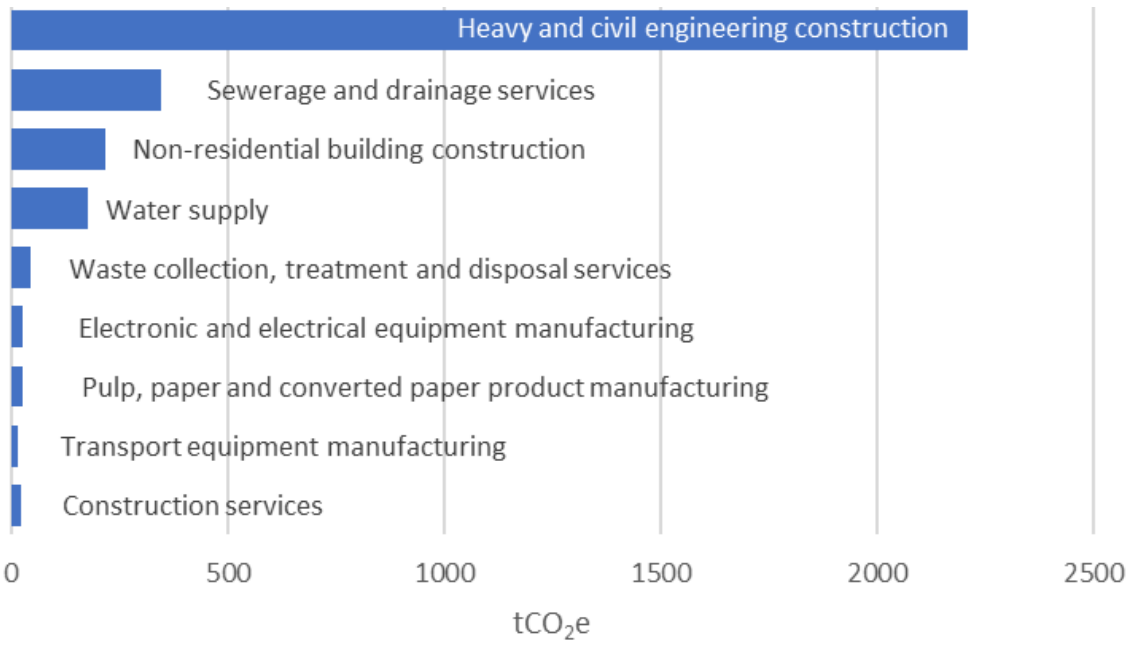
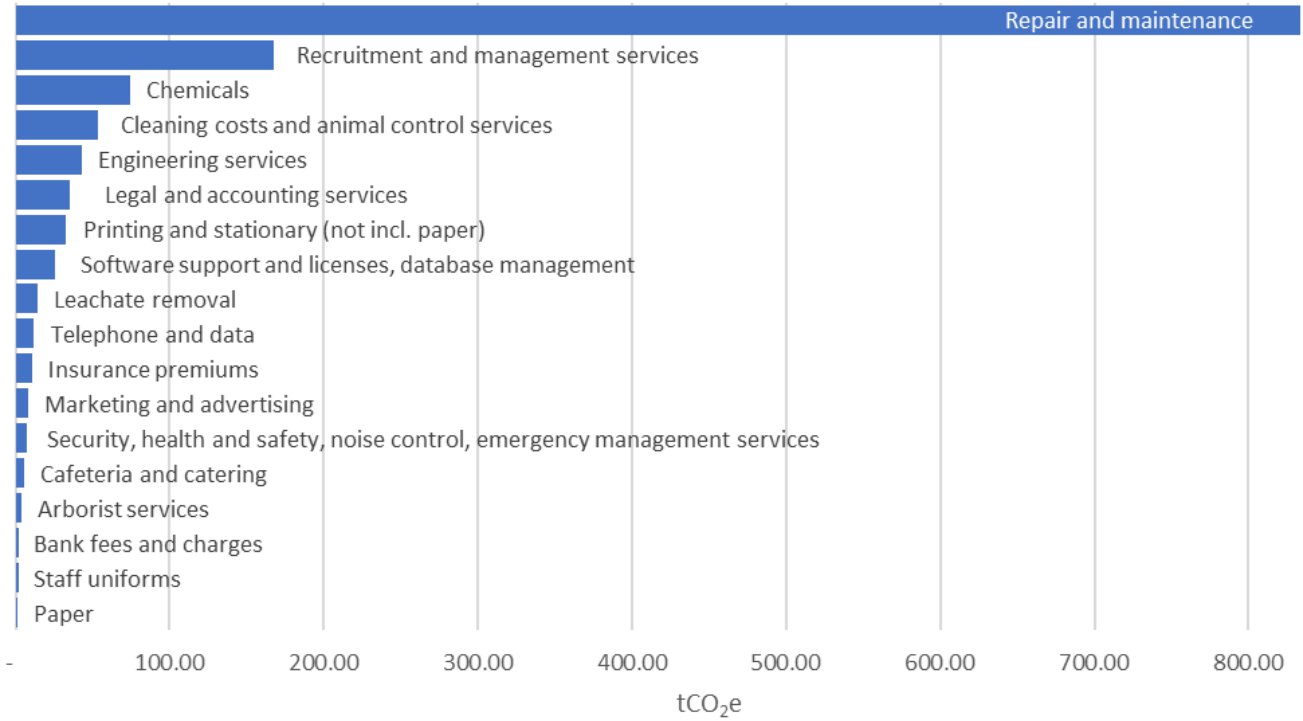


Figure 11 – Emissions from Purchased goods and services (Category 1) by spend type (total 1,332 tCO_2e)



4.0 GHG Emissions Reduction Opportunities

This section describes a range of GHG emission reduction opportunities that KDC might consider implementing. In many cases, there will be financial savings or other economic benefits associated with implementing these recommendations.

4.1 Reduce Wastewater Treatment Emissions

The third largest source of Kaipara District Council's GHG emissions is from Wastewater Treatment with 9.1% of the overall footprint. Wastewater Treatment emissions are direct emissions source (Scope 1), so council has operational control over how these sites are run.

In addition, there are the indirect emissions from the sludge being sent to landfill (Scope 3, Category 5) which account for a further 6% of the footprint. Combined direct and indirect emissions from Wastewater Treatment equate to 15.6% of the footprint.

Wastewater Treatment emissions can be reduced by reducing the inflows and improving treatment methods. However, reducing wastewater inflows may be limited to working with a few large industrial users, therefore, most of the councils' efforts should be focused towards reducing treatment emissions.

We recommend looking at opportunities to reduce treatment emissions by first gathering primary data via direct methane emission measurements, then exploring process improvements and the possibility of gas capture and flaring. Additionally, council may wish to explore alternative sludge disposal methods that do not produce as much GHG emissions. These may include using the sludge for fertiliser or composing.

4.2 Reduce Vehicle Fleet Emissions

Direct emissions from vehicle fleet emissions were 2.9% of the total footprint. Additionally, there are the indirect emissions from fuel use which account for a further 0.7% of the footprint. In total emissions from vehicle fleet are 3.57% of the footprint.

We recommend starting with a vehicle use study to gather a better understanding of how existing vehicles are being used so that council can optimise its fleet use before looking to upgrade its vehicles with lower emission alternatives such as hybrid and electric vehicles.

4.3 Implement Sustainable Procurement Policies

48% of council emissions were generated from capital goods (Scope 3, Category 2) during the financial year. These include emissions from construction and other assets added to the council's balance sheet during the financial year.

Additionally, 22% of council emissions were from purchased goods and services (Scope 3, Category 1). These includes the councils' operational and maintenance contracts that are not reported in Scope 1 & 2 emissions.

We recommend using sustainable procurement policies and guidelines to select relevant providers and to require larger contract providers to estimate and report their Scope 1 and Scope 2 emissions (at a minimum) and demonstrate their reduction performance.

4.3 Reduce Employee Commuting Emissions

The fourth largest source of council emissions were from employee commuting (Scope 3, Category 7), 4.9% of the total footprint. To reduce these emissions council could encourage employees to consider the emissions from their commuting method by encouraging (possibly incentivising) low emissions commuting such as carpooling. Council should continue to offer work-from-home flexibility to employees, and to support staff to hold virtual meetings where appropriate. EECA has modelled the impact of working from home.

5.0 Discussion

5.1 Emission reduction targets

Now that Kaipara District Council has completed their first GHG Inventory and has a baseline of their GHG emissions, the next step for Kaipara District Council is to set an organisational (council wide) GHG emissions reduction target.

We recommend that the council set a target in line with our national target of net zero emissions by 2050 as outlined in the Climate Change Response (Zero Carbon) Amendment Bill.

This would require council to focus on primarily on reducing gross emissions as the price of offsets will likely continue to rise. This means that council should invest in low emission infrastructure today to reduce future offsetting obligations.

6.0 References

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Appendix A: Data quality

Data Quality

The table below describes the data quality indicators used in the above sections. Explanations of these terms are provided below.

Data management	Data collection		
	Measured	Derived	Estimated
Robust	M1	D1	E1
Satisfactory	M2	D2	E2
Questionable	M3	D3	E3

Measured = Data directly provided by a service provider, contractor or directly obtained from a monitoring device. For example, electricity invoices, contractor receipts, emissions monitoring equipment, incident reports, consultant reports etc.

Derived = Data obtained from calculations, mass balances, use of physical/chemical properties, use of coefficients and emission factors etc., for example converting cubic meters of waste into tonnes.

Estimated = Usually, where there is no other available method for obtaining the data. Such data could be prorated on previous results, use of precedents or historical data, or even a calculated guess.

Robust = Evidence of sound, mature and correct reporting system, where room for error is negligible.
Examples would include use of spreadsheets, databases, and on-line reporting.

Satisfactory = Examples would include manual, but structured keeping of records, files, and results.
Some potential for error or loss of data.

Questionable = No logical or structured approach to data or record keeping. High potential for error &/or loss of data. Data may appear to differ from those initially reported.