

# FY21 Greenhouse Gas Inventory Report

Prepared in accordance with  
the Greenhouse Gas Protocol  
and ISO 14064-1-2018



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DISTRICT**

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# Greenhouse Gas Emissions Inventory Summary

## Purpose of this report and limitations

Kaipara District Council (KDC) commissioned CarbonEES® to calculate its organisational greenhouse gas (GHG) inventory for its financial year 2020-2021 (FY21).

The purpose of this report is to transparently disclose KDC's GHG emissions, how they are quantified, how KDC is tracking towards their emissions reduction targets, and suggest further actions that KDC can consider in their decarbonisation plan.

This report was prepared in accordance with the requirements of international standards **ISO 14064-1:2018** and the **GHG Protocol**. Using recognised and widely adopted frameworks for carbon reporting ensures transparency and consistency.

In Financial Year 2020-2021 (FY21), Kaipara District Council's (KDC) total GHG emissions were **10,821 tonnes of CO<sub>2</sub>e (tCO<sub>2</sub>e)**, across ISO 14064-1:2018 Categories 1, 2, 3 and 4. This is an **80%** increase from FY19, KDC's base year. **Wastewater Treatment Plants** accounted for most of KDC's GHG emissions (43%), followed by **Capital Goods** (30%) and **Purchased Goods and Services** (19%). Figure 1 shows a percentage breakdown of each emissions category. Table 1 summarises annual emissions by category. Table 2 shows the specific greenhouse gases emitted from each category. Table 3 summarises all emission sources for FY22, highlighting changes from the FY19 baseline. Table 4 breaks down emissions by Business Groups.

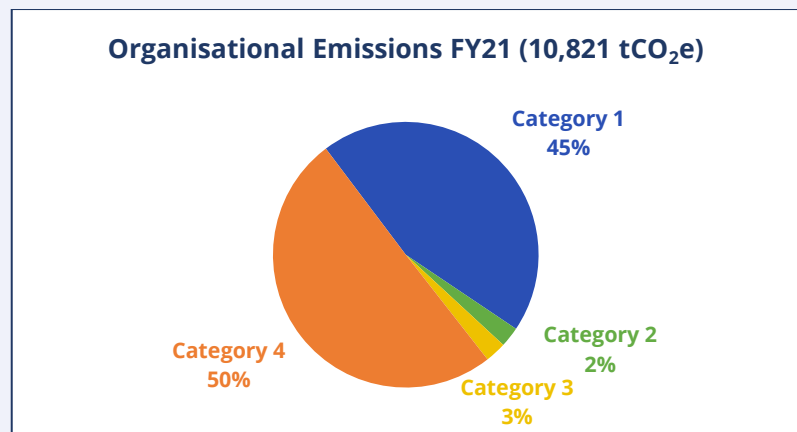


Figure 1: Overall Emissions FY21 (10,821 tCO<sub>2</sub>e)

Table 1: Emissions trend by Category in tCO<sub>2</sub>e

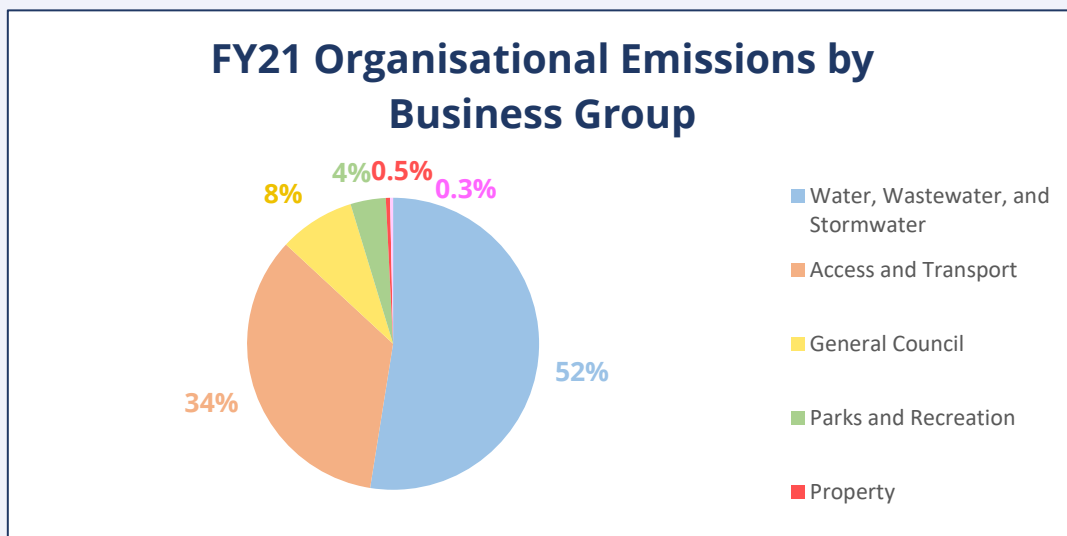
Emissions Category	FY19	FY21	Change from FY19 Baseline
Category 1	717	4,831	574%
Category 2	175	267	52%
Category 3	370	278	25%
Category 4	4,756	5,445	14%
<b>Total</b>	<b>6,019</b>	<b>10,821</b>	<b>80%</b>

Table 2: Emissions by greenhouse gas in tCO<sub>2</sub>e. \* gas broken down as tCO<sub>2</sub>e where no breakdown of the emissions factor by gas is available.

Emissions Category	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	Total tCO <sub>2</sub> e
Category 1	336	3,738	756	4,831
Category 2	260	6	1	267
Category 3*	268	3	7	278
Category 4*	5,369	76	0	5,445
<b>Total</b>	<b>6,233</b>	<b>3,823</b>	<b>764</b>	<b>10,821</b>

**Table 3:** GHG Inventory by Category in tCO<sub>2</sub>e. Colours indicate changes from baseline FY19.

Emissions Category	FY19	FY22
<b>Category 1</b>		
Mobile Fuel Consumption (Fleet)	169	160
LPG	3	1
Wastewater Treatment Plants	545	4,671
<b>Subtotal</b>	<b>717</b>	<b>4,832</b>
<b>Category 2</b>		
Purchased Electricity	175	267
<b>Subtotal</b>	<b>175</b>	<b>267</b>
<b>Category 3</b>		
Freight Transportation and Distribution	5	9
Business Travel and Accommodation	33	14
Employee Commuting and Working from Home	292	216
Upstream Emissions from Fuel Production and Distribution	40	38
<b>Subtotal</b>	<b>370</b>	<b>278</b>
<b>Category 4</b>		
Purchased Goods and Services	1,332	2,084
Capital Goods	3,088	3,261
Imported Energy Transmission and Distribution Losses	15	24
Waste Generated in Operations	320	76
<b>Subtotal</b>	<b>4,756</b>	<b>5,445</b>
<b>Total</b>	<b>6,019</b>	<b>10,821</b>

**Figure 2:** Organisational emissions by Business Group

**Table 4: GHG Inventory by Business Group in tCO<sub>2e</sub>**

Source	KDC - tCO <sub>2e</sub>	% of total
<b>Access and Transport</b>		
Capital goods	2549	24%
Imported Energy Transmissions and Distribution Losses	2	<1%
Purchased electricity	27	<1%
Purchased goods and services	1143	11%
<b>Subtotal Access and Transport</b>	<b>3721</b>	<b>34%</b>
<b>General Council</b>		
Business Travel	14	<1%
Capital goods	100	1%
Diesel - Fleet	100	1%
Downstream Transportation and Distribution	5	<1%
Employee commuting	216	2%
Imported Energy Transmissions and Distribution Losses	2	<1%
Petrol - Fleet	51	<1%
Purchased electricity	24	<1%
Purchased goods and services	354	3%
Upstream Emissions from Fuel Production and Distribution	36	<1%
Waste generated in operations	6	<1%
<b>Subtotal General Council</b>	<b>909</b>	<b>8%</b>
<b>General Infrastructure</b>		
Diesel from waste to landfill transport	9	<1%
Imported Energy Transmissions and Distribution Losses	0.3	<1%
Purchased electricity	3	<1%
Purchased goods and services	22	<1%
Upstream Emissions from Fuel Production and Distribution	2	<1%
<b>Subtotal General Infrastructure</b>	<b>36</b>	<b>&lt;1%</b>
<b>Parks and Recreation</b>		
Capital goods	132	1%
Imported Energy Transmissions and Distribution Losses	0.4	<1%
LPG - Stationary	1	<1%
Purchased electricity	5	<1%
Purchased goods and services	285	3%
<b>Subtotal Parks and Recreation</b>	<b>423</b>	<b>4%</b>
<b>Property</b>		
Capital goods	24	<1%
Imported Energy Transmissions and Distribution Losses	0.3	<1%
Purchased electricity	3	<1%
Purchased goods and services	23	<1%
<b>Subtotal Property</b>	<b>51</b>	<b>&lt;1%</b>
<b>Water, Wastewater, and Stormwater</b>		
Capital goods	455	4.21%
Downstream Transportation and Distribution	4	<1%
Imported Energy Transmissions and Distribution Losses	19	<1%
Purchased electricity	204	2%
Purchased goods and services	258	2%
Waste generated in operations	70	<1%
Wastewater Treatment Plants	4671	43%
<b>Subtotal Water, Wastewater, and Stormwater</b>	<b>5681</b>	<b>52%</b>
<b>Total</b>	<b>10,821</b>	<b>t CO<sub>2e</sub></b>

## 1.0 Introduction

This report is the annual greenhouse gas (GHG) inventory report for Kaipara District Council (KDC) for the period 01<sup>st</sup> July 2020 to 30<sup>th</sup> June 2021. KDC commissioned **CarbonEES®** in May 2022 to calculate its organisational greenhouse gas (GHG) inventory for the financial year, FY21.

A GHG inventory is a list of emission sources and their associated emissions, quantified using standardised methods. The emissions included in this GHG inventory are emitted due to activities under the operational control of KDC in FY21.

The purpose of this report is to transparently disclose these GHG emissions, how they are quantified and how KDC is tracking towards their emissions reduction targets. This report also suggests further actions that KDC can consider in their decarbonisation plan.

### 1.1 Statement of Intent

**CarbonEES®** is committed to preparing transparent and consistent carbon accounting and reporting in line with global best-practice. Therefore, KDC's GHG inventory has been prepared in accordance with the requirements of ISO 14064-1:2018 and informed by the GHG Protocol.

This report specifically relates to the emissions of KDC and has been prepared as part of their carbon reduction journey. To ensure this report is fit for purpose, KDC has identified its intended use cases and intended users. These have been listed in Table 5 and have informed how **CarbonEES®** formulated this report.

**Table 5:** KDC's Intended Use Cases and Intended Users for this GHG Inventory Report

Intended use cases of this GHG Inventory Report	Intended users of this GHG Inventory Report
- To understand KDC's emissions profile and track the progress of the impact of future actions to reduce KDC's organisational carbon footprint.	- KDC officers and executive leadership.
- To communicate accordingly with staff, the public, and other stakeholders.	- KDC elected member and mana whenua representatives.
- To prepare for the likely future introduction of mandatory reporting.	- The general public.
	- Auditors.



## 1.2 Description of Kaipara District Council

### ISO 14064-1-2018, 9.3.1 (a) and 9.3.2 (a)

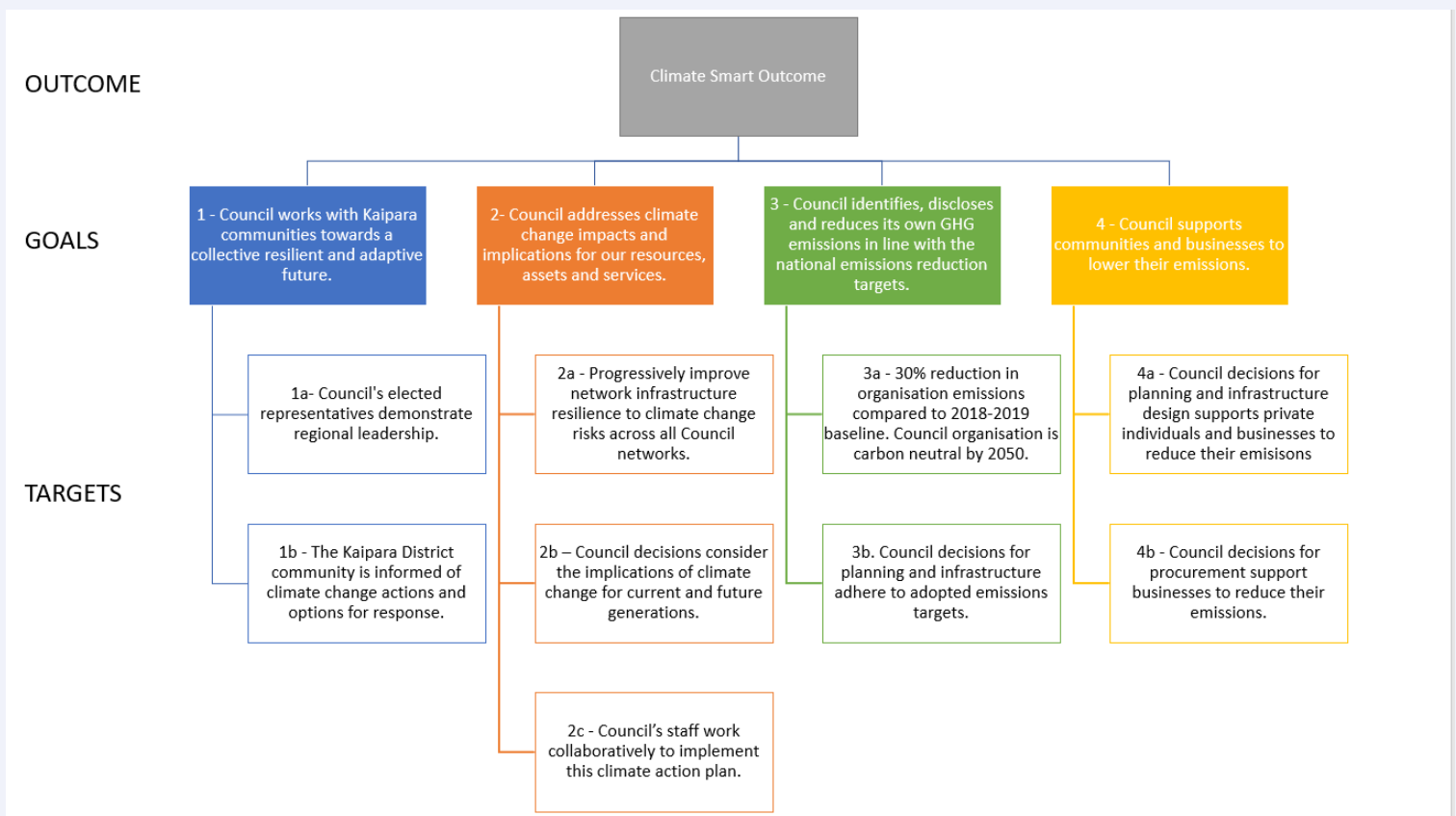
Kaipara District Council (KDC) is the territorial authority for the Kaipara district of Aotearoa-New Zealand. The council's role is to provide local leadership and facilitate the delivery of services and activities that promote community well-being throughout the Kaipara District.

#### 1.2.1 KDC's Decarbonisation Plan

KDC have a target to reduce their emissions compared to their baseline by 30% by 2031. They also have the goal of having net zero emissions by 2050.

KDC's decarbonisation work sits within the Climate Action Plan. The Climate Action Plan has a series of targets that help meet Council's adopted climate change goals and climate smart community outcome.

*Figure 3: KDC's Climate Action Plan*



Phase 1 of the Climate Action Plan was completed in 2022. Phase 1 covers internal, operational actions that help get KDC's "house in order".

There are currently 26 actions covering:

- Advocacy and leadership.
- Council reporting and decision-making.
- Infrastructure planning and standards.
- Infrastructure operations across waste, parks and recreation, water supply, wastewater treatment and stormwater.
- Business cases, procurement and contracting.
- Financial planning and risk management.
- Staff travel and commuting.
- Waste minimisation in offices and Council events.
- Digital operations.
- Staff climate action and sustainability culture.
- Carbon sequestration.

## 1.3 Persons Responsible

### **ISO 14064-1-2018, 9.3.1 (b)**

This GHG inventory was prepared by Josh McIvor at **CarbonEES®**. It was reviewed by Don MacKenzie at **CarbonEES®** and approved by Katy Simon – Climate Change Advisor at KDC.

## 1.4 Reporting Period Covered

### **ISO 14064-1-2018, 9.3.1 (c)**

This GHG inventory report covers KDC's financial year 01 July 2020 to 30 June 2021 ("FY21").

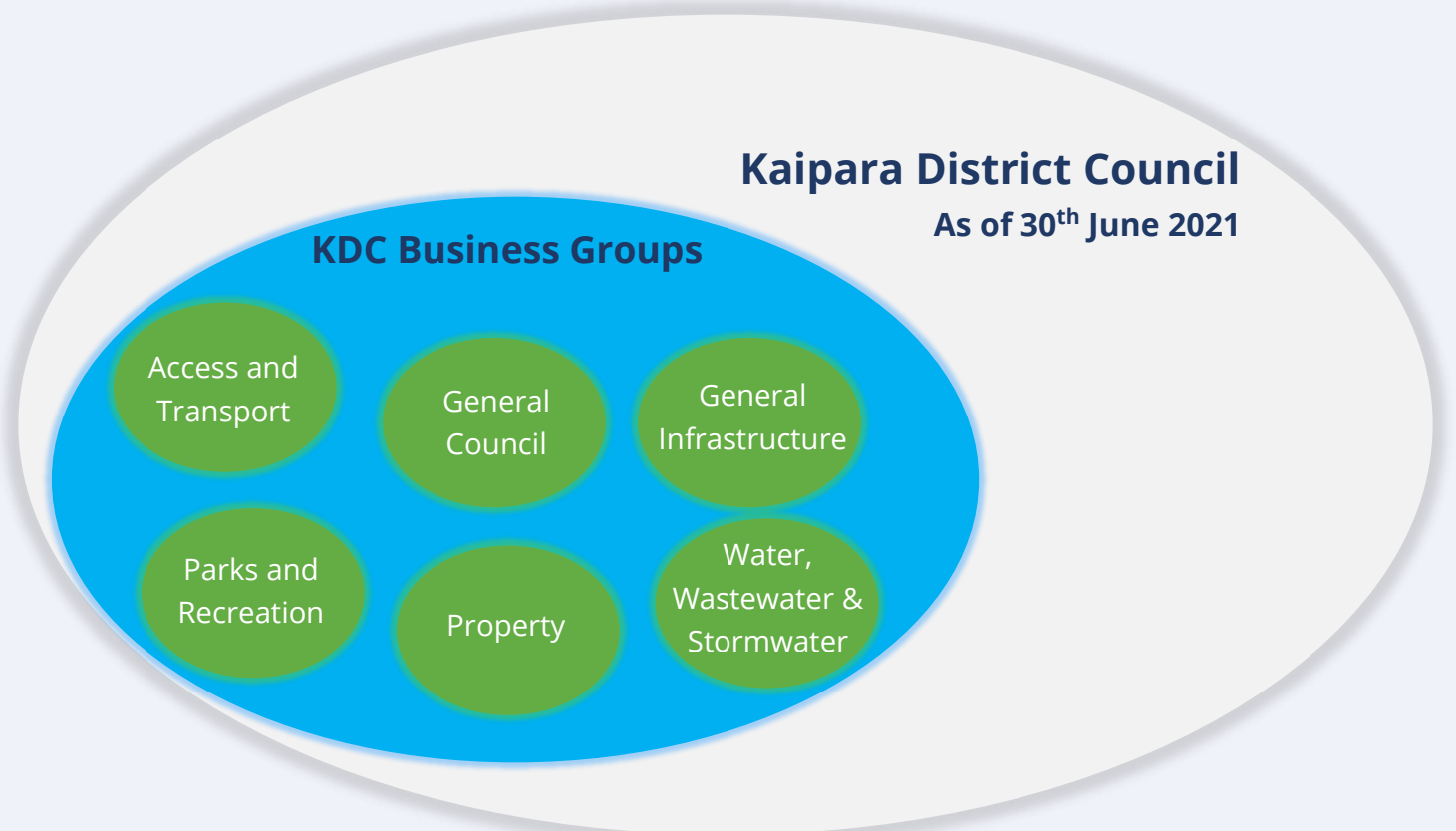
## 2.0 Organisational Boundaries

### ISO 14064-1-2018, 9.3.1 (d)

For an organisation to accurately report its GHG emissions, it must first establish its organisational boundary. The organisational boundary determines the parameters for GHG reporting in the KDC inventory. This boundary refers to the legal composition of the organisation and if the organisation has any direct control over the sources of the emissions. Figure 3 illustrates the organisational boundary of KDC.

### 2.1 Operational Control Approach

For this report, KDC's organisational boundary is determined by using an operational control approach. A district council using an operational control approach takes responsibility for 100% of emissions from operations it or its subsidiaries have operational control over. As such, KDC's GHG inventory includes all sources and sinks associated with activities where KDC has control and the full authority to introduce and implement its operating policies. Due to KDC's responsibility to obtain and spend rate payer funds to provide essential civil services, these activities are also included, despite often being carried out by contractors. This is consistent with the operational control approach, as KDC could implement procurement and spending policies that will inform the operational emissions from these activities.



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

## 2.2 Individual Business Group Definitions

**Table 6:** Brief description of each KDC Business Group

Facility	Description
Access and Transport	The Access and Transport business group oversees streetlights in the Kaipara District.
General Council	The General Council business group oversees KDC's day-to-day council activities.
General Infrastructure	The General Infrastructure business group oversees KDC's infrastructure, such as drainage pumps.
Parks and Recreation (Community Services)	The Parks and Recreation (Community Services) business group oversees KDC's parks and recreation areas. The group manages services in their parks, such as public toilets, and contains sites relating to domains and reserves.
Property (Community Services)	The Property business group oversees external public properties owned or managed by KDC. This includes the Library and Kauri Coast Pool.
Water, Wastewater, and Stormwater	The Water, Wastewater, and Stormwater business group oversees water filtration, wastewater treatment and stormwater maintenance in the Kaipara District. The group manages six wastewater treatment sites.

## 3.0 Reporting Boundaries

This section establishes and documents KDC's reporting boundaries, including the identification of the relevant Category 1, 2, 3 and 4 emissions and removals associated with KDC's operations.

### 3.1 Operational Boundaries

#### **ISO 14064-1-2018, 9.3.1 (e)**

An operational boundary was used to determine which emission sources were included and excluded in this report, and to define the significant emission sources. GHG emission sources from KDC were identified with reference to ISO 14064-1-2018, with guidance from the GHG Protocol.

Table 7 describes the ISO 14064-1-2018 emission categories used in this report. There are two further categories; Category 5 which covers emissions from products created by an organisation; and Category 6 which covers anything not categorised under a previous category. Neither Category 5 nor 6 apply to KDC.

*Table 7: Categories as defined by ISO 14064-1-2018.*

Emission Category	Description	Example
Category 1: Direct Emissions	Direct emissions that occur from sources owned or controlled by KDC.	The combustion of fuels in KDC's vehicle fleet.
Category 2: Imported Energy Indirect Emissions	Emissions associated with the generation of electricity that is purchased by KDC.	Electricity consumed at KDC facilities.
Category 3: Indirect Emissions from Transportation	Emissions that are a consequence of KDC's activities that result in transportation being utilised.	Air travel for business and transportation of goods by postal services.
Category 4: Indirect emissions from products used by an organisation	Emissions related to KDC purchasing goods and services from third parties, for use in their operations.	Emissions from waste generated in operations and services such as legal services purchased by KDC.

## 3.2 Information Management Procedures

### ISO 14064-1-2018, 9.3.2 (i)

GHG emissions sources from KDC were identified by **CarbonEES®** and confirmed by KDC for this GHG inventory. As an external company, **CarbonEES®** require confirmation from KDC to ensure 100% of emissions are covered and accurately represent KDC's activities.

**CarbonEES®** uses their software, **e-Bench®** to collect, store and manage KDC's data. Activity data is either manually or automatically loaded into **e-Bench®** by data analysts at **CarbonEES®**, or automatically uploaded as part of a data activity stream. The **e-Bench®** software is programmed to ensure data is entered accurately. All data is checked for anomalies by the software and is reviewed by a data manager to ensure the data is verified. Emissions are calculated automatically within **e-Bench®** by multiplying the provided activity data by their corresponding emissions factor. KDC can track and monitor their emissions during the year using **e-Bench®**.

If data is not entered into **e-Bench®** through the year (i.e., if the data was requested for the GHG inventory specifically), the business analysts have an internal process guideline to ensure the data is handled and stored securely. Activity data is manually prepared for the GHG inventory by business analysts, then are multiplied by the most recent and relevant emissions factors.

**CarbonEES®** does not get the GHG inventory data verified externally, as it is KDC's responsibility to get their GHG inventory audited.

## 3.3 Significance Criteria

All identified direct emission sources were deemed significant and included. Indirect emissions sources were deemed significant and included based on the principles of completeness and transparency. KDC looks to disclose all their indirect emissions that fall within its organisational boundary (i.e., all are considered significant), with exclusions only being permitted using the decision tree in Figure 5.

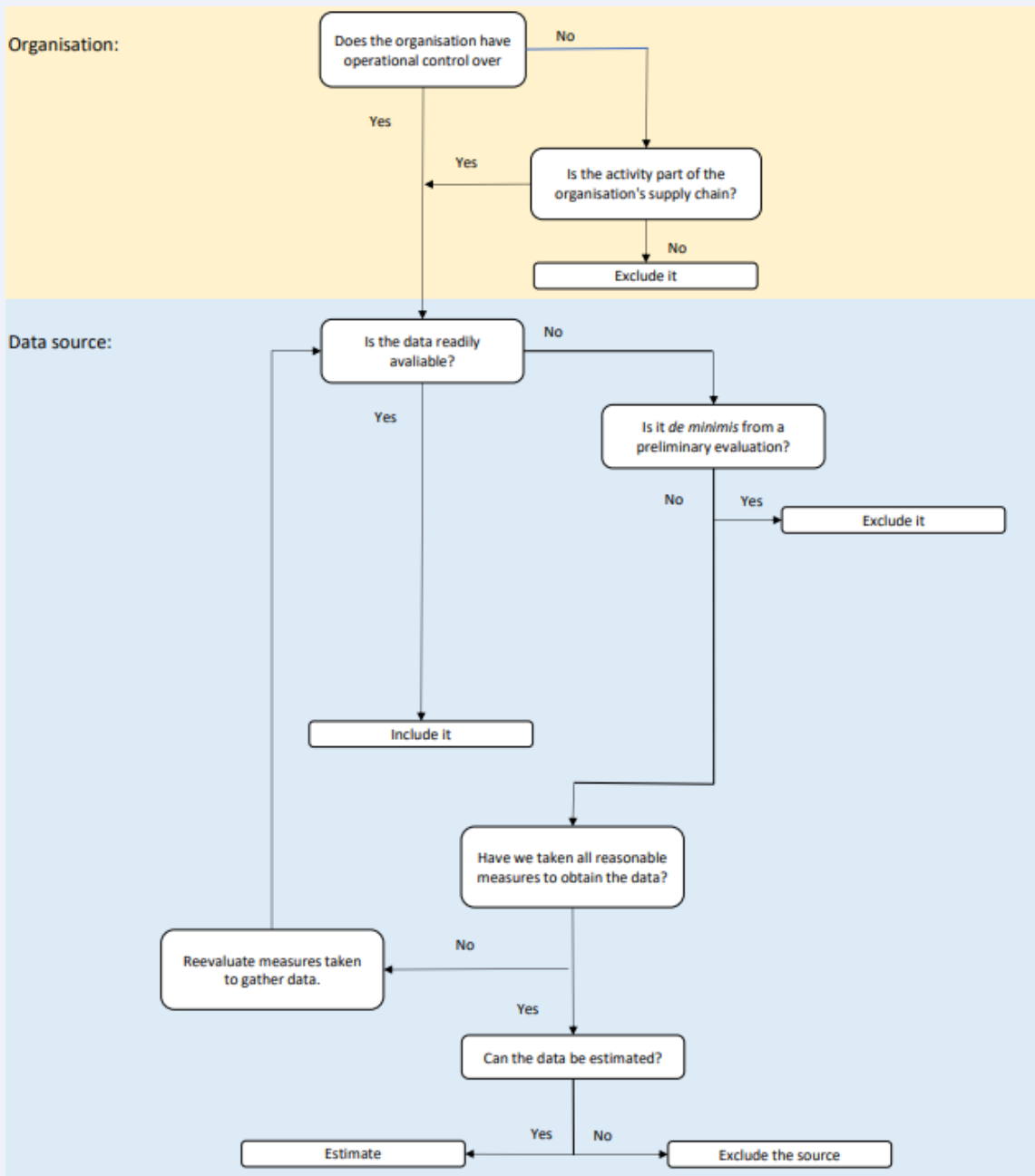


Figure 5: Significance Criteria Decision Tree

### 3.4 Inventory Emission Sources, Emission Factors and Activity Data

#### ISO 14064-1-2018, 9.3.1 (g, m, n, o, t)

Table 8 provides a summary of the emissions sources included in KDC's GHG inventory. The table also comments on the emission factors used, the quality of data, and who the data was provided by. Data quality was calculated using a qualitative Multi-Criteria Decision Analysis (MCDA) method, which is explained further in Appendix A.

**Table 8:** Category 1 Emissions Included in the GHG Inventory

Emission Category	Emission Source	Emission Factors	Data Quality	Data Provided By
Category 1 – Direct Emissions	Mobile Fuel Combustion (Fleet)	MfE (2022) DEFRA (2021)	95%	BP/Z Energy (e-Bench®)
	LPG - Stationary	MfE (2022)	99%	Gas and Tyre (e-Bench®)
	Wastewater Treatment	MfE (2022)	60%	Population data from Stats NZ

**Table 9:** Category 2 Emissions Included in the GHG Inventory

Emission Category	Emission Source	Emission Factors	Data Quality	Data Provided By
Category 2 – Indirect Emissions from Imported Energy	Purchased Electricity	MfE (2022)	99%	Genesis Energy (e-Bench®)



**Table 10:** Category 3 Emissions Included in GHG Inventory

Emission Category	Emission Source	Emission Factors	Data Quality	Data Provided By
<b>Category 3 – Indirect Emissions from Transportation</b>	Freight Transportation and Distribution	MfE (2022) NZ Post (2022)	82%	NZ Post/KDC Estimate
	Employee Commuting and Working from Home	MfE (2022)	63%	KDC
	Business Travel and Accommodation	MfE (2022)	93%	KDC
	Upstream Emissions from Fuel Production and Distribution	DEFRA (2021)	95%	BP/Z Energy <b>(e-Bench®)</b>

**Table 11:** Category 4 Emissions Included in GHG Inventory

Emission Category	Emission Source	Emission Factors	Data Quality	Data Provided By
<b>Category 4 – Indirect Emissions from Products Used by KDC</b>	Purchased Goods and Services	Motu (2014)	84%	KDC
	Capital Goods	Motu (2014)	84%	KDC

**Table 12:** Category 4 Emissions Included in GHG Inventory continued

Emission Category	Emission Source	Emission Factors	Data Quality	Data Provided By
Category 4 – Indirect Emissions from Products Used by KDC	Waste Generated in Operations	MfE (2020) MfE (2022)	60%	KDC
	Imported Energy Transmissions and Distribution Losses	MfE (2022)	99%	Genesis Energy (e-Bench®)

### 3.5 Exclusions

The following sources of emissions have been recognized and left out of this GHG inventory (Table 13). These sources have been deemed insignificant to KDC, not relevant to the inventory, and/or not practically or economically viable to be measured currently.

**Table 13:** Emission Sources Excluded from this GHG Inventory

Emission Category	Emission Source	Reason for Exclusion
Category 1 – Direct Emissions	Fugitive Emissions from Vehicles	Not Applicable
Category 1 – Direct Emissions	Refrigerant Usage	Not Applicable
Category 5 – Indirect Emissions associated with the use of products from an organisation	Processing of sold products	Not Applicable.
Category 5 – Indirect Emissions associated with the use of products from an organisation	Use of sold products	Not Applicable.
Category 5 – Indirect Emissions associated with the use of products from an organisation	End-of-life treatment of sold products	Not Applicable.
Category 5 – Indirect Emissions associated with the use of products from an organisation	Downstream leased assets (i.e., assets eased to third parties).	Not Applicable.
Category 5 – Indirect Emissions associated with the use of products from an organisation	Franchises	Not Applicable.
Category 5 – Indirect Emissions associated with the use of products from an organisation	Investments	Not Applicable.

## 3.6 Impact of Uncertainty

### **ISO 14064-1-2018, 9.3.1 (p, q)**

The process of preparing a GHG inventory involves a certain level of uncertainty. To reduce this uncertainty, verifiable source data has been chosen. In situations where data uncertainty persists, a cautious estimation method has been used to ensure that emissions are overestimated rather than underestimated.

The impact of uncertainty has been considered when assessing data quality. This process is qualitative and is explained further in Appendix A.

## 3.7 Selected Base Year

### **ISO 14064-1-2018, 9.3.1 (k)**

The base year for KDC is 01 July 2018 – 30 June 2019. This provides a benchmark for KDC to compare their emissions. The total emissions for KDC in their base year were **6,019 tCO<sub>2</sub>e**.

## 3.8 Changes to Historic Base Year

### **ISO 14064-1-2018, 9.3.1 (l)**

KDC recalculate their base years if any of the following applied:

- If emission factors have changed significantly and were relevant to prior years.
- If the scope of what is measured within an inventory has changed significantly.
- If the methodology of calculating emissions from activities has changed significantly.

For KDC's inventory for the FY21 year, there have been no significant changes. Therefore, there is no need to recalculate the historic base year.

Upon further investigation, we have identified that KDC's FY19 and FY20 wastewater emissions are underestimated. This is likely due to data unavailability from different wastewater treatment plants in these years. We expect that the methodology for calculating wastewater treatment plant emissions will drastically improve for KDC's FY22 GHG inventory, which may result in a recalculation of KDC's base year in FY22.

## 4.0 GHG Emissions Calculations and Results

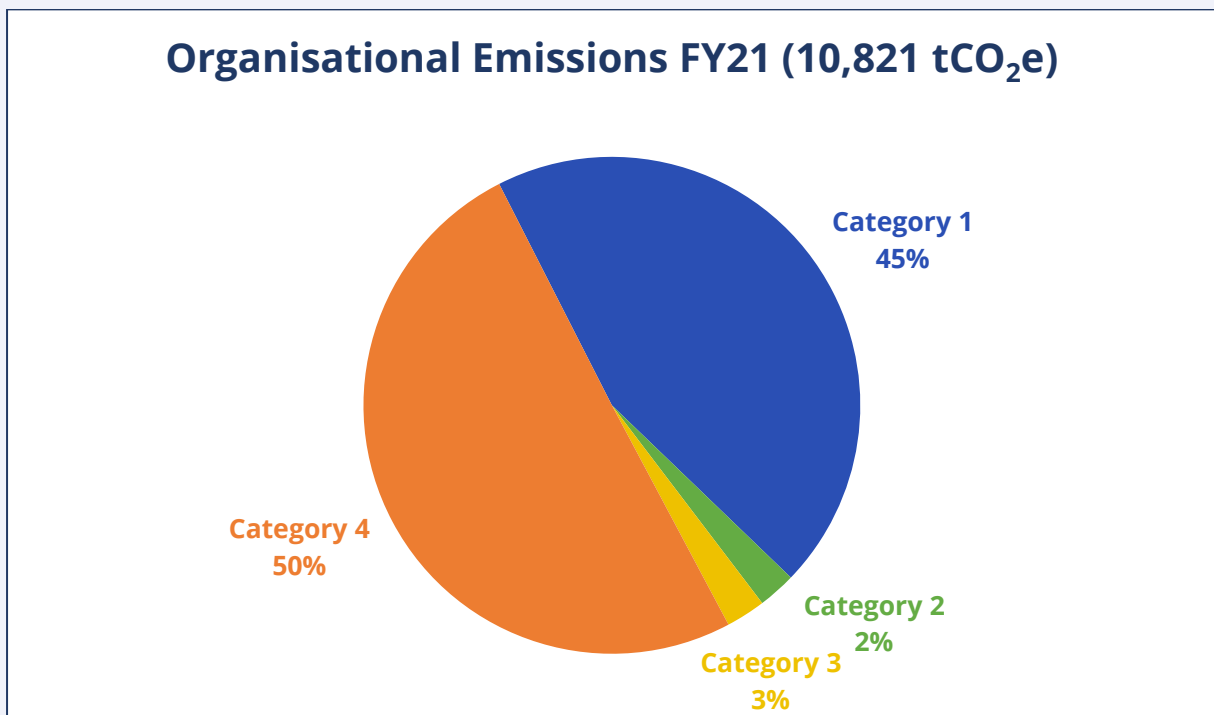
This section presents the results of KDC's GHG Inventory for FY21. It offers a broad overview covering all emissions activities and categories and a detailed review of each activity or category. Within the detailed review is an explanation of each emission source.

A consistent colour scheme has been applied to emission categories. Blue indicates Category 1, Green indicates Category 2, Yellow indicated Category 3, and Orange indicates Category 4.

This section applies rounding to values to the nearest tonne of CO<sub>2</sub>e. For more detailed figures, we encourage readers to view the accompanying GHG inventory.

### 4.1 Organisational emissions by category

The total organisational emissions for KDC in FY21 were **10,821 tCO<sub>2</sub>e**. The emissions breakdown by category is shown in Figure 6.

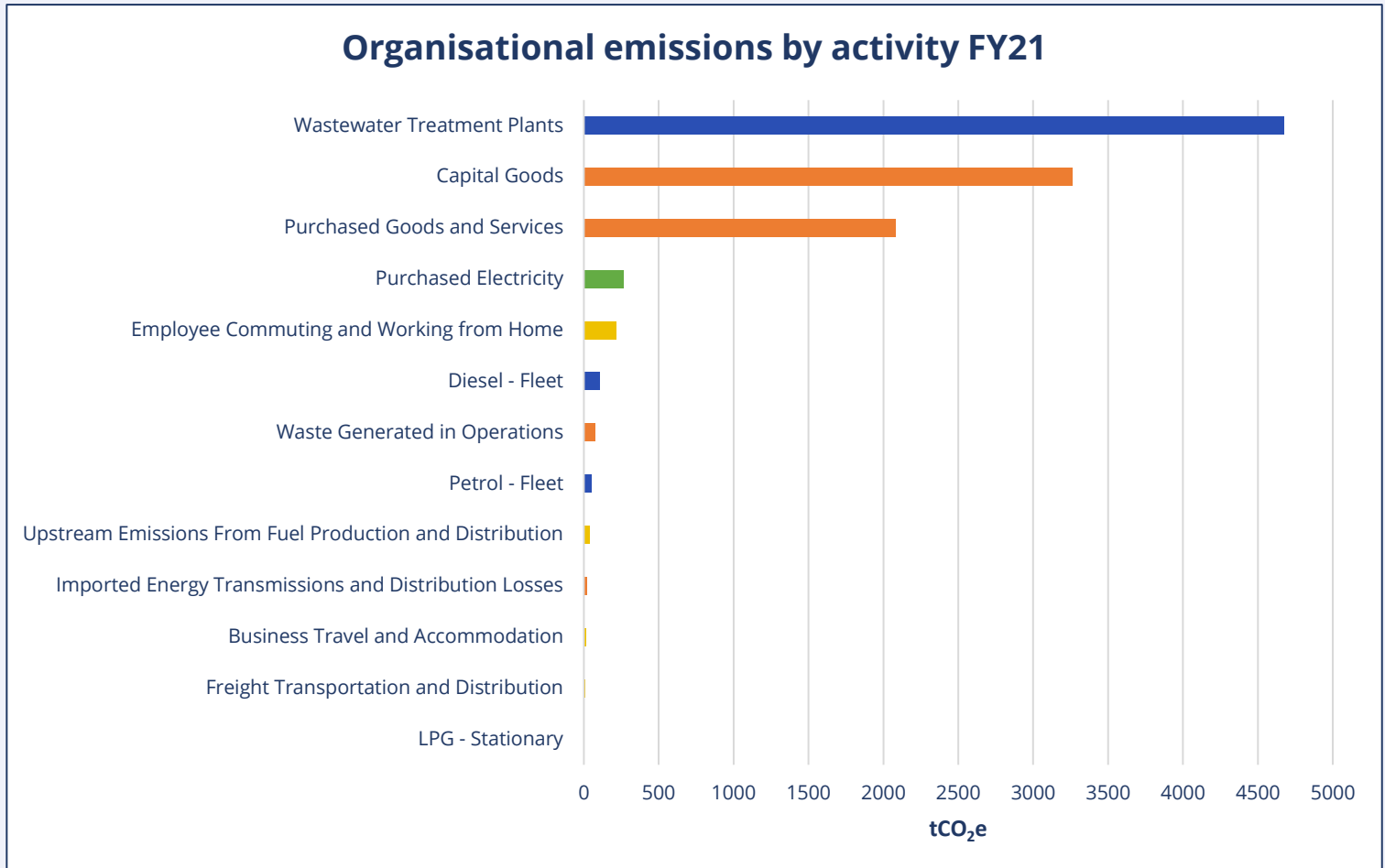


**Figure 6:** FY21 Organisational Emissions (tCO<sub>2</sub>e)

The majority of KDC's organisational emissions fall under Category 4 (50%), followed by Category 1 emissions (45%), Category 3 emissions (3%) and Category 2 emissions (2%).

## 4.2 Organisational emissions by activity

The emissions breakdown by activity is shown in Figure 7.



**Figure 7:** Organisational emissions by activity (tCO<sub>2</sub>e). Blue bars represent Category 1 emissions; Green bars Category 2; Yellow bars Category 3; and Orange bars Category 4.

Most of KDC's organisational emissions are a result of activities at Wastewater Treatment Plants (43%). This is followed by Capital Goods (30%) and Purchased Goods and Services (19%).

## 4.3 Organisational emission reductions / increases

Table 14 details KDC's organisational emission reductions/increases for FY21, compared to their base year FY19. In column 5 (% change from FY19 base year), red figures indicate emission increases and green figures indicate emission reduction.

Overall, KDC's organisational emissions have increased by 80%, from 6,019 tCO<sub>2</sub>e in FY19 to 10,821 tCO<sub>2</sub>e in FY21.

**Table 14:** FY21 Emissions reductions/increases compared to base year FY19, Categories 1 – 3.

Emission Category	Emission Source	Base Year FY19	FY21	% change from FY19 base year
Category 1 – Direct Emissions	Mobile Fuel Combustion (Fleet)	169	160	5%
	LPG - Stationary	3	1	64%
	Wastewater Treatment	545	4,671	757%
Category 2 – Indirect Emissions from Imported Energy	Purchased Electricity	175	267	52%
Category 3 – Indirect Emissions from Transportation	Freight Transportation and Distribution	5	9	100%
	Employee Commuting and Working from Home	292	216	26%
	Business Travel and Accommodation	33	14	57%
	Upstream Emissions from Fuel Production and Distribution	40	38	6%

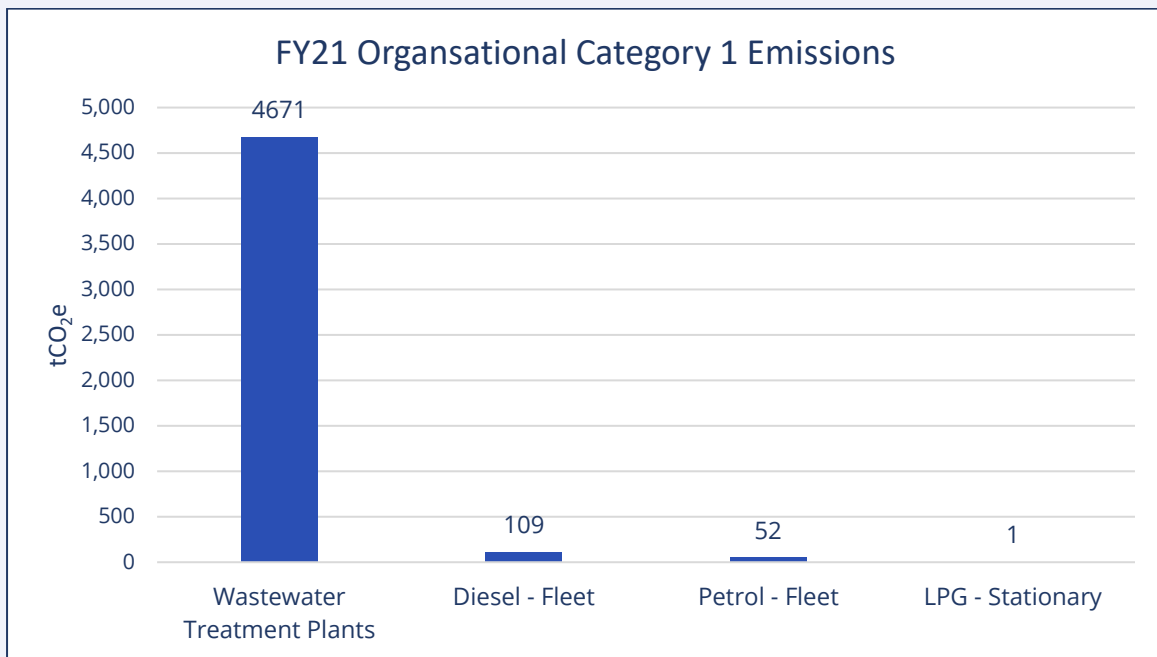
**Table 15:** FY21 Emissions reductions/increases compared to base year FY19, Category 4.

Emission Category	Emission Source	Base Year FY19	FY21	% change from FY19 base year
Category 4 – Indirect Emissions from Products Used by KDC	Purchased Goods and Services	1,332	2,084	56%
	Capital Goods	3,088	3,261	6%
	Waste Generated in Operations	320	76	76%
	Imported Energy Transmissions and Distribution Losses	15	24	62%



## 4.4 Category 1 Emissions

Category 1 emissions are the direct emissions that occur from sources owned or controlled by KDC. The Category 1 activities captured in this report were fuel usage (LPG, petrol, and diesel) and wastewater treatment plant processes. Category 1 emissions in FY21 (4,832 tCO<sub>2</sub>e) have increased 575% when compared to KDC's base year FY19 (717 tCO<sub>2</sub>e). This is largely due to KDC's wastewater treatment plant emissions, which have increased by 574% in FY21 compared to base year FY19. Figure 8 shows KDC's organisational Category 1 emissions, while Table 16 shows the organisational Category 1 emissions reductions (green) and increases (red).



**Figure 8:** FY21 Organisational Category 1 Emissions (tCO<sub>2</sub>e)

**Table 16:** FY21 Organisational Category 1 Emissions with further details regarding reductions/increases.

Category 1 Activity	FY21 tCO <sub>2</sub> e	% of Category 1	% of Overall Emissions	% Change from FY19
Wastewater Treatment Plants	4,671	97%	43%	757%
Diesel - Fleet	109	2%	1%	29%
Petrol - Fleet	52	1%	0.5%	39%
LPG - Stationary	1	0.02%	0.01%	64%
<b>Total</b>	<b>4,838</b>	-	45%	<b>574%</b>

#### 4.4.1 Wastewater Treatment

KDC owns and operates the Mangawhai, Dargaville, Glinks Gully, Kaiwaka, Maungatoroto, and Te Kopuru Wastewater Treatment plants. The process emissions (CH<sub>4</sub>, N<sub>2</sub>O) were estimated using population figures for the district and deriving the population served by each plant, by looking at the number of connections to each plant as a proportion of the total. Factors used were from MfE (2022).

Additionally, as it is known Silver Fern Farms feeds into the wastewater treatment, assumptions had to be made about the impact of this industrial wastewater. Estimated tonnes of kills were taken from another rural wastewater treatment centre which also treats industrial agricultural waste in Manawatū. These facts meant the estimate for process emissions from wastewater treatment for KDC are much higher in FY21 than previous years.

Moving forward KDC intends on doing a Level 2 analysis using the Water NZ (2021) methodology, which should yield more accurate results that can be consistently measured over time. KDC is implementing sampling at the WWTPs currently. In FY22, we expect that recalculations of KDC's wastewater treatment plant emissions will be undertaken.

#### 4.4.2 Mobile Fuel Combustion (Fleet)

KDC uses fuel, both petrol and diesel, in its vehicle fleet. Data has been obtained directly from BP and Z.

#### 4.4.3 LPG

KDC burns LPG at its facilities for heating. Fuel consumption data has been provided by Gas and Tyre.

## 4.5 Category 2 Emissions

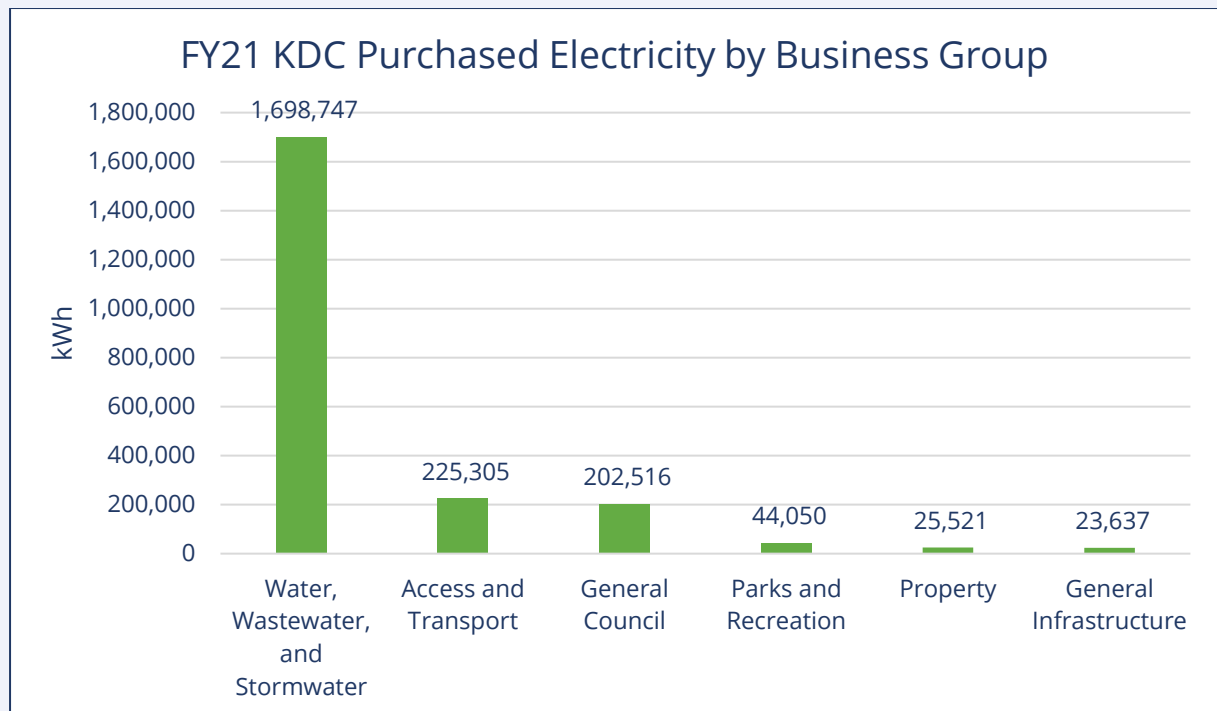
Category 2 emissions are indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling. Although Category 2 emissions physically occur at the facility where they are generated, they are accounted for in an organisation's GHG inventory because they are a result of the organisation's energy use. In this case, Category 2 emissions are from purchased electricity (at all sites) which is used for office lighting, space heating, hot water, and appliances. Category 2 emissions in FY21 (267 tCO<sub>2</sub>e) have increased by 52% compared to KDC's base year, FY19 (175 tCO<sub>2</sub>e). Table 17 shows the organisational Category 2 emissions reductions (green) and increases (red).

**Table 17:** FY21 Organisational Category 2 Emissions with further details regarding reductions/increases.

Category 2 Activity	FY21 tCO <sub>2</sub> e	% of Category 2	% of Overall Emissions	% Change from FY19
Purchased Electricity	267	100%	2%	52%

### 4.5.1 Purchased Electricity

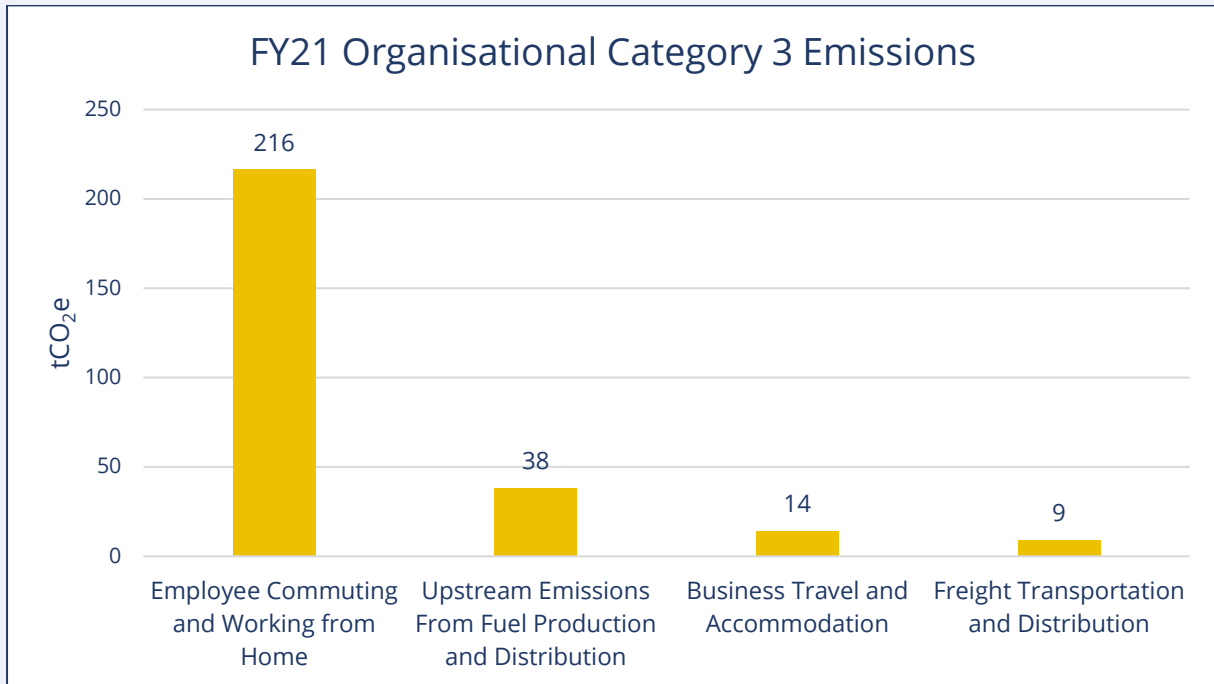
Electricity is used at all KDC sites for Pump, Water Treatment, Wastewater, Community Service and Corporate sites. Electricity consumption data has been provided by Genesis Energy and by KDC. Most electricity consumption is the result of pumps, water treatment, and wastewater treatment. Figure 8 shows KDC's purchased electricity by business group in kWh.



**Figure 9:** FY21 KDC purchased electricity by business group.

## 4.6 Category 3 Emissions

Category 3 emissions are indirect emissions from transportation. These are activities such as business travel, employee commuting, and freight transportation and distribution. Category 3 emissions in FY21 (278 tCO<sub>2</sub>e) have decreased by 25% compared to KDC's base year, FY19 (370 tCO<sub>2</sub>e). Figure 10 shows KDC's organisational Category 3 emissions, while Table 18 shows the organisational Category 3 emissions reductions (green) and increases (red).



**Figure 10:** FY21 Organisational Category 3 emissions.

**Table 18:** FY21 Organisational Category 3 emissions with further details regarding reductions/increases.

Category 3 Activity	FY21 tCO <sub>2</sub> e	% of Category 3	% of Overall Emissions	% Change from FY19
Employee Commuting and Working from Home	216	78%	2%	26%
Upstream Emissions from Fuel Production and Distribution	38	14%	0.4%	6%
Business Travel and Accommodation	14	5%	0.1%	57%
Freight Transportation and Distribution	9	3%	0.1%	100%
<b>Total</b>	<b>278</b>	-	3%	25%

### 4.6.1 Employee Commuting

A high-level estimate for employee commuting was provided by KDC. The main mode of transport is individual cars, and this was assumed to be universal for the purposes of this report. KDC intends on conducting an employee commuting survey for future inventories. Likewise, for working from home emissions, this was a high-level estimate made by KDC. Working from home is relatively new for KDC and emission factors based on average energy use for items such as laptops, a monitor, and heating are provided by MfE (2022).

### 4.6.2 Upstream Emissions from Fuel Production and Distribution

When an organisation uses fuel, there are emissions associated with the production and distribution of fuel, as well as the direct emissions from combusting the fuel itself. Therefore, an organisation is responsible for these upstream emission from the fuel they've purchased. Source data is the same as discussed in 4.4.2, with different emission factors being applied.

### 4.6.3 Business Travel and Accommodation

Some KDC staff are required travel as part of their role. Air travel was provided by KDC as a ledger detailing which airports were travelled between and whether the trip was return or one way. Flight distances were then calculated using an online tool (see references for link). Hotel accommodation was also provided by KDC and is sent directly into e-Bench®. Business travel in personal vehicles is tracked by KDC for reimbursement on a per kilometre basis, and these totals were provided for the report.

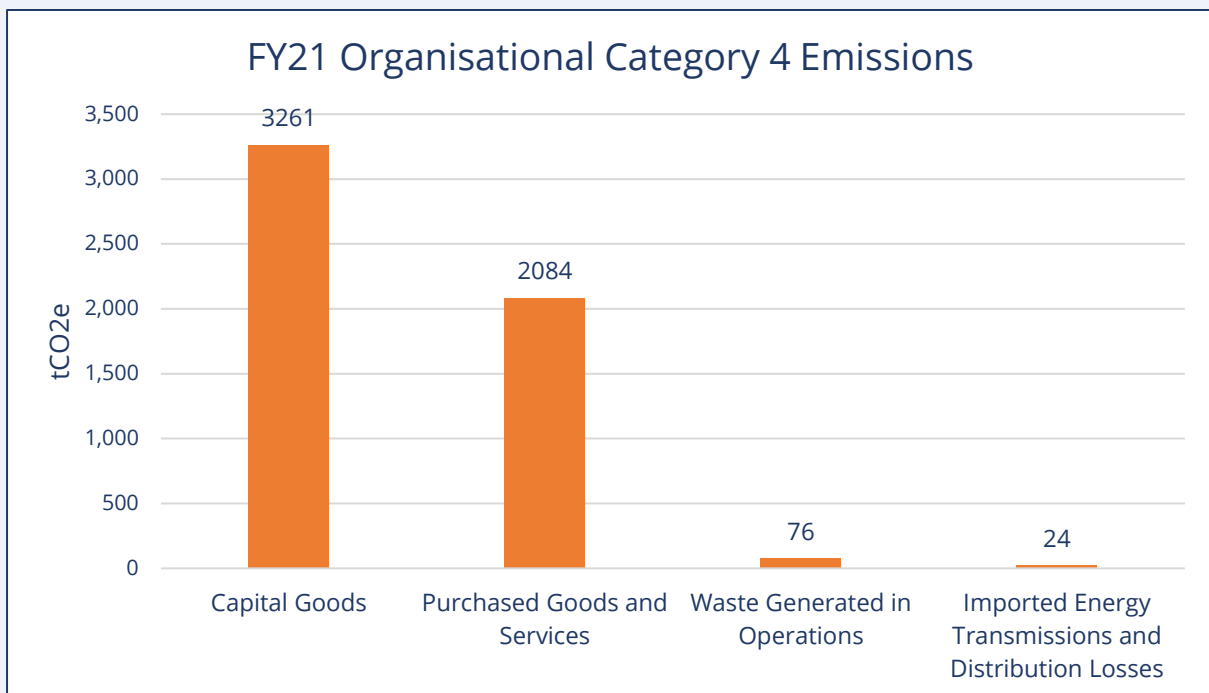
### 4.6.4 Freight Transportation and Distribution

KDC pay for postage of goods to and from various sites and data for this activity was provided to KDC directly by NZ Post. Additionally, KDC also contracts the services to transport sludge from its WWTPs to landfill. Post data was summarised as number of letters and number of parcels sent. Transportation of sludge data was estimated by KDC, with the weight of sludge taken from invoices. Emission factors were provided by NZ Post on a per-letter and per-parcel basis, and by MfE (2022). There is a significant increase in emissions from the baseline year due to the inclusion of the transportation of sludge to landfill, which was not accounted for in the baseline year. If there is a re-calculation of the baseline year undertaken, we would expect this increase to go down.

## 4.7 Category 4 Emissions

Category 4 emissions are indirect emissions from products used by an organisation. These include services an organisation pays for, through the course of undertaking its own activities. This category also includes waste generated by the organisation and upstream transmission and distribution losses from purchased electricity/natural gas.

Category 4 emissions in FY21 (5,445 tCO<sub>2</sub>e) have increased by 14% compared to KDC's base year, FY19 (4,756 tCO<sub>2</sub>e). Figure 11 shows KDC's organisational Category 4 emissions, while Table 19 shows the organisational Category 4 emissions reductions (green) and increases (red).



**Figure 11:** FY21 Organisational Category 4 emissions.

**Table 19:** FY21 Organisational Category 4 emissions with further details regarding reductions/increases.

Category 4 Activity	FY21 tCO <sub>2</sub> e	% of Category 4	% of Overall Emissions	% Change from FY19
Capital Goods	3,261	60%	30%	6%
Purchased Goods and Services	2,084	38%	19%	56%
Waste Generated in Operations	76	1%	0.7%	76%
Imported Energy Transmissions and Distribution Loss	24	0.4%	0.2%	62%
<b>Total</b>	<b>5,445</b>	-	50%	<b>14%</b>

### 4.7.1 Capital Goods

Capital goods describes financial transactions relating to the purchase and construction of fixed assets. These transactions are also referred to as capital expenditure (CAPEX) and includes expenditure on upkeep and improvements for rate payers, such as roading. For KDC's carbon inventory, the highest emitting CAPEX was heavy and civil engineering construction (2,738 tCO<sub>2</sub>e). Emissions from Capital Goods were derived entirely from dollar-spend reports provided by KDC. Over time, it is expected that availability of more granular data relating to KDC's supply chain will increase, allowing for more accurate emissions reporting.

### 4.7.2 Purchased Goods and Services

Purchased goods and services describes financial transactions relating to the day-to-day operations of KDC. These transactions are also referred to as operational expenditure (OPEX) and includes all goods and services purchased by KDC. Examples of purchased goods include staff uniforms, paper and stationary; while examples of services include insurance, cleaning costs and legal and accounting services. The highest emitting OPEX was repair and maintenance services (1,365 tCO<sub>2</sub>e).

### 4.7.3 Waste Generated in Operations

KDC generates waste through its operations, including office waste and wastewater treatment plant (WWTP) sludge sent to landfills. No primary data was available for KDC's office waste, so weights were estimated on an FTE basis using an emissions factor from MfE (2020). This was done to maintain consistency with the previous report. The weight of WWTP sludge removed in FY21 was provided by KDC.

### 4.7.4 Imported Energy Transmissions and Distribution Loss

When an organisation uses imported energy, such as purchased electricity, there are emissions associated with the transmission and distribution losses from the point of generation to the point of consumption. Therefore, an organisation is responsible for these upstream emission from the imported energy they've purchased, as measurements are taken from the point of consumption. Source data is the same as discussed in 4.5.1, with different emission factors being applied.

For example, a wastewater pump may have been recorded as using 10kWh of electricity – and this is measured at the pump itself. So, we record that consumption under Category 2. However, for the pump to consume 10kWh of electricity, the wind turbine that generated the electricity 100km away, had to generate 11kWh, as 1kWh was lost in transmission. We account for that 1kWh by using a reduced emission factor on ALL purchased electricity.

## 5.0 Business Group Analysis

KDC have six different business groups within their organisational structure, as described in Table 5. This section provides analyses of the specific emissions from each of these business groups. Figures 12 and 13 show the share of emissions between the business groups.

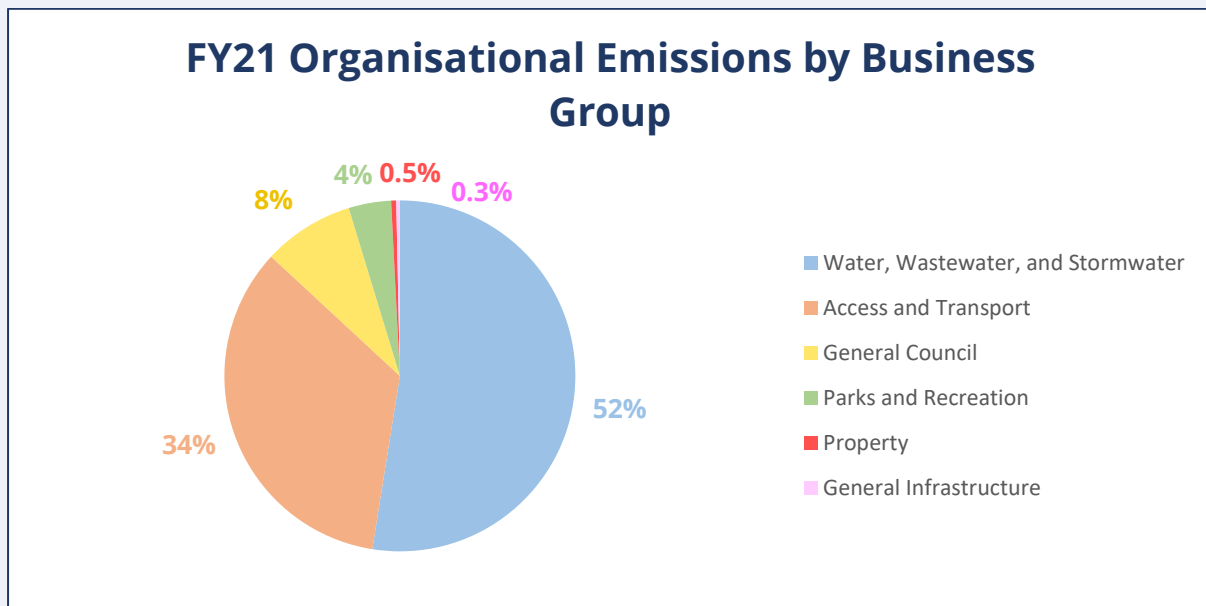


Figure 12: FY21 Organisational emissions by business group

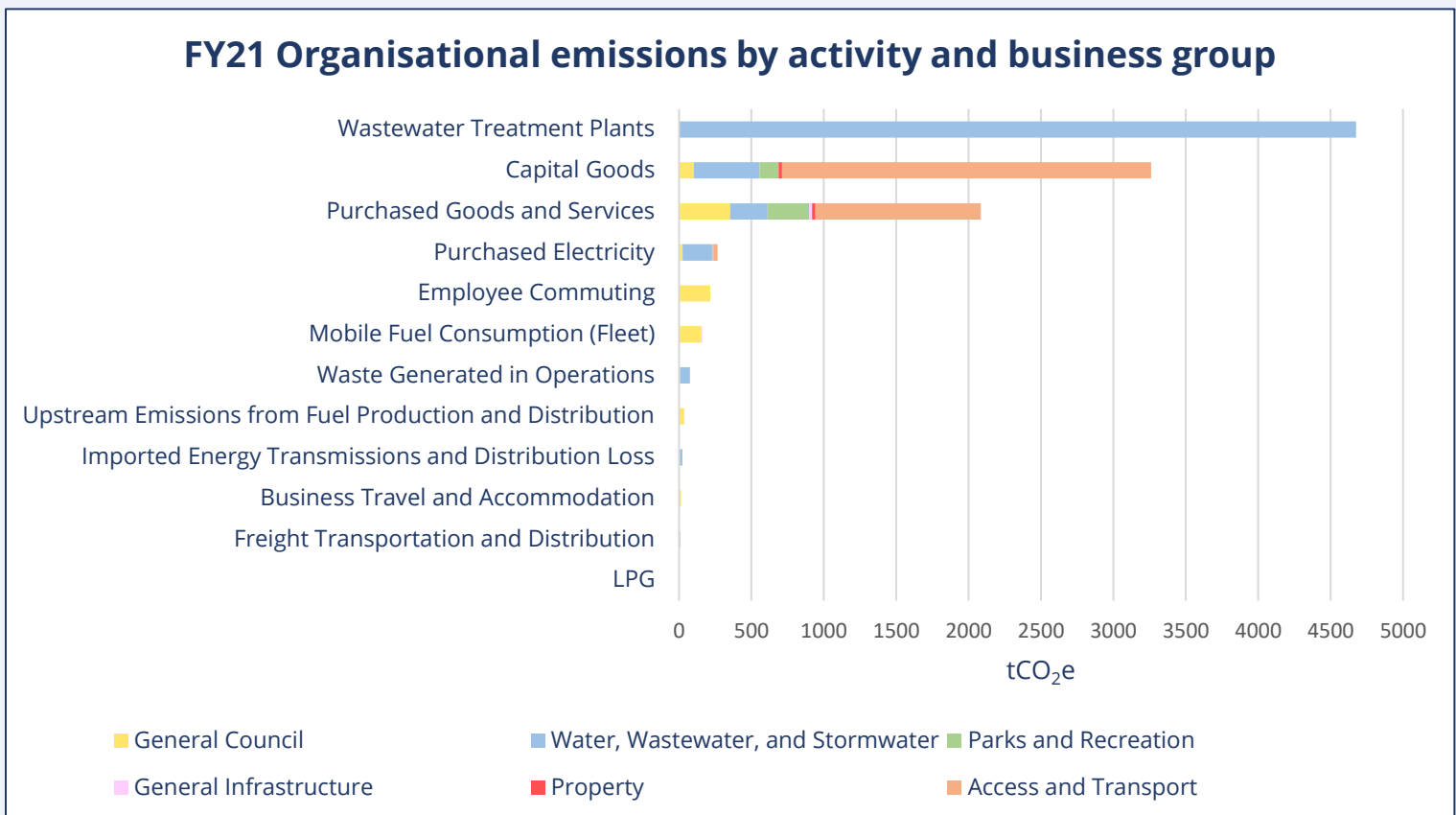
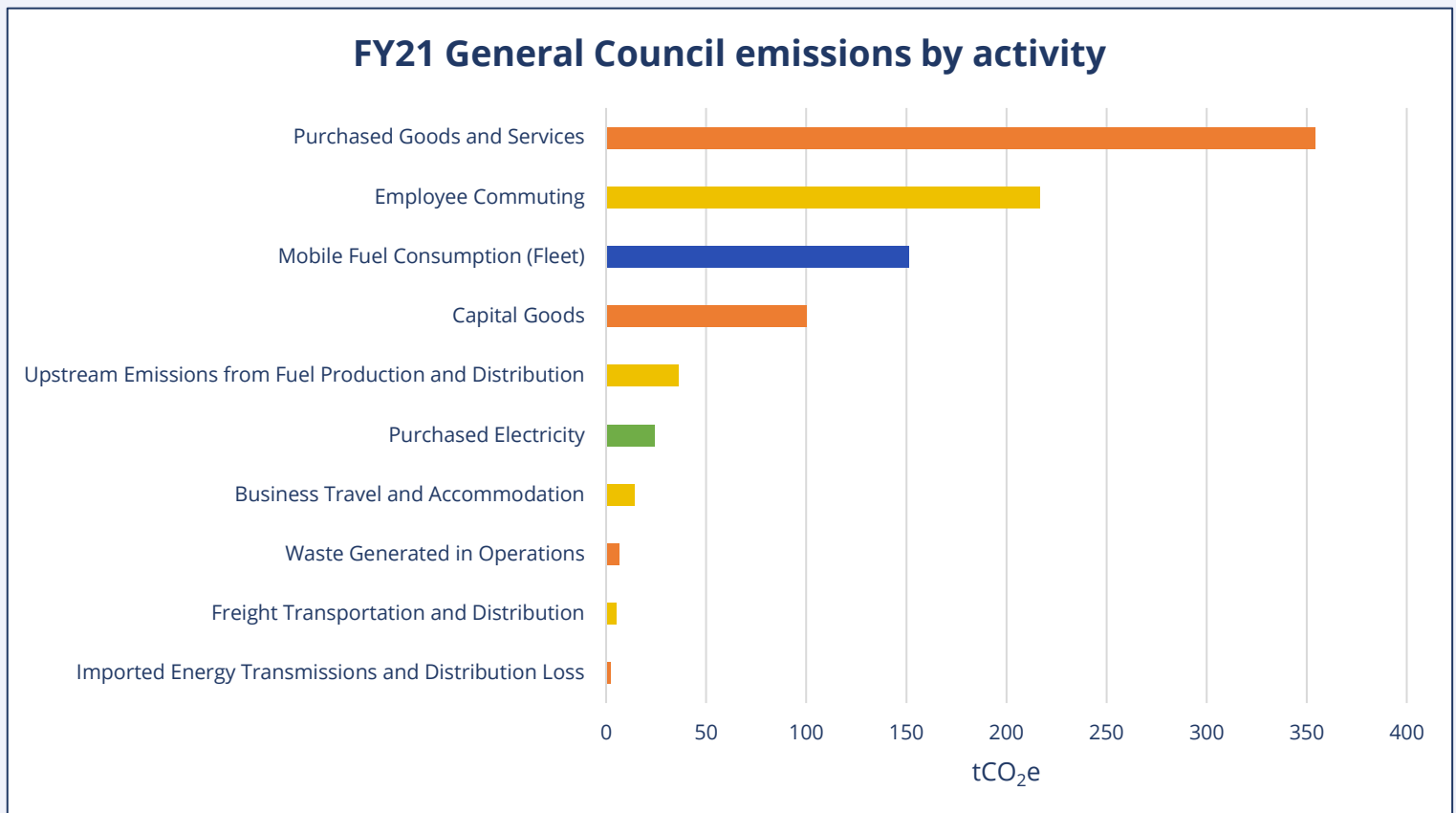


Figure 13: FY21 Organisational emissions by activity and business group



## 5.1 General Council

As described in table 5, the General Council business group oversees KDC's day-to-day council activities and operations. General Council's total emissions for FY21 were 909 tCO<sub>2</sub>e, which accounts for 8% of KDC's total emissions. Figure 14 shows General Council's emissions by activity, while Table 20 provides further detail.



**Figure 14:** FY21 General Council emissions by activity

**Table 20:** FY21 General Council emissions by activity

General Council Emissions Activity	FY21 tCO <sub>2</sub> e	% of General Council Emissions	% Attributed to Emission Activity Total
Purchased Goods and Services	354	39%	17%
Employee Commuting	216	24%	100%
Mobile Fuel Consumption (Fleet)	151	17%	94%
Capital Goods	100	11%	3%
Upstream Emissions from Fuel Production and Distribution	36	4%	94%
Purchased Electricity	24	3%	9%

General Council Emissions Activity	FY21 tCO <sub>2</sub> e	% of General Council Emissions	% Attributed to Emission Activity Total
Business Travel and Accommodation	14	2%	100%
Waste Generated in Operations	6	1%	8%
Freight Transportation and Distribution	5	1%	52%
Imported Energy Transmissions and Distribution Loss	2	0.2%	9%
<b>Total</b>	<b>909</b>	<b>-</b>	<b>-</b>

## 5.2 Water, Wastewater, and Stormwater

As described in table 5, the Water, Wastewater, and Stormwater (WWWSW) business group oversees water filtration, wastewater treatment and stormwater maintenance in the Kaipara District. The group manages 6 wastewater treatment sites. WWWSW's total emissions for FY21 were 5,681 tCO<sub>2</sub>e, which accounts for 52% of KDC's total emissions. Figure 15 shows General Council's emissions by activity, while Table 21 provides further detail.

### FY21 Water, Wastewater and Stormwater emissions by activity

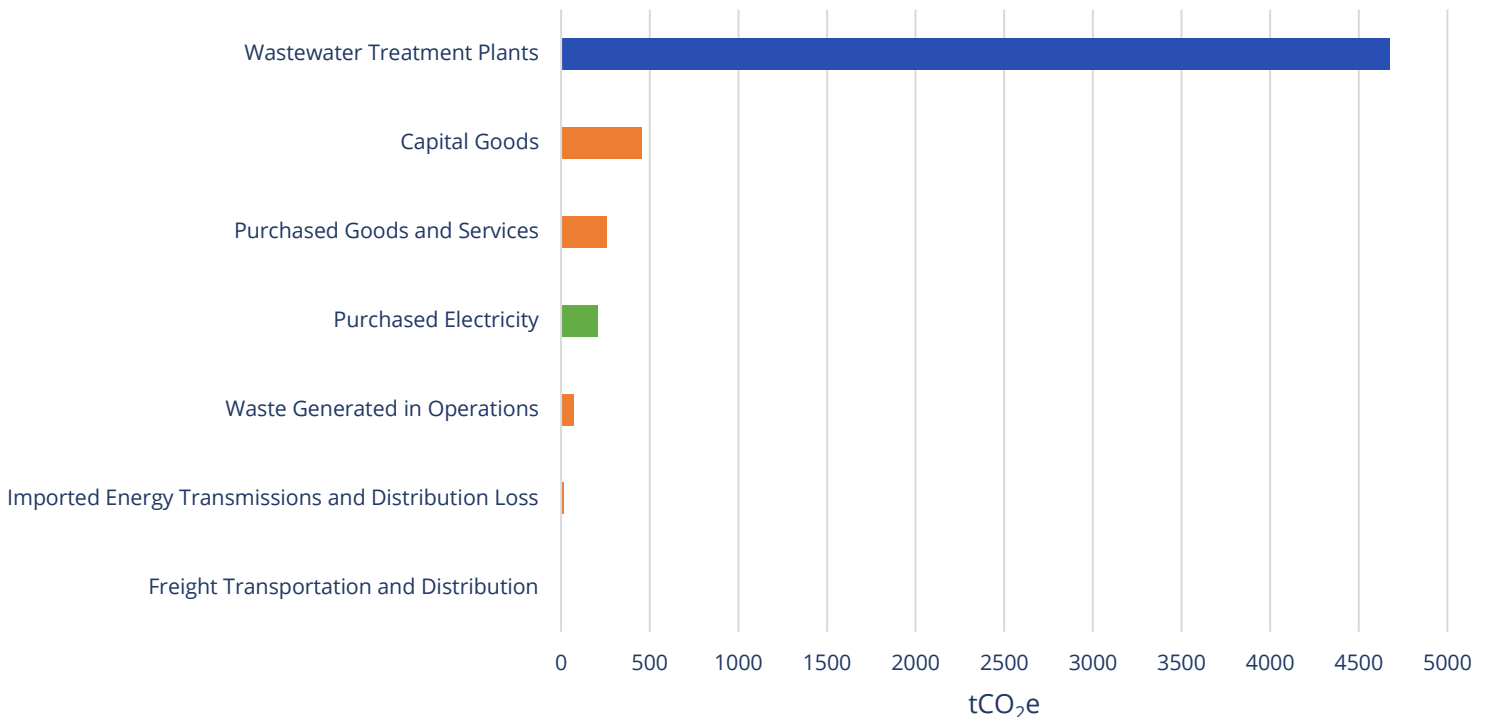


Figure 15: Water, Wastewater and Stormwater emissions by activity

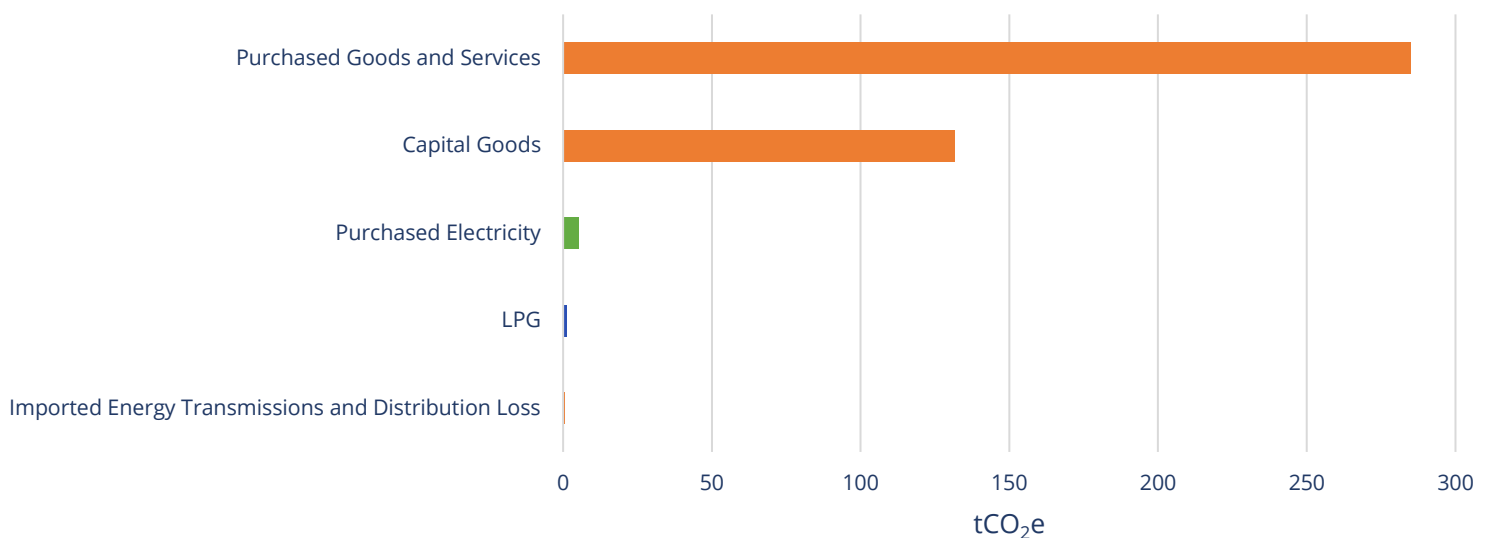
**Table 21:** Water, Wastewater and Stormwater emissions by activity.

Water, Wastewater, and Stormwater Emissions Activity	FY21 tCO <sub>2</sub> e	% of WWWSW Emissions	% Attributed to Emission Activity Total
Wastewater Treatment Plants	4,677	82%	100%
Capital Goods	455	8%	14%
Purchased Goods and Services	258	5%	12%
Purchased Electricity	204	4%	77%
Waste Generated in Operations	70	1%	92%
Imported Energy Transmissions and Distribution Losses	16	0.3%	77%
Freight Transportation and Distribution	4	0.1%	48%
<b>Total</b>	<b>5,681</b>	-	-

### 5.3 Parks and Recreation

As described in table 5, Parks and Recreation business group oversees KDC's parks and recreation areas. The group manages services in their parks, such as public toilets, and contains sites relating to domains and reserves. Parks and Recreation's total emissions for FY21 were 423 tCO<sub>2</sub>e, which accounts for 4% of KDC's total emissions. Figure 16 shows General Council's emissions by activity, while Table 22 provides further detail.

#### FY21 Parks and Recreation emissions by activity

**Figure 16:** FY21 Parks and Recreation emissions by activity

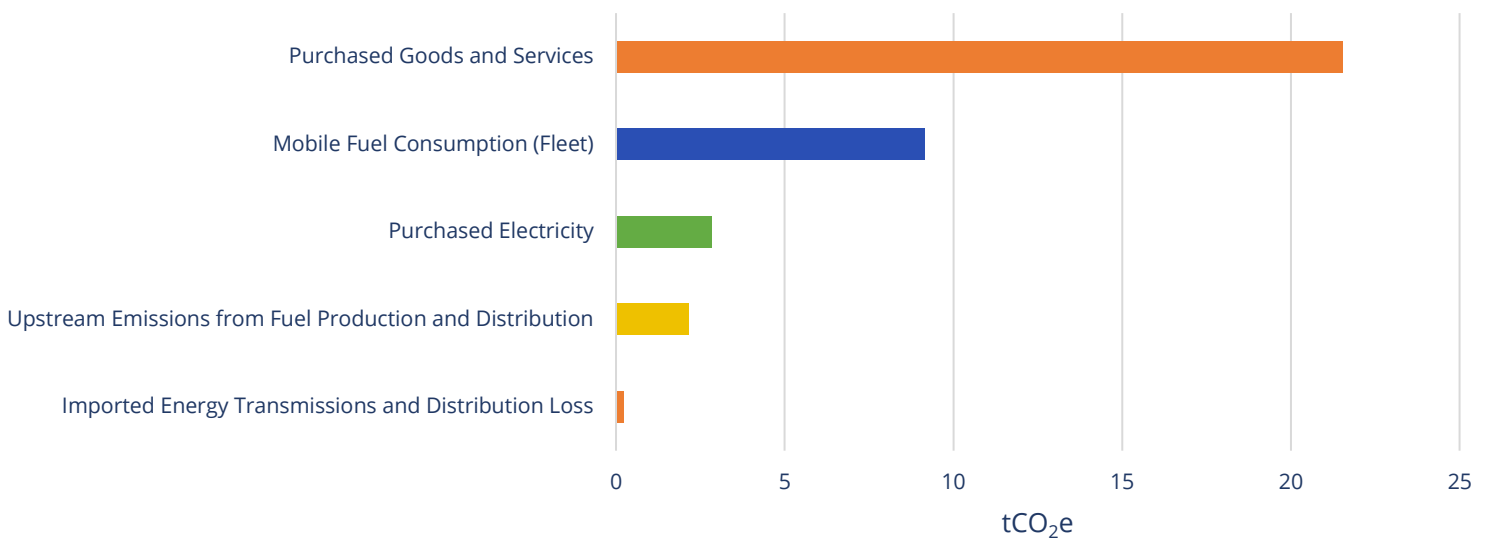
**Table 22:** FY21 Parks and Recreation emissions by activity

Parks and Recreation Emissions Activity	FY21 tCO <sub>2e</sub>	% of Parks and Recreation Emissions	% Attributed to Emission Activity Total
Purchased Goods and Services	285	67%	14%
Capital Goods	132	31%	4%
Purchased Electricity	5	1%	2%
LPG	1	0.3%	100%
Imported Energy and Distribution Losses	0.4	0.1%	2%
<b>Total</b>	<b>423</b>	<b>-</b>	<b>-</b>

## 5.4 General Infrastructure

As described in table 5, the General Infrastructure business group oversees KDC's infrastructure, such as drainage pumps. General Infrastructure's total emissions for FY21 were 36 tCO<sub>2e</sub>, which accounts for 0.3% of KDC's total emissions. Figure 17 shows General Council's emissions by activity, while Table 23 provides further detail.

### FY21 General Infrastructure emissions by activity

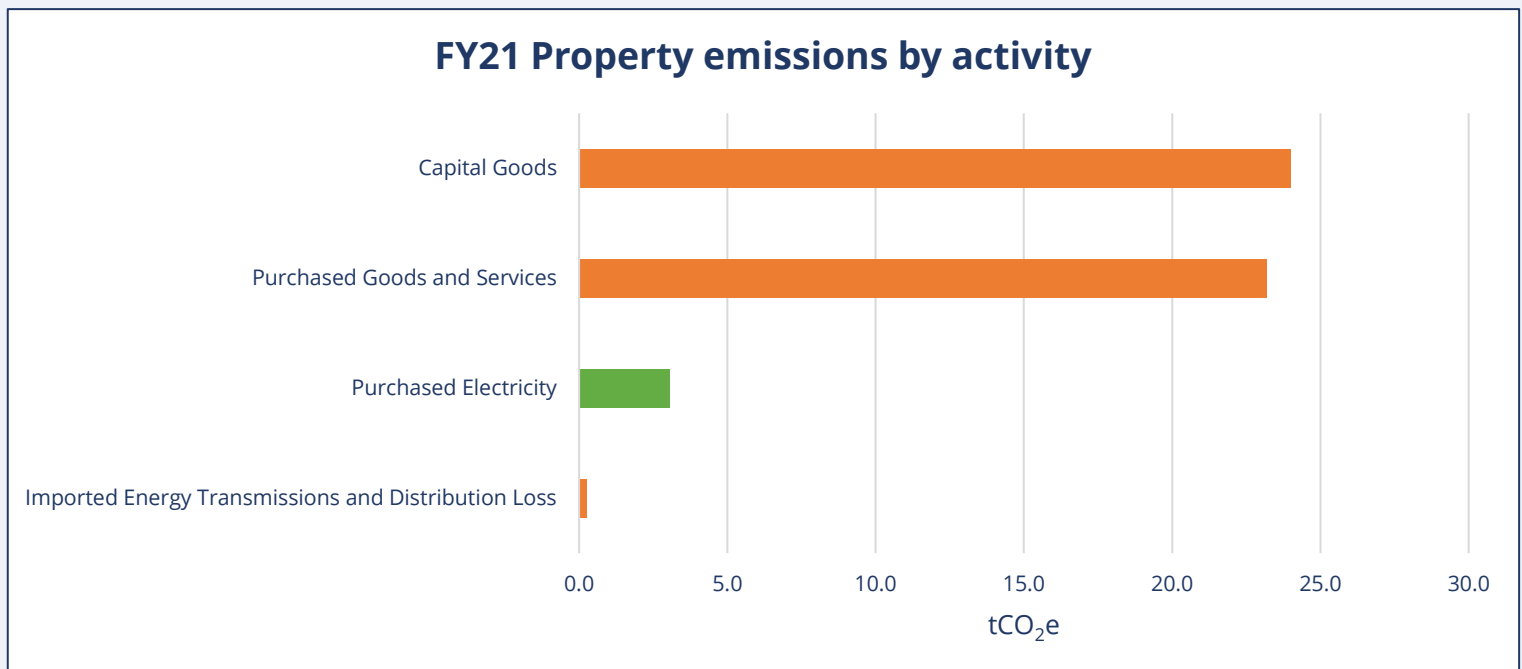
**Figure 17:** FY21 General Infrastructure emissions by activity

**Table 23:** FY21 General Infrastructure emissions by activity

General Infrastructure Emissions Activity	FY21 tCO <sub>2</sub> e	% of General Infrastructure Emissions	% Attributed to Emission Activity Total
Purchased Goods and Services	22	60%	1%
Mobile Fuel Consumption (Fleet)	9	25%	6%
Purchased Electricity	3	8%	1%
Upstream Emissions from Fuel Production and Distribution	2	6%	6%
Imported Energy and Distribution Losses	0.2	1%	1%
<b>Total</b>	<b>36</b>	-	-

## 5.5 Property

As described in table 5, the Property business group oversees external public properties owned or managed by KDC. This includes the Library and Kauri Coast Pool. Property's total emissions for FY21 were 51 tCO<sub>2</sub>e, which accounts for 0.5% of KDC's total emissions. Figure 18 shows Property's emissions by activity, while Table 24 provides further detail.

**Figure 18:** FY21 Property emissions by activity

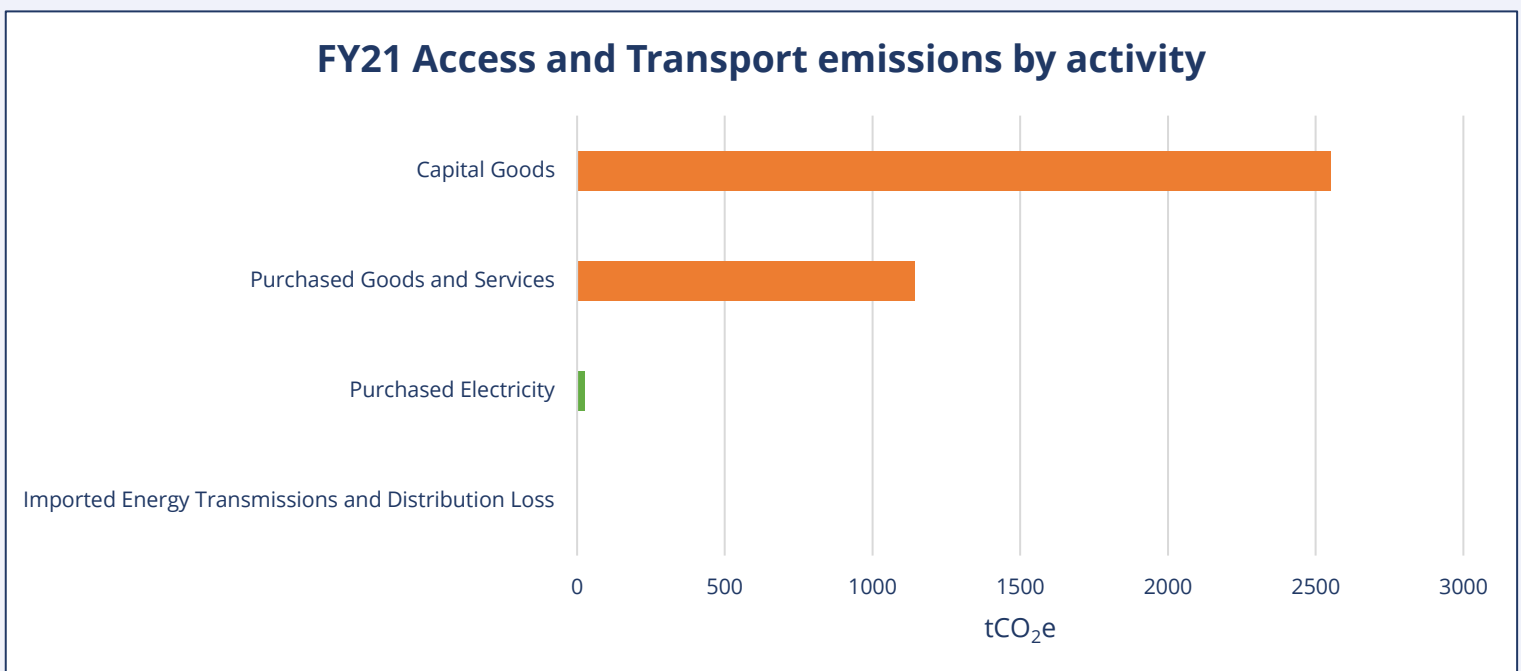
**Table 24:** FY21 Property emissions by activity.

Property Emissions Activity	FY21 tCO <sub>2e</sub>	% of Property Emissions	% Attributed to Emission Activity Total
Capital Goods	24	48%	1%
Purchased Goods and Services	23	46%	1%
Purchased Electricity	3	6%	1%
Imported Energy and Distribution Losses	0.2	0.5%	1%
<b>Total</b>	<b>51</b>	<b>-</b>	<b>-</b>

## 5.6 Access and Transport

As described in table 5, the Access and Transport business group oversees streetlights in the Kaipara District. Access and Transport's total emissions for FY21 were 3,721 tCO<sub>2e</sub>, which accounts for 34% of KDC's total emissions. Figure 19 shows Access and Roding's emissions by activity, while Table 25 provides further detail.

**FY21 Access and Transport emissions by activity**



**Figure 19:** FY21 Access and Transport emissions by activity.

**Table 25:** FY21 Access and Transport emissions by activity.

Access and Transport Emissions Activity	FY21 tCO <sub>2</sub> e	% of Access and Transportation Emissions	% Attributed to Emission Activity Total
Capital Goods	2,549	69%	78%
Purchased Goods and Services	1,143	31%	55%
Purchased Electricity	27	1%	10%
Imported Energy and Distribution Losses	2	0.1%	10%
<b>Total</b>	<b>3,721</b>	-	-

## 6.0 GHG Emissions Reduction Opportunities

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

This is not a detailed or exhaustive list – a separate project to perform a detailed analysis of carbon reduction opportunities would have to be undertaken (something **CarbonEES**® can assist with). This document serves as the first step in that process, by measuring KDC's GHG inventory. As such these recommendations are not to be taken as complete or comprehensive advice.

### 6.1 Reduce Wastewater Treatment Emissions

The largest source of Kaipara District Council's GHG emissions is from Wastewater Treatment with 43% of the overall footprint. This is a significant increase on previous reports, due to updated emission factors and improved estimates (such as the inclusion of agricultural waste). However, when KDC has the data available to perform a Level 2 analysis from the Water NZ (2021) standard, total emissions could change again. Changes to processes or influent should have a measurable impact from this point forward.

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 sampling data to conduct at least a Level 2 analysis, 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 composting.



## 6.2 Further Analyse Project Work and Implement Sustainable Procurement Policies

A large portion of KDC's GHG emissions are generated from services and goods it purchases. However, due to primary data being unavailable, emissions must be derived from dollar-spend figures. This may over-estimate or under-estimate actual emissions.

If KDC was able to build into its procurement policies, a requirement for suppliers to measure and report on either their own emissions, or record values for their major emission sources (e.g., litres of fuel used, electronic equipment provided, concrete used, etc.), it would better be able to look for opportunities to reduce emissions in this area.

Additionally, KDC may wish to build into its supply chain a series of requirements for preference being given to verified, more sustainably produced goods and services. Whilst these may be more costly, verified lower-carbon products are a good way to lower emissions for an organisation, with a relatively easy, swap-in solution.

## 6.3 Reduce Electricity Usage

The fourth largest source of KDC' corporate emissions are from purchased electricity. KDC could go about reducing its electricity usage in a variety of ways. It could look to undertake an energy audit in buildings with a large electricity usage profile. This would enable the identification of any site-specific opportunities for energy reduction.

Additionally, KDC could look to install renewable energy, such as solar panels, at suitable sites – thus lowering KDC' grid-demand.

KDC could also look to purchased Renewable Energy Certificates, which allow KDC to ensure some, or all, of its electricity usage is carbon-free. Renewable Energy Certificates are issued by electricity suppliers to verify a quantity of purchased electricity is confirmed to be renewable. They are limited by the amount of renewable energy generation that retailer has access to.

## 6.4 Reduce Employee Commuting Emissions

The fifth largest source of emissions from KDC were from employee commuting (2%). To reduce these emissions, council could first look to undertake a more comprehensive staff commuting survey. It could then encourage, possible incentivising, low emissions commuting such as carpooling. Work from home flexibility KDC currently offers should be maintained as this will assist in reducing emissions.

## 6.5 Reduce Vehicle Fleet Emissions

Direct emissions from vehicle fleet emissions were 1.48% of the total footprint. Additionally, there are the indirect emissions from fuel use which account for a further 0.35% of the footprint. In total emissions from vehicle fleet are 1.83% 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.

## 7.0 Discussion

### 7.1 Emission Reduction Targets

KDC has determined emissions reductions targets to reduce its organisational emissions by 30% by 2031, compared to its baseline. Additionally, it wishes to become net zero by 2050.

Given KDC's carbon footprinting process is still in its early days and is ever evolving, these targets should be achievable, even given the significant increases this reporting period. Ultimately, however, KDC may wish to reconsider its baseline year, once its wastewater treatment emissions estimation methodology is fully in place and consistent. Once KDC are able to undertake a Level 2 analysis, any differences between years should be purely down to activity changes and not measurement methodology changes.

### 7.2 Emissions Offsets

If KDC is to meet its emission reduction targets, they will need to make substantial reductions to their emissions profiles. However, it is widely accepted that hard to eliminate emissions will remain after an organisation has endeavoured to reduce emissions as far as it can. KDC may wish to offset some or all its remaining emissions at some point in the future and could look at purchasing carbon credits to this end.

Alternatively, if KDC wanted to participate in tree planting activities without having it certified they could disclose an estimate of the emissions offset the planted trees would create if they specified that the estimate has not been certified. This estimate could be included as an appendix to future GHG emissions inventories, but non-certified emission offsets should not be included in net emissions calculations.

## 8.0 References

- MfE (2022) - Ministry for the Environment. 2022. Measuring Emissions: A Guide for Organisations. 2022 Detailed Guide. Wellington: Ministry for the Environment.
- MfE (2020) - Ministry for the Environment. 2020. Measuring Emissions: A Guide for Organisations. 2020 Detailed Guide. Wellington: Ministry for the Environment.
- DEFRA (2021) - Department for Environment, Food and Rural Affairs. 2019. Greenhouse gas reporting: conversion factors 2019. United Kingdom.
- Motu (2014) - Greenhouse Gas Emissions in New Zealand: A Preliminary Consumption-Based Analysis, Motu Working Paper 14-05, Motu Economic and Public Policy Research, Wellington New Zealand.
- David A. Turner, Ian D. Williams, Simon Kemp (2015) - Greenhouse gas emission factors for recycling of source-segregated waste materials. Resources, Conservation and Recycling, Volume 105, Part A, December 2015, Pages 206-197. <https://doi.org/10.1016/j.resconrec.2015.10.026>
- RBNZ (2020) – Reserve Bank of New Zealand. Inflation calculator. <https://www.rbnz.govt.nz/monetary-policy/inflation-calculator>
- Population data - <https://www.stats.govt.nz/tools/2018-census-place-summaries/kaipara-district>
- Flight Distances - [https://airport.globefeed.com/New\\_Zealand\\_Distance\\_Between\\_Airports.asp](https://airport.globefeed.com/New_Zealand_Distance_Between_Airports.asp)

## 9.0 Glossary

- **Carbon Dioxide Equivalent (CO<sub>2</sub>e)** - 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<sub>2</sub>. Standard ratios are used to convert gases into equivalent amounts of CO<sub>2</sub>; these are based on each gas's GWP over a 100-year timeframe.
- **Carbon Footprint** - A measure of the amount of GHGs emitted by an organisation. Typically expressed in terms of CO<sub>2</sub>e, 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<sub>2</sub> or CO<sub>2</sub>e.
- **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<sub>2</sub>. For example, sulphur hexafluoride has 23,900 times the GWP of CO<sub>2</sub>, thus is 23,900 times more potent at contributing to global warming than CO<sub>2</sub> over a 100-year timeframe.
- **Greenhouse Gas (GHG)** - 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.

## Appendix A: Data Quality

**CarbonEES®** use a Multi-Criteria Decision Making (MCDM) methodology for determining the emission data quality in carbon inventories. Each data source is rated out of 5 by asking questions in the following weighted criteria:

- **Accuracy:** How accurately does the data portray the emission activity? Is it comparable with other carbon inventories?
- **Certainty:** How certain are you that the data is accurate? Are there any estimations? What is the potential margin of error?
- **Frequency:** How frequently is the data captured?
- **Timeliness:** How well does the data capture the period measured in this inventory?
- **Completeness:** How complete is the data? Are there any gaps?

The table below shows the ratings for each emission activity under the weighted criteria and the resulting data quality.

Emission Activity	Accuracy	Certainty	Frequency	Timeliness	Completeness	Data Quality
Mobile Fuel Combustion (Fleet)	5	4	5	5	5	95%
LPG	5	5	4	5	5	99%
Wastewater Treatment	2	3	2	5	5	60%
Purchased Electricity	5	5	4	5	5	99%
Freight Transportation and Distribution	4	4	2	5	5	82%
Upstream Emissions from Fuel Production and Distribution	5	4	5	5	5	95%
Business Travel and Accommodation	5	4	4	5	5	93%
Employee Commuting and Working from Home	3	2	2	5	5	63%

Emission Activity	Accuracy	Certainty	Frequency	Timeliness	Completeness	Data Quality
Purchased Goods and Services	5	2	5	5	5	84%
Capital Goods	5	2	5	5	5	84%
Waste Generated in Operations	2	3	2	5	5	60%
Imported Energy Transmissions and Distribution Losses	5	5	4	5	5	99%
<b>KDC GHG Inventory Average Rating</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>5</b>	<b>5</b>	<b>85%</b>

## Appendix B: ISO 14064-1 Reporting Index

ISO Reporting	Section in this report	ISO Reporting	Section in this report
9.3.1 (a)	<a href="#">1.2</a> , <a href="#">2.2</a>	9.3.1 (q)	<a href="#">3.6</a>
9.3.1 (b)	<a href="#">1.3</a>	9.3.1 (r)	<a href="#">1.1</a>
9.3.1 (c)	<a href="#">1.4</a>	9.3.1 (s)	<a href="#">3.2</a>
9.3.1 (d)	<a href="#">2.0</a> , <a href="#">2.1</a>	9.3.1 (t)	<a href="#">9.0</a>
9.3.1 (e)	<a href="#">3.0</a> , <a href="#">3.3</a>	9.3.2 (a)	<a href="#">1.2.1</a>
9.3.1 (f)	<a href="#">Table 2</a>	9.3.2 (b)	Not applicable
9.3.1 (g)	Not applicable	9.3.2 (c)	Not applicable
9.3.1 (h)	Not applicable	9.3.2 (d)	Not included
9.3.1 (i)	<a href="#">3.5</a>	9.3.2 (e)	<a href="#">5.0</a>
9.3.1 (j)	<a href="#">4.0</a>	9.3.2 (f)	<a href="#">4.1</a>
9.3.1 (k)	<a href="#">3.7</a>	9.3.2 (g)	Not included
9.3.1 (l)	<a href="#">3.8</a>	9.3.2 (h)	<a href="#">4.3</a>
9.3.1 (m)	<a href="#">3.4</a>	9.3.2 (i)	<a href="#">3.2</a>
9.3.1 (n)	Not applicable	9.3.2 (j)	Not included
9.3.1 (o)	<a href="#">3.4</a>	9.3.2 (k)	Not included
9.3.1 (p)	<a href="#">3.6</a>	9.3.3	Not included