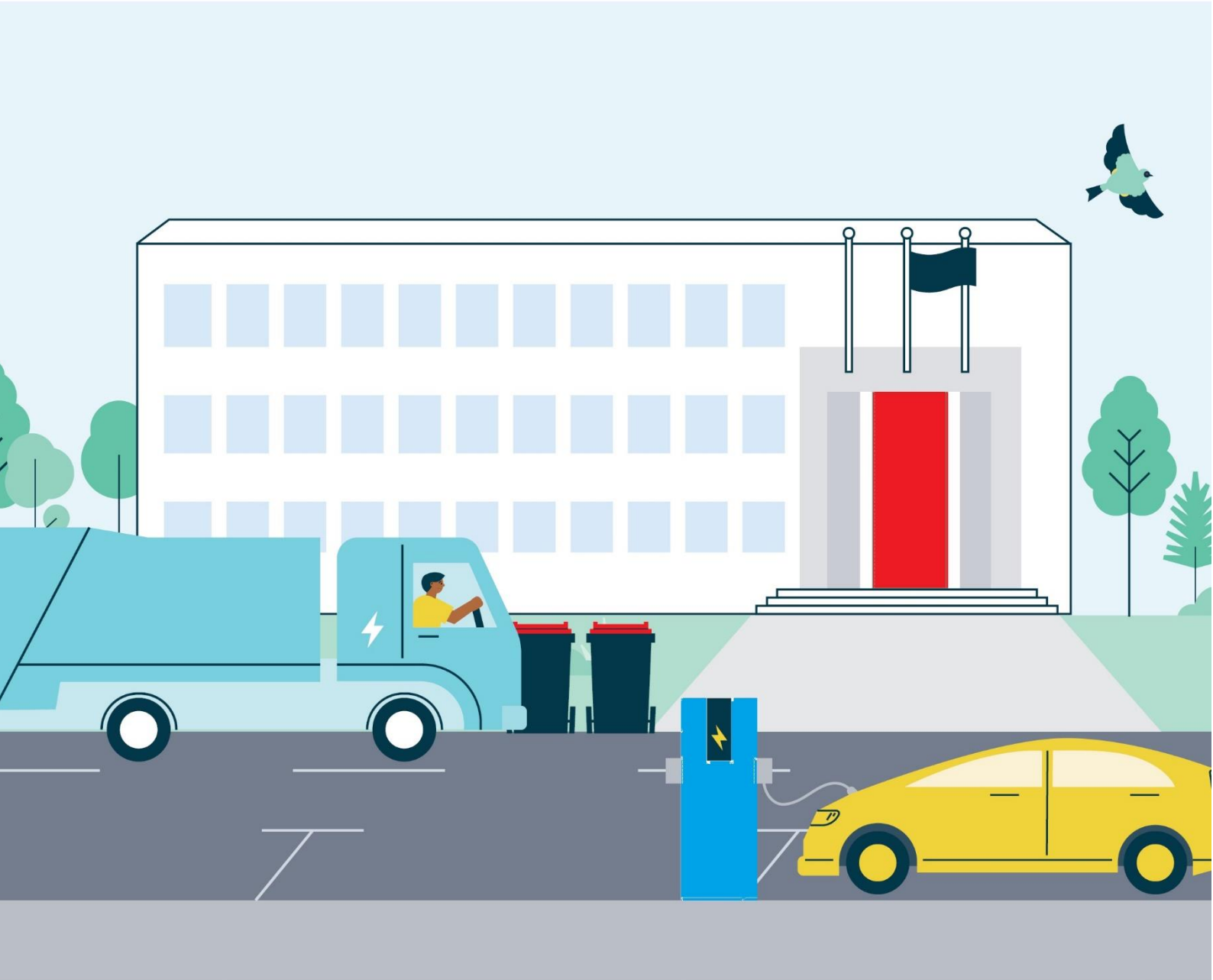
HUTT CITY
TE AWA KAIRANGI

Greenhouse Gas Inventory Report
2023/2024



This report has been produced in accordance with ISO 14064-1:2018 and the Greenhouse Gas Protocol.

Emissions are discussed in Scopes, for consistency with other reports.

Version	Author	Date	Description
V 1.0	Shane Gogo	11/11/2024	1st Draft
V 2.0	Shane Gogo	28/11/2024	2nd Draft
FINAL	Shane Gogo	18/12/2024	Final

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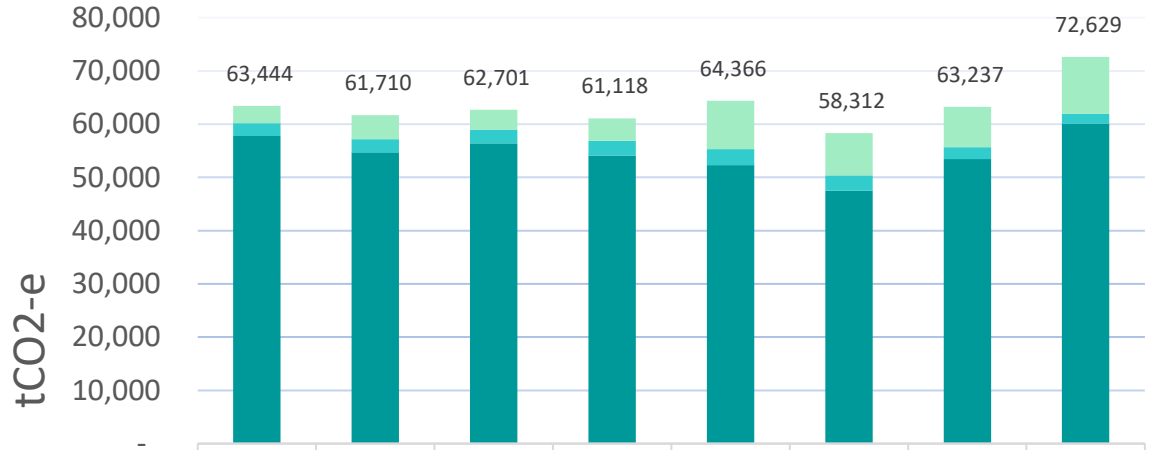
SUMMARY

Hutt City Council (HCC) has in place its Carbon Reduction and Climate Resilience Plan 2021-31, with an organisational target to reduce emissions to net zero by 2050. This report on the greenhouse gas inventory 2023/24 assesses HCC's performance against this target. Hutt City Council's total carbon footprint for 2023/24 has been estimated at 72,629 tCO_{2-e}. This compares to 63,444 tCO_{2-e} for 2016/17 as the baseline year.

Overall emissions have increased compared to the baseline, and also compared to the previous year (refer Figure 1).

Figure 1: Hutt City Council's annual emissions



	2016 - 2017	2017 - 2018	2018 - 2019	2019 - 2020	2020 - 2021	2021 - 2022	2022 - 2023	2023 - 2024
Scope 3	3,256	4,514	3,736	4,231	9,035	7,905	7,538	10,671
Scope 2	2,383	2,501	2,590	2,744	3,046	2,921	2,225	1,821
Scope 1	57,805	54,695	56,375	54,143	52,285	47,486	53,474	60,138
Total	63,444	61,710	62,701	61,118	64,366	58,312	63,237	72,629

Significant increases in emissions have been recorded for Silverstream landfill (Stage 2) and the closed Silverstream landfill (Stage 1). For Stage 2 this is due to

- the overall amount of waste contained in the landfill increasing (and hence emissions continue to increase), and
- a temporary reduction in the amount of gas that was able to be destroyed, as a result of engines being replaced in April 2024 and despite the flare operating as expected. (However, the new engines are expected improve gas destruction ability going forward.)

Regarding the closed landfill (Stage 1), Stage 2 is slowly moving over the top of Stage 1, and it is becoming more difficult to extract gas, in particular vis-à-vis the modelled theoretical gas generation.

There has also been an increase in emissions associated with contracts, which includes the new Te Ngaengae Pool and Fitness as a major building and construction project. Note that

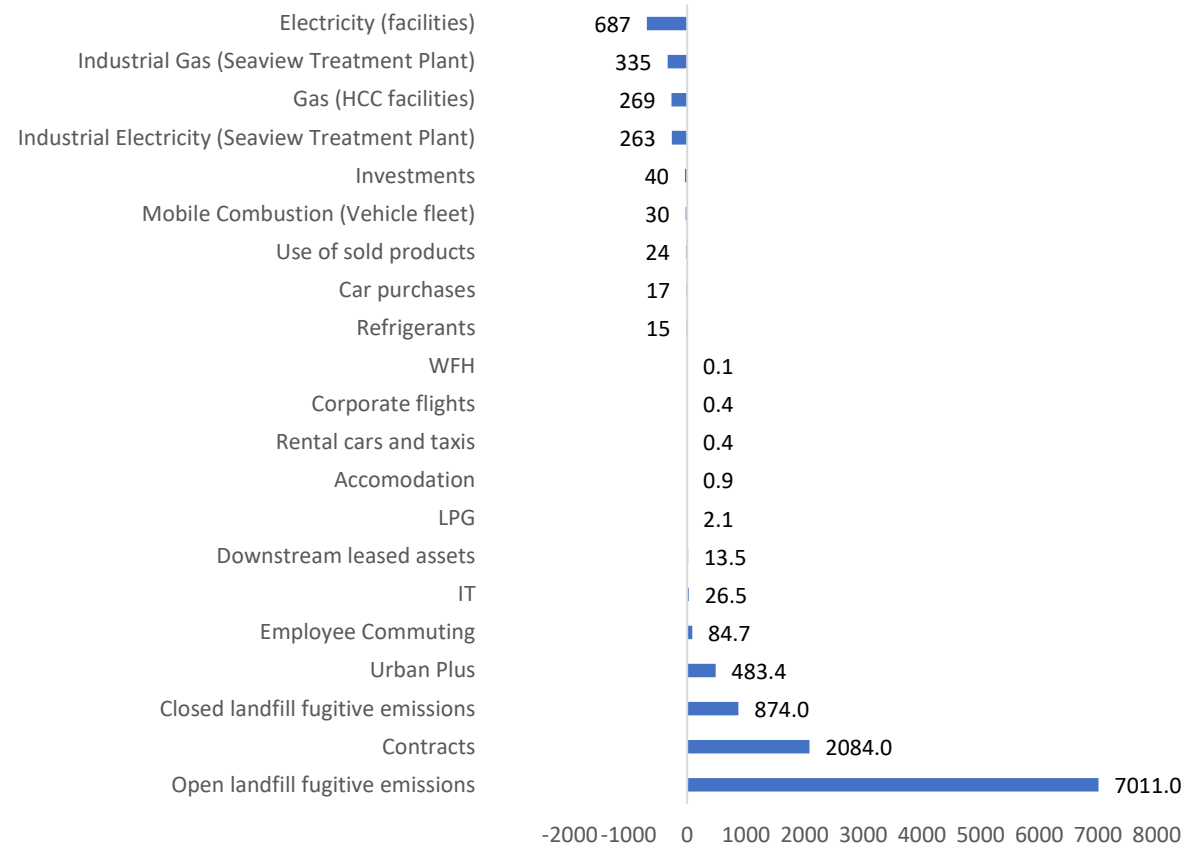
while a number of large contractors now report their actual emissions, the majority of emissions associated with contracted services, greater than or equal to $250,000 NZD, is still estimated by applying industry-wide emission factors to dollars spent. Although this is common practice in scope 3 reporting, there is significant uncertainty associated with those estimates.

The increase in emissions regarding Urban Plus is due to the completion of new homes that were still under construction last year.

Reductions in emissions have occurred in the use of electricity to heat and power our facilities, and various minor categories. This includes reductions in emissions associated with the use of fleet vehicles, with the vehicle fleet now 69% electric.

Figure 2 below shows the increases and reductions for respective emissions categories for this financial year, compared to last year's inventory report.

Figure 2: Hutt City Council emissions profile for 2023/24



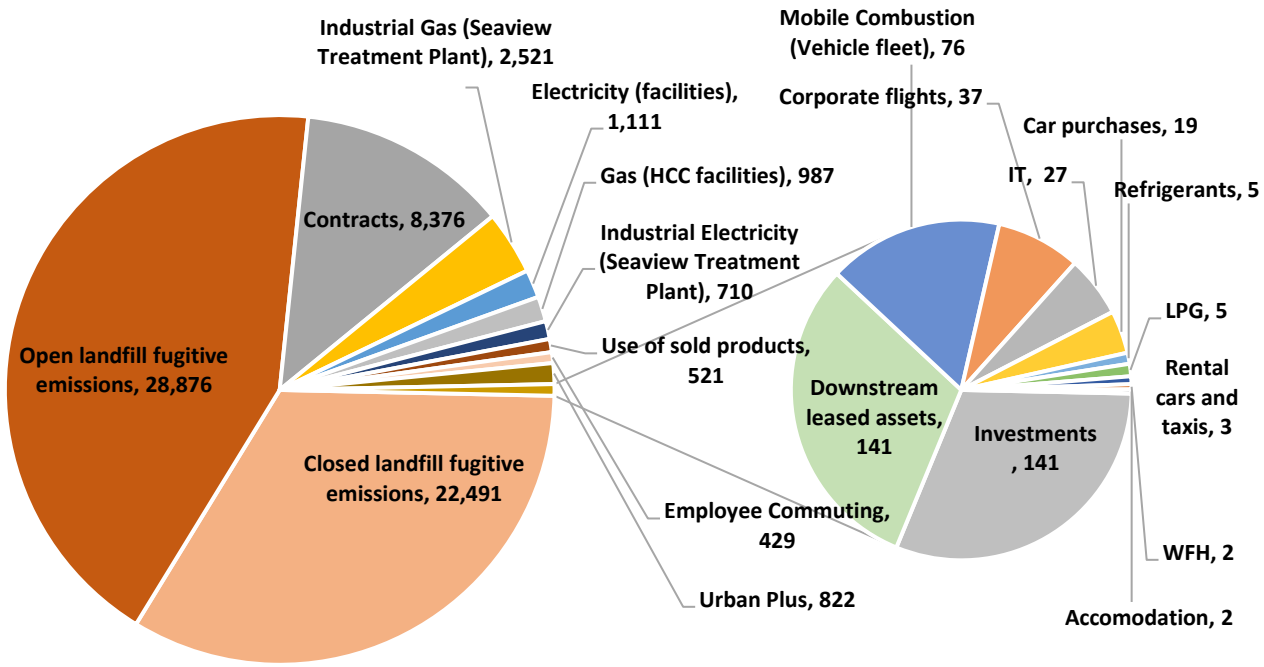
Note that emissions associated with IT networking and data services have been included in this financial year's reporting.

A notable exclusion is the LULUCF (Land Use, Land Use Change and Forestry) category, as the focus of the report is on gross emissions, and because any credits arising from forests registered under the NZ Emissions Trading Scheme are scheduled to be sold, with revenue to be used to facilitate emission reductions in the organisation, and across Lower Hutt (via Council's Low Carbon Acceleration Fund).

Lastly, industrial and invoiced emissions for Wellington Water are reported by Wellington Water for this financial year, however only accounting for its Scope 1 & 2 emissions as the council-controlled organization was not able to provide an update on its scope 3 emissions.

Figure 3 below shows a detailed breakdown of Hutt City Councils emissions for 2023/24.

Figure 3: Hutt City Council emissions profile for 2023/24



Hutt City Council's largest emission sources are the open Silverstream landfill (Stage 2), and the closed Wainuiomata landfill and Silverstream landfill (Stage 1/1A). Emissions from contracted services is the next biggest emission source, followed by a range of smaller sources.

1. INTRODUCTION

1.1 ORGANISATIONAL BOUNDARIES

A consolidation approach has been applied to define carbon emissions for operational boundaries.

The following methods are widely used in organisational carbon footprint reporting: the control approach (either financial or operational control), and the equity share approach.

There are advantages and disadvantages to each approach, and a useful summary is available in the Global Greenhouse Gas Protocol Accounting and Reporting Standard for the Financial industry via the Greenhous Gas Protocol website.

For this greenhouse gas inventory, an equity share consolidation approach is used, which means that Council Controlled Organisations (CCOs) are considered an equal component of the footprint, alongside the Council's own operations. This is in order to consider Hutt City Council's overall performance and considering that Hutt City Council either has complete or significant financial interest in its CCOs, which results in significant active influence.

Hutt City Council has three CCOs:

Seaview Marina and Urban Plus Limited are 100% owned by HCC; governance is conducted via the companies' respective boards of directors, with the boards accountable to Hutt City Council.

Wellington Water as a whole is 20% owned by Hutt City Council. Each shareholding council is represented on the Wellington Water Committee by one representative, Wellington Water additionally has a board of independent directors. Hutt City has varying stakes in particular assets that are managed by Wellington Water; for example, Hutt City Council has 100% legal ownership of the Seaview Wastewater Treatment Plant, with varying degrees of annual funding responsibilty (averaging a 70% split between Hutt City Council and Upper Hutt City Council).

Hutt City has complete ownership and operational control of the Silverstream landfill, which receives waste from Lower Hutt and other districts in the Greater Wellington region. This results in Hutt City Council having a disproprtionately large carbon footprint compared to other organisations within the city. Waste itself is estimated at 9.3% of Lower Hutt's emissions. Hutt City Council also owns, or has management responsibility, for various closed landfills in Lower

Hutt that have residual emissions, including a closed municipal landfill in WainuiomataMeasurement period

Hutt City Council's greenhouse gas emissions are reported over a financial year period which commences on 1 July and ends on 30 June the following year. All data collected between the financial year period is then used to calculates Scope 1, 2 and 3 emissions.

1.2 REPORTING BOUNDARIES

Scope 1, 2, and 3 are included. Specific categories are reported as below:

Scope and categories	Subcategories	Included
Scope 1 - Direct emissions and removals		
Stationary combustion	Fossil gas used in facilities (HCC)	YES
	Direct flaring from landfills	YES
	Marina Seaview LPG use	YES
	Diesel used in generators	NO (Only included if diesel is used for an emergency in the financial year)
	Biomass fuel	NO (no biomass is used)
Mobile combustion	Fuel used in owned vehicles	YES
Direct process emissions and removals from industrial processes	Seaview Wastewater Treatment Plant	YES
Direct fugitive emissions	Refrigerants (HFC)	YES
	Open landfill fugitive emissions	YES
	Closed landfills fugitive emissions	YES
Scope 2 – Indirect emissions from imported energy		
Purchased energy	Electricity	YES
	Steam	NO (no steam is used)
	Heating & cooling	NO (no additional purchased heating and cooling)
Scope 3 - Indirect emissions		
Upstream scope 3 emissions		
Purchased goods and services	Contracts	YES
	Urban Plus	YES
	Water Supply network	YES
	IT networking and data storage	YES
Capital goods	Cars (Embodied emissions)	YES
	Buildings owned by UPL and Seaview Marina	NO (excluded as these cannot currently be accurately assessed)
Fuel- and energy-related activities (not included in Scope 1 or Scope 2)	Boat activities within the Marina area	YES
Upstream transportation and distribution	Three-water management and network	NO (no available data)

Waste generated in operations	Seaview Wastewater Treatment Plant	Captured in Scope 1, via open landfill fugitive emissions
	Demolition waste	Captured in Scope 1, via open landfill fugitive emissions
	Corporate waste	Captured in Scope 1, via open landfill fugitive emissions
Business travel	Corporate flights	YES
	Rental cars and Taxis	YES
Employee commuting	Staff travel to work	YES
Working from Home	Working from Home	YES
Upstream leased assets	Building owned and leased	NO (but accounted for under facilities)
Couriers	Couriers	YES

Downstream scope 3 emissions

Downstream transportation and distribution	Product transportation	NO (no distributed sold products)
	Three-water management and network	NO
Processing of sold products		NO (no processed sold products)
Use of sold products	Urban Plus houses	YES
End-of-life treatment of sold products	Urban Plus houses	NO (no products have reached end of life)
Downstream leased assets	Facilities	YES
Franchises		NO (HCC does not have franchises)
Investments	Public investments	YES

OTHERS

Land Use, Land Use Change & Forestry	NO

1.3 EXCLUSIONS

1.3.1 Land Use, Land Change and Forestry (LULUCF

Scope 3 emissions are not captured in their entirety. LULUCF (Land Use, Land Use Change and Forestry) emissions are excluded, as the focus of the report is on gross emissions, and because any credits arising from forests registered under the NZ Emissions Trading Scheme are scheduled to be sold, with revenue to be used to facilitate emission reductions.

1.3.2 Capital Goods: Seaview Marina & Urban Plus Limited

The emissions associated with Scope 3 capital goods for Seaview Marina and Urban Plus are excluded as they cannot currently be assessed with accuracy. Hutt City Council is required to maintain financial records for the prior seven years, and many of HCC's assets are older than seven years.

1.3.3 Contracts: Dollar spend below $250,000 NZD

The method of deriving emissions associated with contracts also differs, depending on the size of contract. Contracts worth $250,000 and below are excluded from carbon reporting. Only contracts worth $250,000 or more are accounted for as they make up a larger portion of emissions. Where available and reported by suppliers, actual emissions are reported. However, where data is unavailable, emissions are estimated via the spend based method (i.e. an industry/activity emission factor is multiplied by the amount of dollars spent) and is factored against PPI.

1.4 BASE YEAR

The base year for assessing HCC's emission reduction performance is 2016-2017, this was the year first assessed by HCC (carried out by AECOM). There are several differences in methodology and exclusions between the initial assessment and the present assessment, so these reports cannot be directly compared (e.g. the initial report excluded fugitive emissions from closed landfills). However, where possible, emissions data has been back-calculated in order to enable a comparison between different years.

2. METHODOLOGY

Generally, emissions were calculated as per *Ministry for the Environment 2024 Measuring Emissions: A Guide for Organisations: 2024 Detailed Guide. Wellington: Ministry for the Environment,* (hereafter referred to as 'the MFE guide'). Where the methodology differs, the differences are discussed in this methodology section.

While some emission factors used could be considered out of date, such as those retrieved from Motu publications that are based on spend, an inflationary factor (Producer Price Index - PPI) has been applied to update these.

A table of all emission data sources and assumptions used are provided in Appendix 1- Data source and assumptions.

2.1 SCOPE 1 – DIRECT GREENHOUSE GAS EMISSIONS

2.1.1 Stationary combustion

Facility Gas Use

Natural gas use is accounted for across all council owned and operated facilities. Emissions are calculated as per the MFE guide, using invoiced consumption.

Direct flaring from landfills

Refer to Appendix 2- Active and closed landfill assessment.

Seaview Marina

Calculated as per the MFE guide, using invoiced consumption. Seaview Marina consumes bottled LPG and standard diesel.

2.1.2 Industrial processes

Emissions associated with the Seaview Wastewater Treatment plant are calculated from Wellington Water's (WW) carbon emissions profile for financial year 2023/24. Note that WW's greenhouse gas inventory was produced with reference to Water NZ Guidelines 2021 and as per the MFE guide.

2.1.3 Direct fugitive emissions

Open landfill fugitive emissions

Refer to Appendix 2- Active and closed landfill assessment.

Closed landfill fugitive emissions.

Refer to Appendix 2- Active and closed landfill assessment.

2.2 SCOPE 2 – INDIRECT EMISSIONS FROM IMPORTED ENERGY

The most recent available emission factors from the MFE guide (July 2024) are used. Since MFE has only published factors up to July 2024 the most recent factor is used for all following months. Renewable Energy Certificates are not used by Hutt City Council.

2.3 SCOPE 3 – UPSTREAM INDIRECT EMISSIONS

2.3.1 Purchased goods and services

Contracts

Emissions data was requested from HCC's larger contractors (typically those where HCC's expenditure exceeds $250,000 per year), in line with HCC's expectations. In most cases, relevant contractors and suppliers only provided Scope 1 and Scope 2 emissions data, as some contractors do not yet collect Scope 3 data, and most existing contracts do not yet require the collection of this data. Note that work is under way to ensure that emissions data is available from a wider range of HCC's suppliers, and that relevant contracts include objectives and actions to reduce emissions.

Where contractors and suppliers did not provide emissions data, emissions were estimated based on contract spend and emission factors provided by Motu ("*Consumption-based greenhouse gas emissions input-output model", 2014, obtained by Motu Economic and Public Policy Research from Statistics New Zealand, MBIE and MFE in 2013. Unrestricted dataset available online from www.motu.org.nz).* While this is not a precise method, it acts as a suitable proxy. These factors have been adjusted based on the Producer Price Index (PPI) for the June 2024 quarter, only the net figures are reported.

https://www.stats.govt.nz/information-releases/business-price-indexes-june-2024-quarter/

Note that inflationary adjustments now utilise the Producer Price Index (PPI) instead of the Consumer Price Index (CPI). Therefore, the contractor emissions results were recalculated for financial year 2022/23 as an error was identified and have been adjusted to use PPI for consistent results moving forward.

Urban Plus

Urban Plus Limited provided information on expenses associated with construction and demolition, equipment, operational expense, and cleaning. Emissions have been estimated by using Motu factors and are included here. Note that all data from Urban Plus was for financial year 2023/2024 and was gathered and supplied by HCC's finance team.

Wellington Water

Wellington Water (WW) completed an operational footprint for the financial year 2023/2024. Included in their report were emissions from natural gas used for drying sludge, electricity and T&D losses which is represented as industrial fossil gas and industrial electricity. They also accounted for emission sources of Methane and Nitrogen expelled during the process, hence this is represented as industrial process emissions in this report. However, WW did not include emissions associated with purchased goods and services. They have not updated that footprint

data since 2021 when Wellington Water provided an inventory of maintenance related expenses. Emissions associated with these are included and assumed to be the same.

IT networking and data storage

HCC uses Microsoft (MS) Azure for cloud-based information sharing and storage. Microsoft Azure reports all scopes of emissions associated with HCC cloud usage via Power BI. The offshore MS storage facility in Australia manages storage for any businesses and organisations in the Oceania region, however the IT emissions data is reported and representative of HCC's emissions.

2.3.2 Capital Goods

Cars (vehicle purchases)

Upstream emissions associated with the purchase of vehicles have been estimated based on Motu factors and factoring inflation rates based on producer price index and amortised across the duration of vehicle ownership.

https://www.stats.govt.nz/information-releases/business-price-indexes-june-2024-quarter/

Capital goods for Urban Plus and Facilities are excluded as these cannot be accurately assessed.

2.3.3 Business travel

Corporate flights

HCC uses Orbit Travel as a travel agent. As part of this service, they produce a report based on distance travelled, in kilometres, associated with air travel. This information is submitted to CarbonEES, who organise and present the data on their software platform eBench. Emissions are calculated using the appropriate emission factors from the MFE emissions guide 2024.

2.3.4 Employee commuting

A staff survey was completed in October 2024, and the associated emissions of each respondent was calculated as per the 2024 MFE guide. These emissions were averaged and extrapolated to account for every council staff member.

2.3.5 Employees working from home

A staff survey was completed in October 2024, and the associated emissions of each respondent was calculated as per the 2024 MFE guide. These emissions were averaged and extrapolated to account for every council staff member.

2.3.6 Couriers

Emissions associated with couriers were estimated based on contract spend and emission factors provided by Motu (in "Consumption-based greenhouse gas emissions input-output model". 2014. Obtained by Motu Economic and Public Policy Research from Statistics New Zealand, MBIE and MFE in 2013. Unrestricted dataset available online from www.motu.org.nz). The specific factor used was "Postal and courier pickup and delivery

services". While this is not a precise method, it acts as a suitable proxy. These factors have been adjusted based on June 2024 quarter PPI from StatsNZ Scope 3 – Downstream indirect emissions

https://www.stats.govt.nz/information-releases/business-price-indexes-june-2024-quarter/

2.3.7 Downstream transportation and distribution

The only significant downstream transportation and distribution that Hutt City Council carries out is associated with the Three Waters network. These emissions are therefore captured elsewhere (Scope 2, Scope 3 – purchased goods and service, and Scope 3 – capital goods).

Houses sold by Urban Plus are built on site and not transported.

2.3.8 Use of sold products

Emissions associated with houses sold by Urban Plus have been estimated based on the cumulative number of houses sold by UPL and 2024 StatsNZ data on regional household emissions. Note that UPL houses have to achieve a minimum HomeStar 6 rating and cannot include the use of fossil gas for cooking and heating. It is likely the use of these houses may result in lower emissions than StatsNZ data suggests.

2.3.9 Downstream leased assets

The majority of HCC's leased assets are captured within Scope 1 and 2. Although HCC is invoiced for the energy consumption at these sites, it passes this on to the lessee to settle. Council leases property under operating leases. A majority of these leases have a non-cancellable term of 36 months, with the exception of housing leases that have a non-cancellable term of 22 working days.

For the remaining sites, especially tenanted houses, the emissions are estimated based on the average Wellington household emissions from StatsNZ, as well as StatsNZ data on the average number of occupants in a household.

2.3.10 Public investments

The emissions associated with HCC's public investments are calculated by using the Motu derived emission factor for the *Banking and financing; financial asset investing* industry.

2.4 LAND USE, LAND USE CHANGE, FORESTRY

Regarding the land use, land use change, forestry category (LULUCF), Council owns forest land in Lower Hutt, some of which result in net carbon sequestration (e.g. post-1989 native forests). Some of the forests have been registered under the NZ Emissions Trading Scheme and earn carbon credits, most or all of which are intended to be used to facilitate emissions reductions (through the sale of carbon credits, the proceeds will be used for emission reductions or facilitating additional carbon sequestration through planting). Therefore, for the purposes of this carbon footprint report, LULUCF has been excluded, to avoid double counting.

3. RESULTS

3.1 2023/2024 EMISSIONS

Scope and categories	Subcategories	Included
Scope 1 - Direct GHG emissions and removals		
Stationary combustion	Facility gas use (HCC)	987
	Marina Seaview LPG use	5
	Industrial gas use – Seaview Wastewater Treatment Plant	2,521
Mobile combustion	Fuel used in owned vehicles	76
Industrial Processes - Direct process emissions and removals from industrial processes.	Seaview Wastewater Treatment Plant	5,176
Direct fugitive emissions	Refrigerants (HFC)	5
	Open landfill fugitive emissions	28,876
	Closed landfills fugitive emissions	22,491
Scope 2 - Indirect emissions from imported energy		
Purchased energy	Electricity (HCC facilities)	1,111
	Electricity (industrial – Seaview Wastewater Treatment Plan)	710
Scope 3 - Indirect emissions		
Upstream scope 3 emissions		
Purchased goods and services	Contracts	8,376
	Urban Plus	822
	Water Supply network	109
	IT networking and data storage	27
Capital Goods	Cars (vehicle purchases)	19
Business travel	Corporate flights	37
	Rental cars and Taxis	3
Employee commuting	Staff travel to work	429
Working from Home	Staff working from home	2
Couriers	Couriers	16
Downstream scope 3 emissions		
Use of sold products	Urban Plus houses & Seaview Marina	521
Downstream leased assets	Facilities	141
Investments	Public investments	141
OTHERS		
Land Use change	Land use change	excluded

3.2 SCOPE 1 – DIRECT GREENHOUSE GAS EMISSIONS

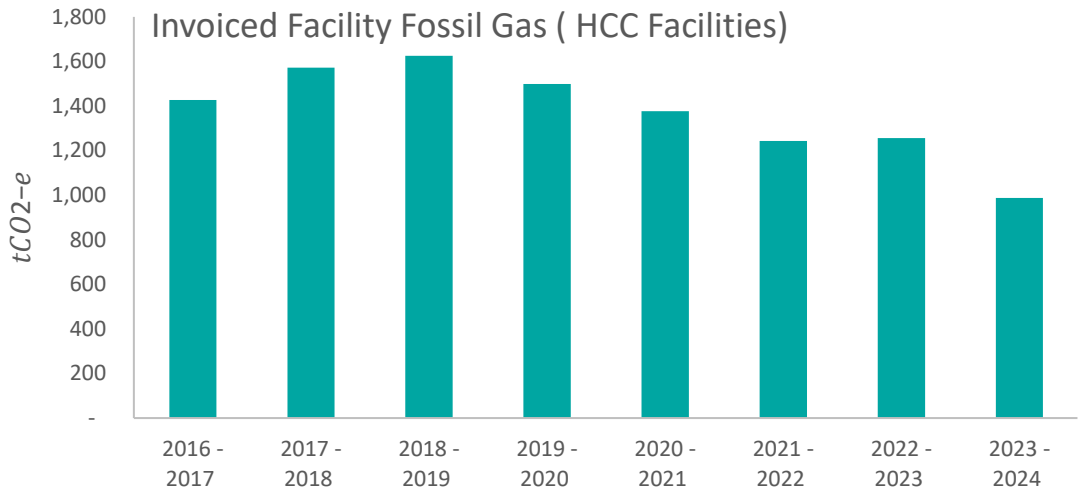
3.2.1 Stationary combustion

Fossil gas used in facilities

Emissions from fossil gas consumption have been steadily reducing since the 2019 calendar year, initially due to the closure of the old Naenae pool, and then due to the decarbonisation programme to phase out gas and improve energy efficiency (e.g. replacement of a gas boiler with a heat pump at the Eastbourne Summer Pool and McKenzie Baths).

Hutt City Council is committed to removing fossil gas from all its facilities by 2030, which consequentially means that HCC is not expected to directly consume any fossil fuels from the next decade outside of emergency situations (during a civil defence emergency Hutt City Council may operate diesel generators to support the emergency response).

Figure 4: Fossil gas consumption, for HCC facilities



Direct flaring from landfills

Direct flared emissions are those associated with the engines of the power plant (and a supplementary flare) at Silverstream landfill, which destroys methane, producing carbon dioxide and electricity. These are noted separately as some landfill emissions are fugitive, whilst these are direct emissions.

In all totals and time series these emissions are included with 'open landfill emissions', due to this breakdown only being available for one year (please refer to Appendix 1 for more detail on landfill emissions.

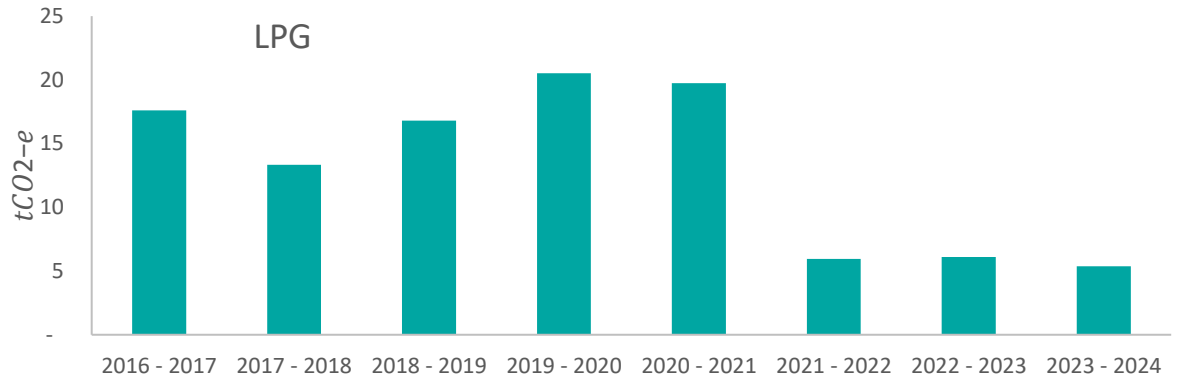
Financial year	Silverstream fugitive emissions separated by pathway (tCO_2e)			
	Stage 1 & 1a		Stage 2	
	Through cap	From engines	Through cap	From engines

2022/23	5,384	1,461	9,445	11,266
2022/24	**8,525**	**768**	**19,962**	**8,914**

Seaview Marina

Seaview Marina uses LPG to heat its showers and ablution blocks. There has been a reduction on LPG gas use since the 2020/2021 financial year. The reduction is related to a decline in tenants and shower use post covid.

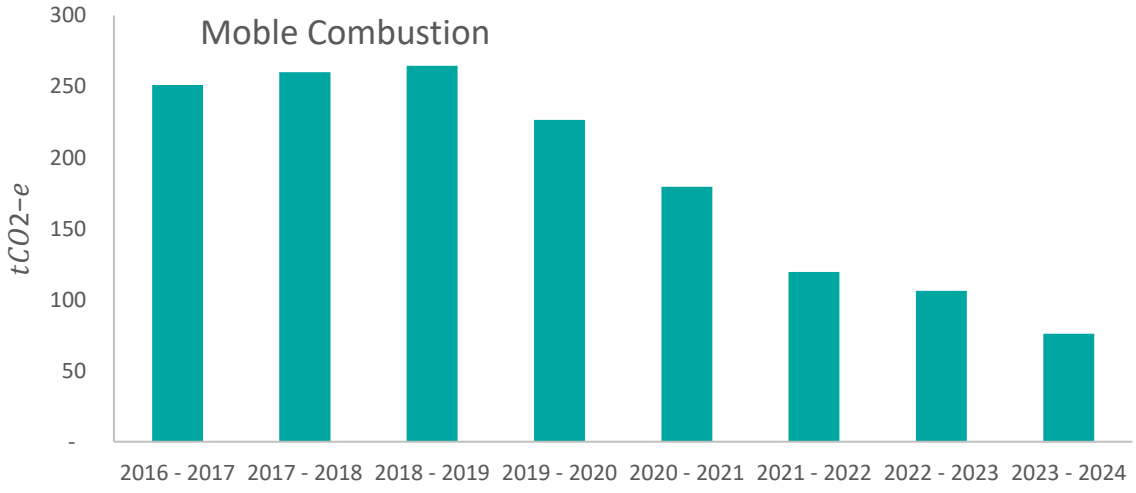
Figure 5: LPG emissions, Seaview Marina



3.2.2 Mobile combustion

Emissions from transport fuels (the operation of Council's vehicle fleet) continue to reduce, in line with Council's electrification of its fleet. By the end of the 2023/24 financial year, about 69% of Council's vehicle fleet were electric.

Figure 6: Mobile combustion, HCC transport fuel use



3.2.3 Industrial processes

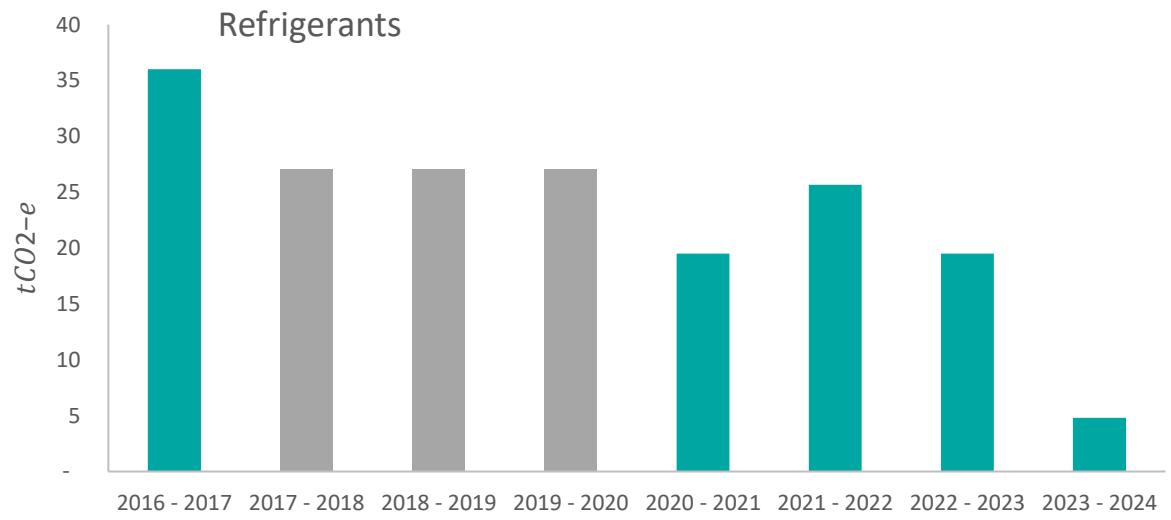
Scope 1 emissions associated with the Seaview Wastewater Treatment plant, other than stationary combustion, are included here and were reported to be 5,176 tCO_{2-e} by Wellington Water. Due to inconsistent monitoring and reporting from Wellington Water, there is difficulty in accurately comparing carbon emissions per respective financial year.

3.2.4 Direct fugitive emissions

Refrigerants

Emissions associated with refrigerant use is calculated to have decreased compared to the previous year. There was a reported leakage of the R410a refrigerant from air conditioning at the Wainuiomata Community Centre. The refrigerant itself has a high emission factor because of its global warming potential (GWP 1924), but overall emissions were significantly lower compared to the previous financial year's results. Note that 2017/18 – 2019/20, highlighted in grey, are averages of those years for which we do not have data.

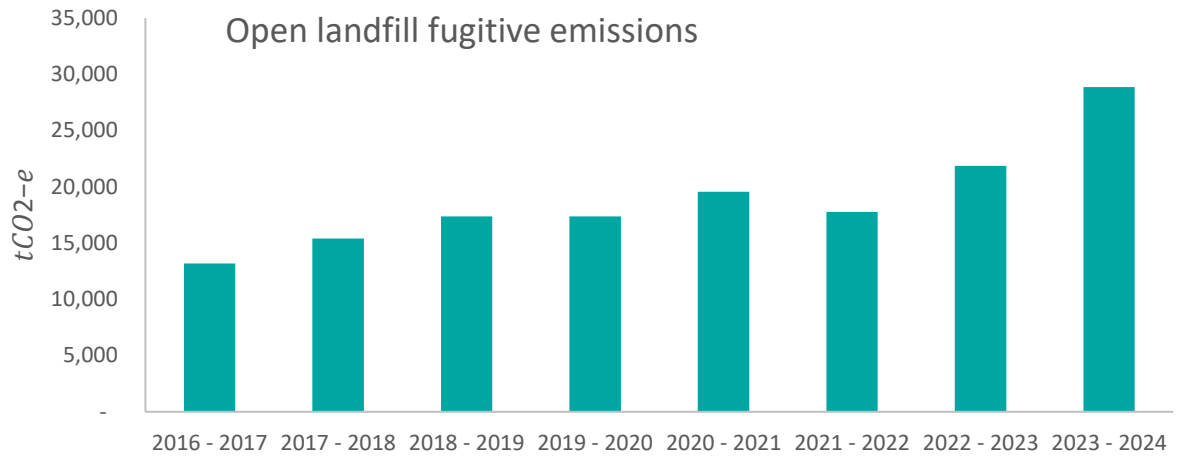
Figure 7: Refrigerant emissions



Open landfill emissions

The emissions associated with Silverstream landfill (Stage 2) have increased, due to (a) the overall amount of waste contained in the landfill increasing (and hence emissions continue to increase), and (b) a temporary reduction in the amount of gas that was able to be destroyed, as a result of engines being replaced in April 2024 (despite the flare operating as expected). However, the new engines will improve gas destruction ability going forward. Please refer to Appendix 1 for additional information.

Figure 8: Open landfill fugitive emissions

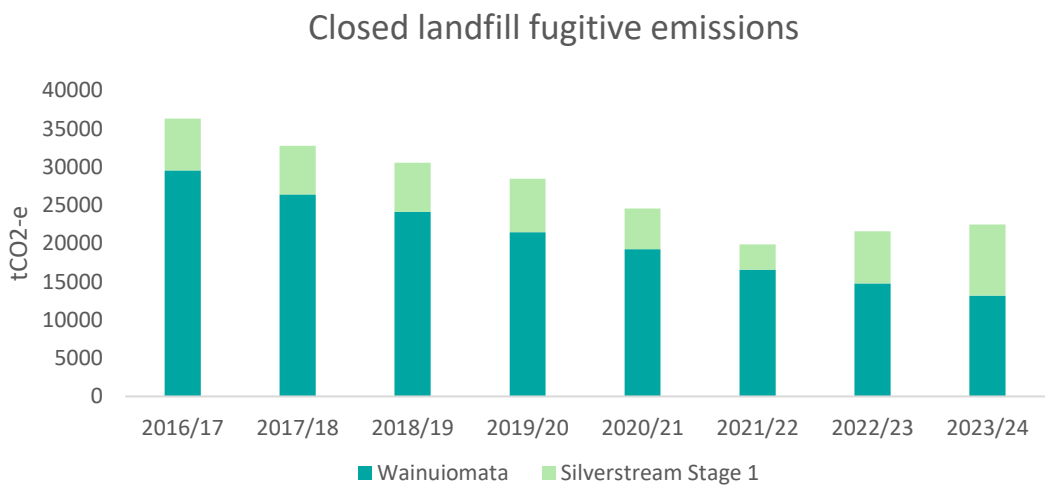


Closed landfill fugitive emissions

Emissions from the closed Silverstream landfill (Stage 1) increased due to insufficient gas extraction and destruction. There are two factors that are relevant for this. As noted above, the engines at the power plant were replaced in April 2024, and this resulted in a temporary reduction in the amount of gas that able to be destroyed (as emissions from both Stage 1 and Stage 2 are combusted in the on-site power plant). In addition, Stage 2 is slowly moving over the top of Stage 1, and it is becoming more difficult to extract gas (in particular vis-à-vis the modelled theoretical gas generation). In June 2024, two new gas wells were installed into stage 1 in an attempt to increase extraction, but these did not produce significant volumes of gas. Please refer to Appendix 1 for additional information.

Financial year	**Fugitive emissions estimate in t CO_2e (emissions destroyed by combustion in brackets)**		
	Silverstream		**Wainuiomata**
	Stage 1 & 1a	**Stage 2**	
2016/17	6,814 (24,713)	13,182 (42,583)	29,545 (0)
2017/18	6,375 (23,137)	15,416 (53,106)	26,412 (0)
2018/19	6,375 (23,137)	17,362 (58,805)	24,173 (0)
2019/20	6,995 (25,390)	17,356 (67,228)	21,487 (0)
2020/21	5,350 (19,416)	19,559 (58,766)	19,249 (0)
2021/22	3,328 (20,231)	17,757 (87,024)	16,563 (0)
2022/23	6,845 (14,611)	21,865 (100,095)	14,772 (0)
2023/24	**9,293 (11,115)**	**28,876 (108,266)**	**13,198 (0)**

Figure 9: Closed landfill fugitive emissions

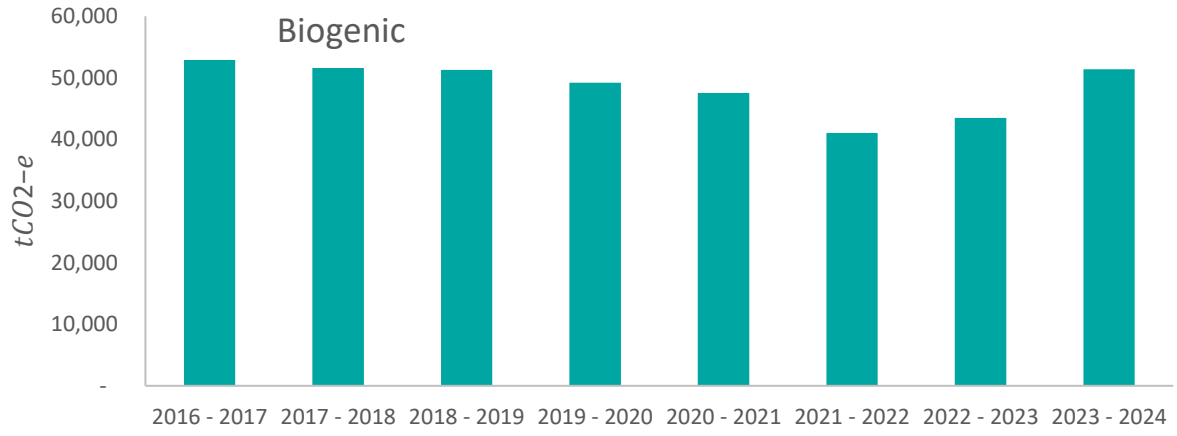


3.2.5 Biogenic emissions

As below, biogenic methane emissions increased compared to the previous year, but note that biogenic emissions are not additional to those noted elsewhere (e.g. section 3.2.4). Please refer to Appendix 1 for more detail on biogenic emissions.

There is significant work under way to continuously improve methane capture and destruction at Silverstream landfill (e.g. new wells are being added as required).

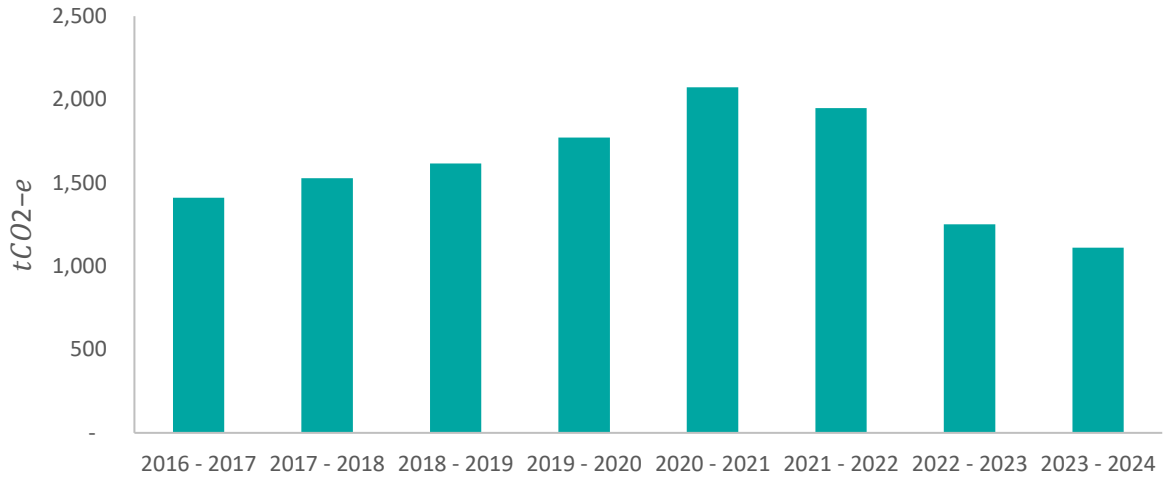
Figure 10: Total fugitive landfill emissions: biogenic



3.3 SCOPE 2 – INDIRECT EMISSIONS FROM IMPORTED ENERGY

The below figure shows emissions associated with invoiced electricity consumption.

Figure 11: Electricity use



Note that emissions associated with electricity consumption can fluctuate from year to year, depending on the carbon intensity of New Zealand's electricity generation.

Emissions for the previous years have been re-calculated, as updated emission factors have been released by the Ministry for the Environment in 2024.

Electricity consumption associated with Seaview Wastewater Treatment Plant cannot be compared to prior years and are estimated to be 710 tCO_{2-e} for the 2023/2024 year.

3.4 SCOPE 3 – UPSTREAM INDIRECT EMISSIONS

3.4.1 Purchased goods and services

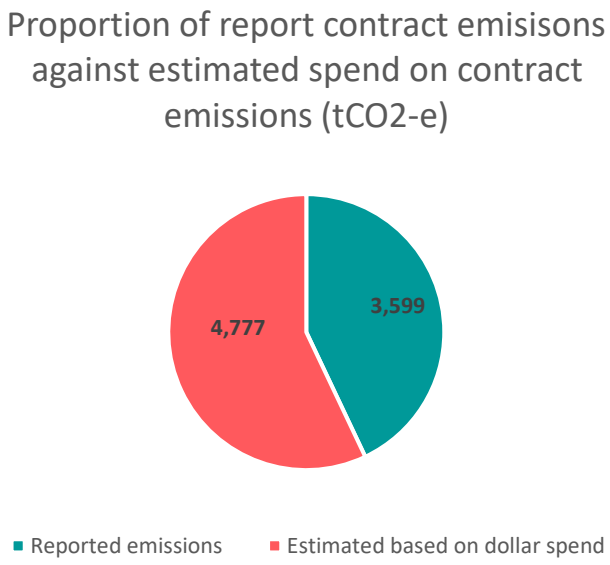
Contracts

For most contracts and purchased services, emissions have been estimated based on spend and MOTU factors. However, for some larger contracts over $250,000 per year in spend (see Figure 12), it was possible to obtain actual emissions data, as it is reported by contractors and suppliers. One example is the emissions associated with kerbside rubbish and recycling collection, with Waste Management NZ as the supplier of that service. However, note that the data underlying this figure excludes contracts for certain services, such as gas, electricity, and Wellington Water, as these are addressed elsewhere.

This year, total emissions for this category have been estimated at 8,376 tCO_{2-e}. Within that, 3,599 tCO_{2-e} are associated with reported emission contracts (see Figure 12).

Also note that, compared to the previous year, there has been a significant increase in emissions associated with contracts, which includes the new Te Ngaegnae Pool as a major building and construction project.

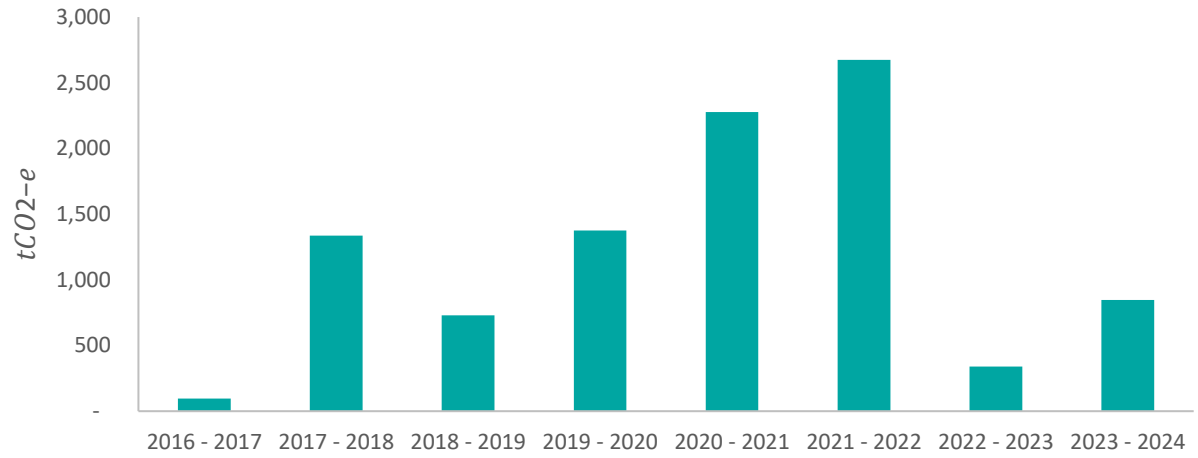
Figure 12: Emissions associated with major operational contracts and services



Urban Plus

These emissions are primarily derived from the construction activity that Urban Plus limited undertakes (via suppliers that undertake services and activities for Urban Plus). Due to only having financial figures that combines the demolition and construction costs, this is likely an overestimation of emissions. Urban Plus also accounts for the costs of a project upon completion, which accounts for some of the annual variation in these emissions. Work is being undertaken to reduce operational emissions of the properties (new homes have to achieve a minimum rating of Homestar 6), but it is not apparent if the embodied emissions will be reduced. Urban Plus emissions have risen since housing projects reached completion this financial year.

Figure 13: Urban Plus emissions from purchased goods and services



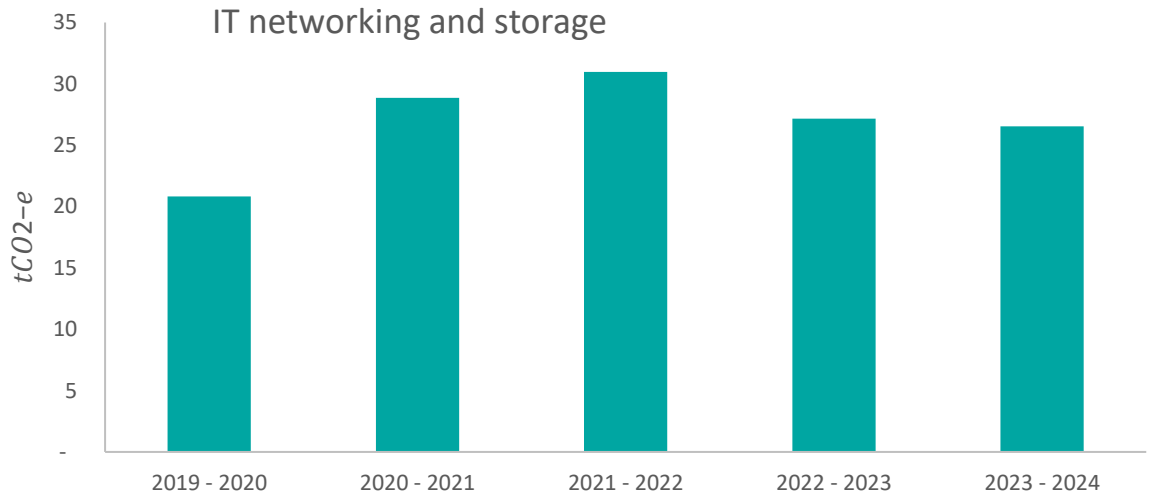
3.4.2 IT networking and data storage

HCC uses Microsoft (MS) Azure for cloud-based information sharing and storage. Microsoft's ''Azure" emissions dashboard accounts for HCC's cloud usage. In 2020 HCC switched from on-premise storage (CM9/TRIM) to cloud storage (SharePoint/Te Pātaka), which utilises Microsoft's offshore servers in Australia. This resulted in data migration from the old system TRIM to SharePoint. Collection and transfer of new data onto SharePoint increased cloud storage capacity. Hence, only the last four years of data is shown here, as there is uncertainty around the emissions associated with IT networking and data storage prior to that point.

The movement, storage, and increased cloud capacity for data results in energy use and translates to increased emissions from storage systems, which is evident in the increase in emissions between 2019/20 and 2021/22.

In addition, the offshore MS storage facility in Australia manages storage for businesses and organisations in the Oceania region. Emissions data, collected through PowerBI, represents only HCC's portion of these emissions.

Figure 14: IT network and storage emissions



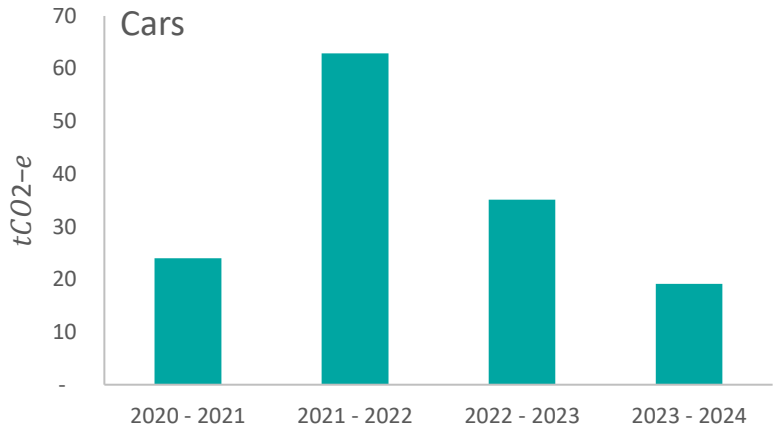
3.4.3 Capital goods

Cars (vehicle purchases)

The embodied emissions of purchased cars is estimated to reduce gradually, as HCC converts its fleet to electric.

Note that HCC's fleet has not grown but has reduced since 2019. Emissions reported here are associated with vehicle purchases per financial year, to replace vehicles, in line with Council's vehicle fleet policy and replacement guidance.

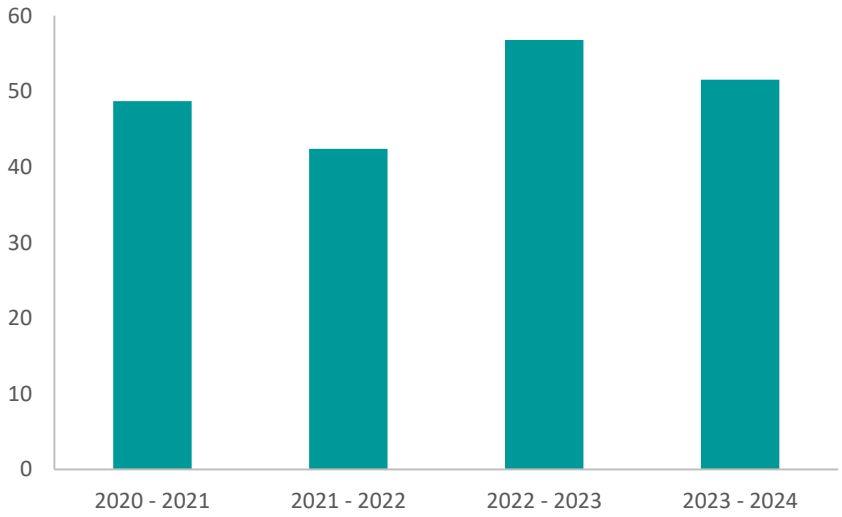
Figure 15: Embodied Emissions of Cars



3.4.4 Waste from facilities

Emissions associated with HCC's facility waste has broadly remained stable. This emission source is provided as an information item only, as emissions are captured under Scope 1 (Silverstream landfill fugitive emissions).

Figure 16: Facility waste

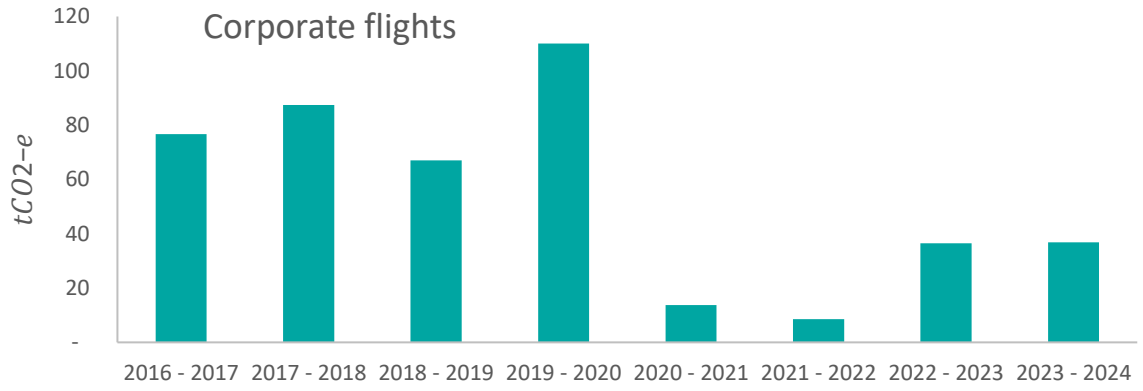


3.4.5 Business travel

Corporate flights

Since the end of the COVID-19 pandemic, emissions from corporate flights have again increased. While there have been consistent emissions figures for 2023/24 compared to last financial year, it is likely that physical attendance at conferences may rise again but it does not appear likely that emissions will return to pre-pandemic levels, due to the general acceptance of online and remote working technologies (e.g. MS Teams).

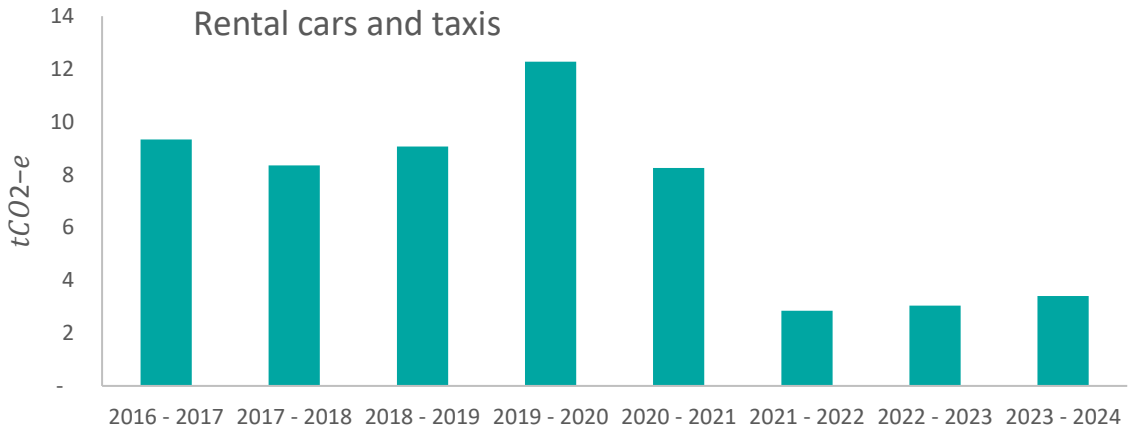
Figure 17: Corporate flight emissions



Rental cars and taxis

Emissions associated with rental car and taxi use has remained low since financial year 2020/2021, this is linked to the continued lower level of flight and corporate travel.

Figure 18: Rental car and taxi emissions



3.4.6 Employee commuting

The emissions associated with HCC's employee commuting is estimated to be 429 tCO_{2-e}, for this inventory a staff survey was produced specifically for commute emissions calculations (total tonnage is extrapolated out to represent all employees, based on the survey results).[1]

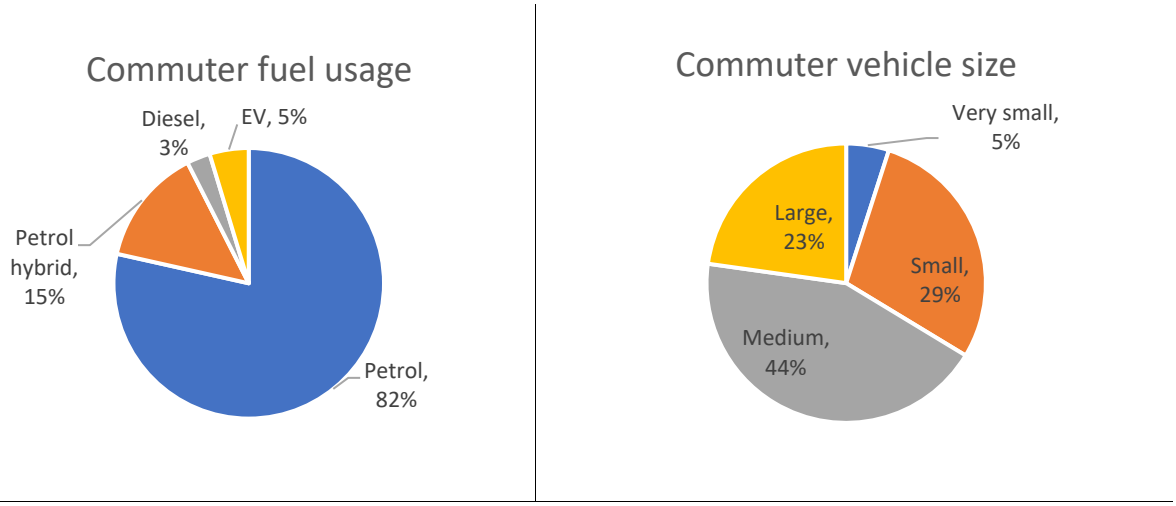
Notable insights include:

- 12% of reported commutes are on public transport.
- 5% reported commutes are through active transport.
- 76% of respondents drive a personal car to work daily.

Most of HCC staff seem to commute from within the Hutt Valley, with a mean commute distance of 29.5 km.

With regard to staff using motor vehicles to travel to and from work, the majority of vehicles are petrol and diesel vehicles. The use of EVs is still low.

Figure 19: Vehicle technologies, and vehicle size



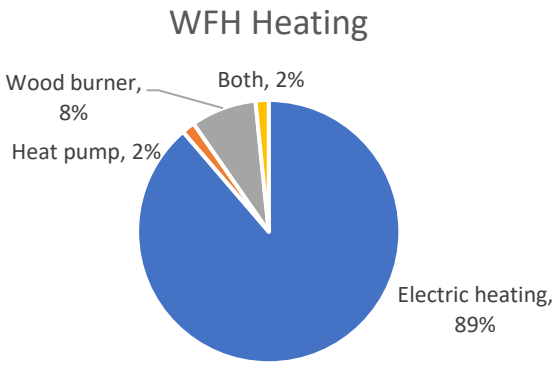
3.4.7 Employees working from home

Emissions associated with staff working from home have been estimated at 2.20 tCO_{2-e}, which is significantly less than the emissions associated with commuting (429 tCO_{2-e}). Emissions are primarily associated with space heating. According to survey data, 89% of staff working from home typically use electric heaters, and emissions could be reduced by staff switching away from gas to alternative technologies for heating, such as heat pumps.

[1] The number of respondents differed was lower than last year's survey results. While results are extrapolated so that we derive emissions totals across all staff, results are not fully comparable and are an estimate only for this emission category.

Based on these findings, there appear to be emission saving benefits associated with working from home and hybrid/flexible working arrangements, including by reducing transport emissions through reduced commuting. However, those benefits also need to be viewed in light of other benefits associated with staff working in the office (e.g. relationship building, face to face interactions).

Figure 20: Heating technologies used by staff at home



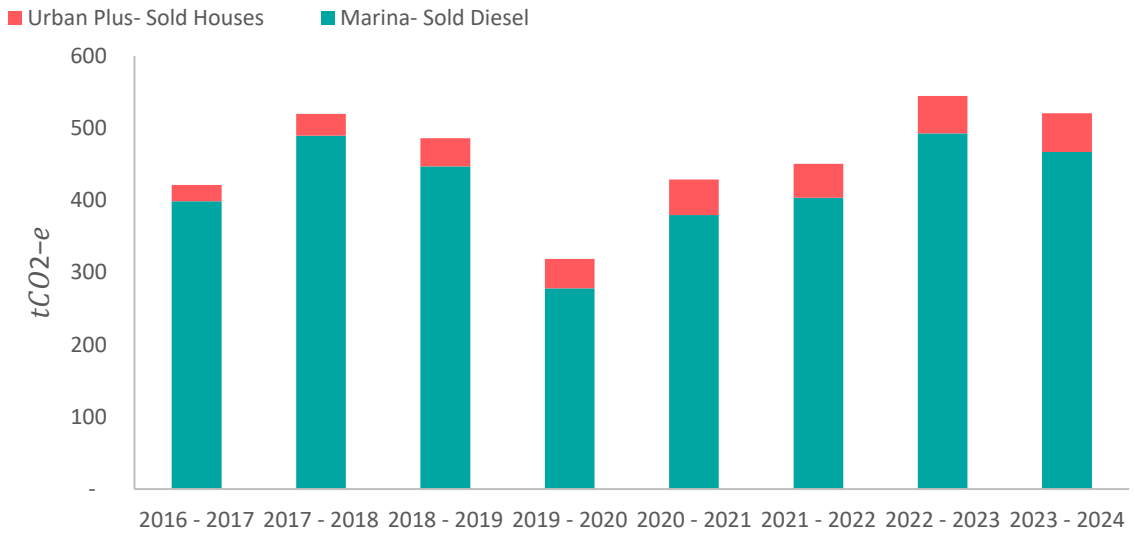
3.5 SCOPE 3 – DOWNSTREAM INDIRECT EMISSIONS

3.5.1 Use of sold products

Hutt City Council only has two sold products, including diesel from the Marina to boat users, and UPL selling houses. The latter are a small emission source through the occupant's usage of energy for heating and cooking.

Emissions associated with sold houses could be lower than is estimated here. This is because UPL builds homes to Homestar 6 as a minimum, and no longer installs fossil gas for any home and water heating, and cooking. Average TOITU figures do not reflect actual occupant emissions per household. The amount of diesel sold to boat users is subject to demand. The emergence of electrified boat options is yet to have an impact as traditional fuelled boats remain popular. Emissions associated with sold diesel may reduce through the adoption of electric boats in the medium to long term, which the Seaview Marina may choose to incentivise/promote in the future.

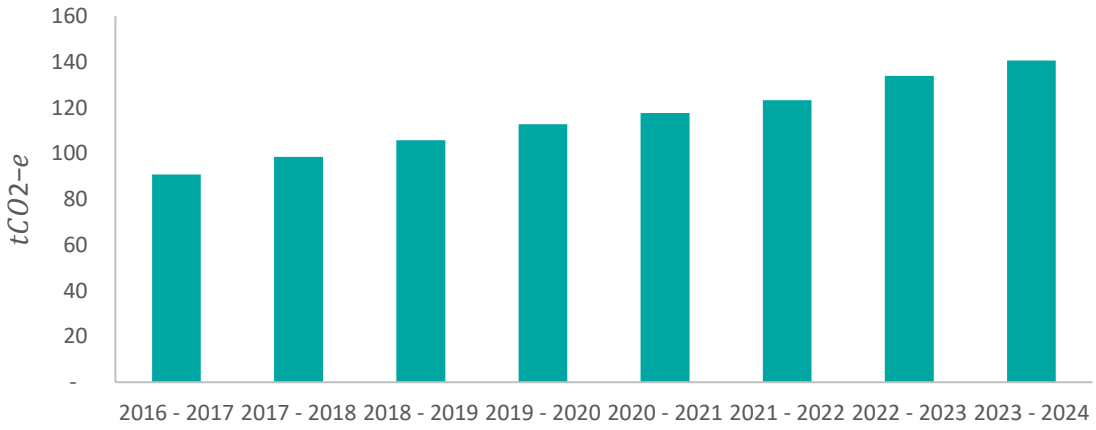
Figure 21: Indirect Emissions - sold houses & sold diesel



3.5.2 Downstream leased assets

These emissions are related to occupants living in houses owned by Urban Plus, these are estimated to have increased due to the increasing number of rentals owned by UPL.

Figure 22: Downstream leased assets



3.5.3 Public investments

Hutt City Council does not currently have a green investment policy, in contrast Auckland, Dunedin, Palmerston North, Waikato Regional, and Christchurch City Council have already adopted binding policies to divest from fossil fuels.

3.6 LAND USE, LAND USE CHANGE, FORESTRY

Council owns forest land in Lower Hutt, some of which results in net carbon sequestration (e.g. post-1989 native forests). While some of the forests have been registered under the NZ Emissions Trading Scheme, the resulting carbon credits are intended to be used to facilitate emissions reductions (through the sale of carbon credits, and the use of proceeds for implementing carbon emission reductions and facilitating additional sequestration through planting). Therefore, for the purposes of this carbon footprint report, land use, land use change and forestry has been excluded, to avoid double counting.

3.7 COUNCIL CONTROLLED ORGANISATION EMISSIONS

Note that the following sections and associated emissions are represented within their appropriate category above and provided as an information item only.

3.7.1 Wellington Water

Wellington Water (WW) were able to provide an updated emission report for this financial year. Although WW is a council-controlled organization, it is 100% responsible to account for its operational emissions. HCC continues to work with WW to have updated data for the purpose of future reports.

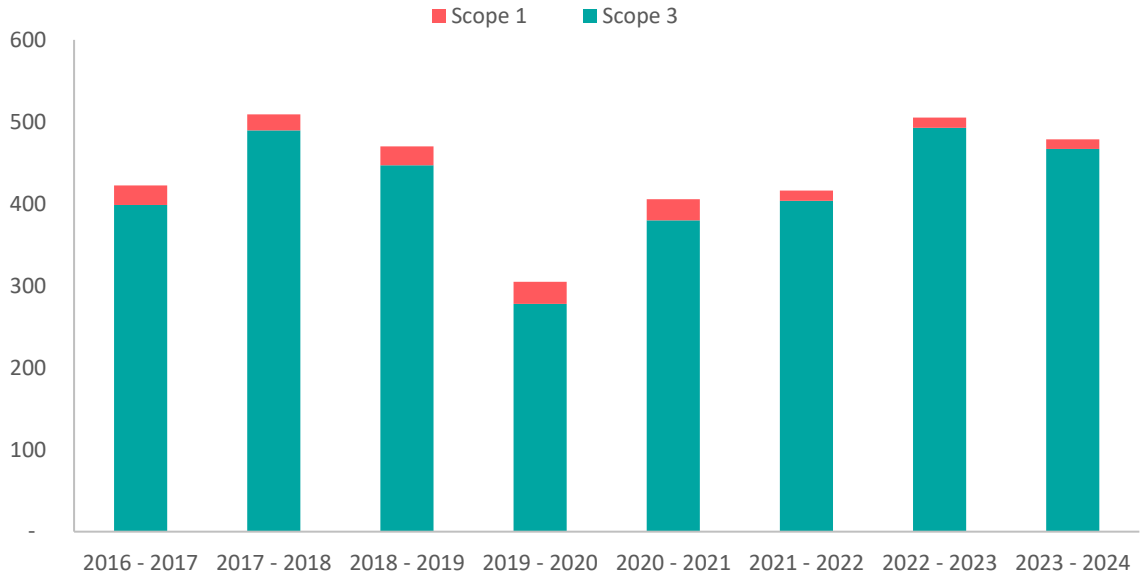
WW's scope 1 & 2 emissions for financial year 2023/2024 are calculated to be at 8,407 tonnes, and there have been no significant changes in technology or fuel sources used since. However, Lower Hutt's population has grown, hence may have correlation to the increase in emissions.

3.7.1 Seaview Marina

The majority of Seaview Marina's carbon footprint is associated with diesel sold to marina customers (Scope 3). Scope 1 for the marina includes diesel used for the ute, travel lift for lifting and moving vessels for repair, and LPG bottles for the showers.

Note that the Seaview Marina's Scope 2 emissions (electricity) are invoiced directly to Hutt City Council and included in Hutt City Council's Scope 2 emissions (refer section 2.2) and are therefore not included below.

Figure 23: Seaview Marina emissions

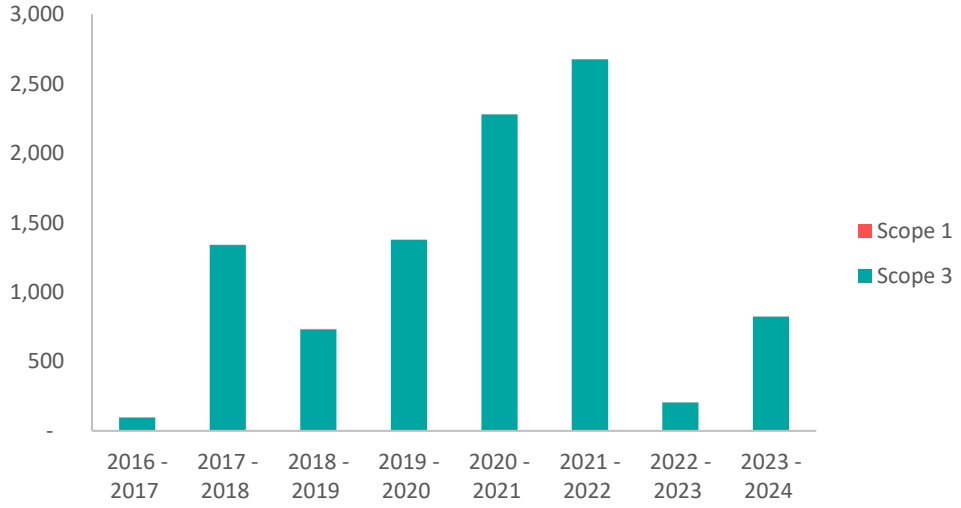


3.7.2 Urban Plus Limited

As below, almost the entirety of Urban Plus's emission profile is estimated to originate from its emissions associated with the buildings it constructs (refer sections 3.4.1 and 3.5.1). Therefore, the timing of the completion of builds will heavily influence the emissions profile. Existing housing projects have reached final stages hence emissions for this financial year remain low.

Note that Urban Plus's Scope 2 emissions (electricity) are invoiced directly to Hutt City Council and included in Hutt City Council's Scope 2 emissions (refer section 2.2) and are therefore not included below.

Figure 24: Scope 1 & Scope 3 Urban Plus Emissions



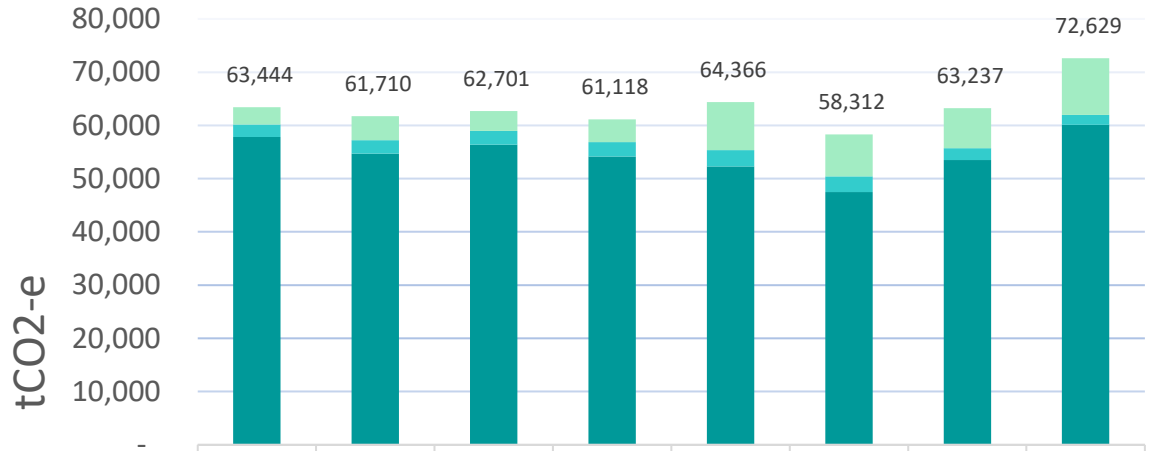
4. PERFORMANCE ASSESSMENT

4.1 PERFORMANCE COMPARED TO THE BASE YEAR

In light of changes to emissions reporting methodologies, and changes in scope, where possible emission results have been recalculated to enable a comparison.

Compared to the base year, emissions have increased significantly, and this is largely due to the emissions increases associated with Silverstream landfill Stage 2 and a significant increase in emissions associated with contracts, (primarily purchased goods & services), which includes the new Te Ngaegnae Pool as a major building and construction project for financial year 2023/2024.

Figure 25: Hutt City Council's annual emissions



	2016 - 2017	2017 - 2018	2018 - 2019	2019 - 2020	2020 - 2021	2021 - 2022	2022 - 2023	2023 - 2024
Scope 3	3,256	4,514	3,736	4,231	9,035	7,905	7,538	10,671
Scope 2	2,383	2,501	2,590	2,744	3,046	2,921	2,225	1,821
Scope 1	57,805	54,695	56,375	54,143	52,285	47,486	53,474	60,138
Total	63,444	61,710	62,701	61,118	64,366	58,312	63,237	72,629

4.2 PERFORMANCE COMPARED TO PRIOR REPORTS

Hutt City Council's total carbon footprint for 2023/24 has been estimated at 72,629 tCO_{2-e}. As noted above, in light of changes to emissions reporting methodologies, and changes in scope, where possible emission results have been recalculated to enable a comparison.

Overall emissions have increased compared to the previous year, largely due to increases in open and closed landfill emissions, and emissions associated with contracted services.

Note that emissions associated with IT networking and data services have been included in this financial year's report. The only exclusion is LULUCF, as the focus of the report is on gross emissions, and because any credits arising from forests registered under the NZ Emissions Trading Scheme are scheduled to be sold, with revenue to be used to facilitate emission reductions or additional carbon sequestration through planting.

Significant increases in emissions have been recorded for Silverstream landfill (Stage 2) and the closed Silverstream landfill (Stage 1). For Stage 2 this is due to

- the overall amount of waste contained in the landfill increasing (and hence emissions continue to increase), and
- a temporary reduction in the amount of gas that was able to be destroyed, as a result of engines being replaced in April 2024 and despite the flare operating as expected. (However, the new engines are expected improve gas destruction ability going forward.)

Regarding the closed landfill (Stage 1), Stage 2 is slowly moving over the top of Stage 1, and it is becoming more difficult to extract gas, in particular vis-à-vis the modelled theoretical gas generation.

There has also been an increase in emissions associated with contracts, which includes the new Te Ngaengae Pool and Fitness as a major building and construction project. Note that while a number of large contractors now report their actual emissions, the majority of emissions associated with contracted services, greater than or equal to $250,000 NZD, is still estimated by applying industry-wide emission factors to dollars spent. Although this is common practice in scope 3 reporting, there is significant uncertainty associated with those estimates.

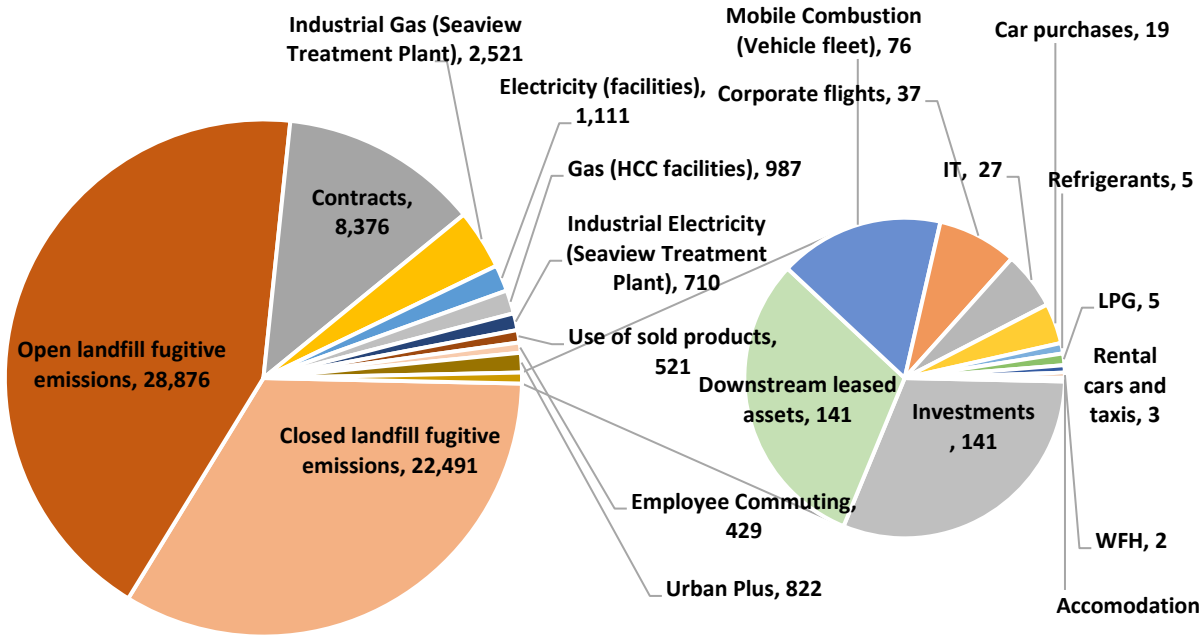
The increase in emissions regarding Urban Plus is due to the completion of new homes that were still under construction last year.

Reductions in emissions have occurred in the use of electricity to heat and power our facilities, and various minor categories. This includes reductions in emissions associated with the use of fleet vehicles, with the vehicle fleet now 69% electric.

Lastly, industrial, and invoiced emissions for Wellington Water are based on the 2023/24-financial year report as the council-controlled organization was only able to provide its scope 1 & 2 emissions.

Figure 26 shows a detailed breakdown of emissions for 2023/24.

Figure 26: Hutt City Council emissions profile for 2023/24



Hutt City Council's largest emission sources are the open Silverstream landfill (Stage 2), and the closed Wainuiomata landfill and Silverstream landfill Stage 1/1A. Emissions from contracted services is the next biggest emission source, followed by a range of smaller sources.

4.3 PERFORMANCE COMPARED TO CARBON REDUCTION AND CLIMATE RESILIENCE PLAN 2021-2031

Hutt City Council (HCC) has in place its Carbon Reduction and Climate Resilience Plan 2021-31, with an organisational target to reduce emissions to net zero by 2050, and various actions to give effect to this target. Hutt City Council provides quarterly updates to its Climate Change and Sustainability Committee on progress regarding the implementation of this plan.

The latest report with a full overview on the status of each action is available online (refer report number CCASC2024/09/04, page 45) .

APPENDIX 1 - DATA SOURCE AND ASSUMPTIONS

Scope /Category	Data source and Assumptions
General	
Emission Factors	Emission factors calculated for respective emission categories were taken from the Ministry for Environment "Te ine tukungga, Measuring emissions: A guide for organisations (2024 detailed guide). https://environment.govt.nz/publications/measuring-emissions-a-guide-for-organisations-2024-detailed-guide/
Motu Emission Factors	Motu 2014 emission factors were only used to calculate contract dollar spend emissions. While the emission factors are not a precise method, it acts as a suitable proxy. https://motu-www.motu.org.nz/wpapers/14_05.pdf
Global Warming Potential used	Extracted from the Ministry for Environment "Te ine tukungga, Measuring emissions: A guide for organisations (2024 detailed guide). The Guide uses the 1000-year GWPs from IPCC's AR5 to ensure consistency with New Zealand's Greenhouse Inventory 1990-2022.
Population	Population figures are provided for by StatsNZ. Recent figures are obtained from the "Greenhouse gas emissions report for Wellington region 2022" on StatsNZ. https://www.stats.govt.nz/information-releases/subnational-population-estimates-at-30-june-2024-2018-base/
Producer Price Index	The Producer Price Index (PPI) is employed as an inflationary measure and is taken from the StatsNZ. https://www.stats.govt.nz/information-releases/business-price-indexes-june-2024-quarter/ The PPI reflects changes in the price that producers receive and does not include sales and excise. This is common with council as sales tax are exempted. This alteration was done based on defining Hutt City Council as a producer rather than a consumer. The scope of categories PPI covers is in line with council spend categories.
Scope 1 - Direct Greenhouse Gas Emissions: Stationary combustion	
Facility Gas Use	Emissions data is supplied via eBench through monthly invoicing from the contracted gas supplier. Hutt City Council utilizes "eBench", an energy management software, to monitor energy use across its facilities. Ebench uses invoiced gas consumption data and applies current emission factors published by MEF to calculate natural gas emissions.

Direct Flaring from landfill	Carbon emissions data is provided by Tokin & Taylor in its 2023/2024 financial year Landfill Emissions Report. Refer to Appendix 2 to view report, assumptions, and results.
Seaview Marina	LPG and Diesel data are supplied by Hutt City Council's finance team. Seaview Marina is a Council Controlled Organisation (CCO); hence Hutt City Council has oversight of its operational expenditure.
Industrial Processes	Provided by Wellington Water in its 2023/2024 financial year emissions report. The industrial process accounts for Methane (CH_4) and Nitrogen (NO_2) emissions during wastewater treatment processes at the Seaview Wastewater Treatment Plant.
Mobile Combustion	Emissions data supplied by eBench. Data associated with fuel use for Hutt City Council (HCC) owned vehicles is provided by BP and is then consolidated and supplied via "eBench", an energy management software utilized by HCC.
Direct Fugitive Emissions	
Refrigerants (HFC)	Refrigerant losses in kilograms are supplied by Aquaheat for financial year 2023/2024.
Open Landfill Fugitive Emissions	
Closed Landfill Fugitive Emissions	The Open landfill and Closed landfill fugitive emissions are provided by Tonkin & Taylor in its 2023/2024 financial year Landfill Emissions Report. See Appendix 2- Active and Closed Landfill Assessment.
Scope 2 - Indirect Emissions from Imported Energy	
Purchased Energy	
Electricity	Emissions data is supplied via eBench through monthly invoicing from contracted electricity suppliers. Hutt City Council Utilizes "eBench", an energy management software, to monitor energy use across its facilities. Ebench uses invoiced electricity consumption data and applies current emission factors published by MEF to calculate natural gas emissions.
Scope 3 - Indirect Emissions: Upstream Scope 3 Emissions	
Purchased Goods and Services	
Contracts	Contractor emissions are collected and combined using two methods; Reported emissions and Dollar Spend. Reported emissions are supplied by contractors reporting their 2023/2024 financial year carbon emissions. The Dollar Spend approach only accounts for contracts worth $250,000 NZD or more. Applying Motu emission factors with the nature of dollar spend derives emissions for each contract spend. The Producer Price Index (PPI) is applied for inflation adjustments.

	Contractor spend values are supplied by Hutt City Councils team via "TechOne", a finance software utilised by council. Note that last financial year's contracts emissions have been recalculated due to an error and are adjusted from Consumer Price Index (CPI) to Producer Price Index (PPI) to reflect consistency in reporting moving forward.
Urban Plus	Urban plus is a Council Controlled Organisation, and all dollar spend information for its operational expenditures is provided by council's finance team. Urban Plus operational expenditure includes capital goods, purchase goods and services, fuel costs and air travel. Electricity costs are excluded as these are invoiced directly to Hutt City Council and included in scope 2 emissions.
Wellington Water	Emissions for the 2023/2024 financial year are reported and supplied by Wellington Water. Wellington Water only accounts for Scope 1 and Scope 2 emissions at the Seaview Waste Treatment Plant (SWTP). Emissions relating to transportation of waste to landfill is excluded as this is covered in the Tokin & Taylor Landfill Emissions report. MFE 2024 emission factors were used in computing SWTP emissions.
IT Networking Data	Carbon emissions supplied by HCCs IT team via a cloud-based information sharing and storage software called Microsoft Azure. All scopes are reported associated with HCC cloud use.
Capital Goods	
Cars (Embodied Emissions)	Capital expenditure (Capex) information associated with vehicle purchases for financial 2023/2024 are supplied by Hutt City councils finance team. Vehicle embodied emissions are calculated using total Capex and Motu emission factors while factoring in PPI for inflationary adjustments.
Business Travel (Corporate flights)	Total Corporate flight travelled distance is supplied by Orbit Travel via ebench. Orbit Travel acts as councils flight booking agent and all flight details are consolidated and supplied to eBench for reporting. Emissions are calculated using domestic aviation emission factors with a radiative forcing multiplier. Emission factors employed are taken from the MFE 2024 emissions guide.
Employee commuting	Employee commuting and work from home information was gathered from a Hutt City Council staff survey conducted for the 2023/2024 financial year. Emissions for each respondent was calculated as per the 2024 Ministry for Environment emissions guide. These emissions were averaged and extrapolated to account for every council staff member.
Employee Work from Home	
Couriers	Courier information is supplied by council's finance team. Courier emissions are calculated based on contract spend and Motu emission factors while integrating PPI to account for inflation adjustments.

Scope 3 - Indirect Emissions: Downstream Scope 3 Emissions	
Use of Sold Products	Use of sold products accounts for emissions belonging to Seaview Marina and Urban Plus. Seaview Marina emissions are associated with sold diesel. Urban Plus emissions relate to estimated emissions from houses sold. Dollar Spend information is provided by council's finance team and is applied against Motu factors, with inflationary adjustments.
Downstream Leased Assets	Dollar spend information supplied by councils finance team is used to calculate leased asset emissions.
Investments	Emissions were calculated using Motu emission factors against investment dollar spend inflation adjustments accounted for in calculations. All dollar spend information is provided by council's finance team.

APPENDIX 2 - ACTIVE AND CLOSED LANDFILL ASSESSMENT

Tonkin+Taylor

14 November 2024
Job No: 82948.017

Hutt City Council
By email: jorn.scherzer@huttcity.govt.nz

Attention: Jörn Scherzer

Dear Jörn

Hutt City Carbon Footprint - Active and Closed Landfill Assessment

Tonkin &Taylor Ltd (T+T) are pleased to provide an estimate of the carbon emissions from selected waste disposal sites within the Hutt City area. This work was requested by Hutt City Council (HCC) for inclusion in HCC's 2023 carbon footprint inventory.

1 Estimated carbon emissions

Carbon emissions have been estimated for Silverstream (Stages 1, 1a and 2), along with Wainuiomata closed landfill. The emissions are summarised in Table 1.1 below.

Table 1.1: Estimated emissions

Financial year	Fugitive emissions estimate in t CO_2e (emissions destroyed by combustion in brackets)		
	Silverstream		Wainuiomata
	Stage 1 & 1a	Stage 2	
2016/17	6,814 (24,713)	13,182 (42,583)	29,545 (0)
2017/18	6,375 (23,137)	15,416 (53,106)	26,412 (0)
2018/19	6,375 (23,137)	17,362 (58,805)	24,173 (0)
2019/20	6,995 (25,390)	17,356 (67,228)	21,487 (0)
2020/21	5,350 (19,416)	19,559 (58,766)	19,249 (0)
2021/22	3,328 (20,231)	17,757 (87,024)	16,563 (0)
2022/23	6,845 (14,611)	20,711 (101,394)	14,773 (0)
2023/24	9293 (11,115)	28,876 (108,266)	13,198 (0)

Note – The Silverstream emissions are after extraction and destruction is taken into account. No rounding undertaken to above figures at request of HCC, so that rounding can be applied elsewhere in inventory.

Commentary on the changes in emissions since last year is as follows:

- Stage 1/1a – Gas extraction has become increasingly challenging for this area of the landfill, with wells failing to produce gas (eg due to collapse or blockage) and the encroachment of Stage 2 partially over the top of Stage 1a (in particular, Slope 12 will require the removal of

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some gas extraction wells over the next year). In addition, when engines were off line during April and May, extraction from Stage 2 was prioritised.

- Stage 2 – emissions have increased year on year from Stage 2, as would be expected for an active landfill - each year, gas is produced by the new waste deposited, plus all the previously deposited waste. Destruction efficiency is lower than 2022/23 due to the inefficiency introduced due to the replacement of one of the gas engines in June 2024. With additional wells and improvements to the wellfield operations, the total volume of emissions destroyed has increased, though the flow of landfill gas collected has decreased.
- Wainuiomata – generation is declining at this closed landfill, which is reflected in the emissions.

The fugitive emissions through the landfill cap and from the gas engines/flare are separated in Table 1.3 below. UEF calculations for 2023/24 are enclosed in Appendix A. Records of tonnages submitted to MfE are included in Appendix C.

Consistent with the Environmental Protection Authority's interpretation set out in the regulations in the 2015 amendment and updated in February 2023, the default waste composition parameters have been used for all waste. The waste emissions factors for Stages 1/1a and Stage 2 are outlined in Table 1.2 below.

Table 1.2: Waste emissions factor with and without landfill gas recover (LFGR)

Waste stream component	Waste emissions factor L_0				
	Without LFGR			With LFGR	
				Stages 1/1a	Stage 2
	m^3 CH_4/tonne	kg CO_2-e/kg		kg CO_2-e/kg	
Garden	75	0.29	1.80	0.92	0.38
Nappies and sanitary	100	0.19			
Putrescibles other than garden waste	200	0.49			
Paper	215	0.58			
Sewage sludge	120	0.15			
Timber	120	0.08			
Textile	25	0.02			
Inert	0	0.00			

Table 1.3: Proportion of fugitive emissions through cap and from engines and flare

Financial year	Silverstream fugitive emissions separated by pathway (t CO_2e)			
	Stage 1 & 1a		Stage 2	
	Through cap	From engines and flare	Through cap	From engines and flare
2021/22	1,472	1,856	7,833	9,923
2022/23	5,384	1,461	9,445	11,266
2023/24	8525	768	19,962	8,914

2 Location of diffuse emissions

Since 2010, surface monitoring of methane emissions has been undertaken regularly across Silverstream Stages 1/1a and 2. The frequency of monitoring has varied between weekly and monthly over the years and is currently undertaken fortnightly. This monitoring only allows concentrations of methane emitted to be measured, not volumes.

From the body of information gathered, the emissions pathways for landfill gas to escape to atmosphere are typically through:

- Cracks between extraction wells and the clay cap: As the landfill moves, so cracks regularly develop, generally hairline in size, through which gas can escape.
- Exposed leachate gravels in Stage 2: these gravels line the base and sides of the landfill, ensuring downward migration of leachate. They also collect landfill gas. A temporary inhibitor is installed where the gravels daylight, which comprises a polyethylene membrane and compacted clay. On occasions this inhibitor is damaged or disturbed, causing emissions.

An ongoing regime of maintenance is in place to remediate the above pathways.

3 Collection efficiency

The efficiency with which landfill gas is collected from Stages 1/1a and Stage 2 are detailed in Table 3.1 below.

Table 3.1: Collection efficiency

Financial Year	Silverstream landfill gas collection efficiency	
	Stages 1/1a	Stage 2
2023/24	49%	79%

4 Flare down time

Flare and gas engines down time is automatically accounted for in the emissions estimate as the emissions are calculated on the flow of gas through the flare and gas engines. Flare down time, as reported by the operator, LMS, is detailed in Table 4.1 below.

Table 4.1: Flare downtime (July 2023 to June 2024)

Month	Report Month Hours (see note)	Flare operating (hrs)	Flare downtime (hrs)	Flare downtime (% of month hrs)
July	744	743.7	0.3	0%
August	744	731.8	12.2	2%
September	719	707.7	11.3	2%
October	744	692.4	51.6	7%
November	720	673.8	46.2	6%
December	744	734.0	10	1%
January	744	744.0	0	0%
February	696	649.7	46.3	7%
March	744	469.9	274.1	37%

Month	Report Month Hours (see note)	Flare operating (hrs)	Flare downtime (hrs)	Flare downtime (% of month hrs)
April	721	716.3	4.7	1%
May	744	498.1	245.9	33%
June	720	9.4	710.6	99%

Notes

1) The above readings are made by the operator as close to the month end as possible, which is why the monthly hours do not always equate to 30/31 days.
2) The flare is only operated when required to take excess not consumed by the power plant (the gas is preferentially directed to the power plant to convert into electricity).

5 Flare vs gas engines destruction

The volumes of gas destroyed by the flare vs the gas engines is detailed on Table 5.1 below (obtained from LMS records). The destruction efficiency of the engines is understood to be 90% and we understand that the destruction efficiency of the flare is 98% (although for the purposes of the calculated emissions in Table 5.1, has been assumed to be 90%).

Table 5.1: Volumes of gas through the flare vs gas engines (July 2023 to June 2024)

Month	Volume (m^3) of gas through		% of gas volume through the flare
	Gas engines	Flare	
July	551,646	446,659	45%
August	756,878	317,322	30%
September	682,801	293,401	30%
October	581,220	285,304	33%
November	674,657	223,782	25%
December	709,254	266,687	27%
January	692,829	293,568	30%
February	663,408	183,006	22%
March	692,583	97,711	12%
April	288,577	438,067	60%
May	331,977	416,729	56%
June	882,596	5,082	1%

Note: % gas volume through flare = volume of gas through flare divided by sum of gas volume through flare and gas engines.

6 Landfill gas composition

Spot checks throughout the year have been made for Silverstream Stages 1/1a and 2. No monitoring wells are installed at Wainuiomata Closed Landfill. Gas composition data from Silverstream Stage 1/1a and 2 are enclosed as Appendix B.

7 Data sources

- Wainuiomata
  - Landfill gas generated (at 50% methane) has been estimated from Figure 3.1 of the Landfill Emissions Report[1], using the T+T Model (Red) line.
  - Wainuiomata has no gas extraction system, however, a 10% oxidation of methane when passing though the cap has been assumed.
  - A flare trial was undertaken at the end of 2022, which extracted landfill gas from about 10% of the landfill. Only one well consistently extracted gas over the course of a week (approximately 90 m^3/hr), the other wells did not produce sufficient gas to flare. The results of the trial indicate that the estimate in Figure 3.1 of the Emissions Report is likely to represent a worst case for gas generation.
- Silverstream, Stage 1 and 1a
  - Silverstream Stage 1/1a landfill gas is extracted to create electricity that is fed into the national grid. A flow logger was installed on 18th October 2019 and has recorded an average flow of 108 m^3/hr for the 2023/23 financial year.
- Silverstream Stage 2
  - Carbon emissions have been estimated using the data from the UEF assessments for calendar years 2016 to 2023. For 2024, an interim UEF assessment has been used to estimate the gas generation and flow.

[1] T+T (March 2021) Wainuiomata closed landfill emissions investigation: Task 2 – Gas generation modelling, draft letter report, prepared on behalf of Hutt City Council.

8 Applicability

This report has been prepared for the exclusive use of our client Hutt City Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

Report prepared by:	Authorised for Tonkin & Taylor Ltd by:
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Melissa Fortune	Ed Breese
Environmental Engineer	Project Director

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Appendix A UEF calculations

Project: Silverstream Landfill Project No: 82948.028
Description: 2023 UEF Calculation 13/11/2024
Computed: MEKL

01 SCHOLL CANYON MODEL SINGLE WASTE PROFILE - UEF Calculation

The generation of landfill gas is estimated by the Scholl Canyon model, which is a first order decay model. The calculation procedures permits the modelling of:

- single waste/time input profiles
- single gas production per unit weight (Lo)
- changes in the decay parameters to account for the effects of capping a landfill
- capping is presumed to occur at a set period following the placement of any particular unit of waste - this is appropriate for relatively large landfills, where the construction of an effective capping system is likely to occur at intermediate stages throughout a long operational period on large landfills, particularly in climates with high rainfall.

Cap placement definition - after a set period following waste placement

The Scholl Canyon Model is implemented in the USEPA model LandGem. In LandGem the data for incoming waste is provided in discrete annual tonnages. By default this is split into 10 equally spaced placements through the year. In this implementation the unit of time is flexible and the number of increments within this unit of time is also flexible.

LandGem and time units

Reference

DEPARTMENT OF THE ARMY U.S. Army Corps of Engineers CEMP-RT Washington, DC 20314-1000 ETL 1110-1-160 Technical Letter No. 1110-1-160 17 April 1995 "Engineering and Design LANDFILL OFF-GAS COLLECTION AND TREATMENT SYSTEMS"

Collection/Destruction only (UEF Regulations Clause 23C)

Waste parameters

Potential CH_4 generation capacity of the waste (2015 Default) $L_o := 79.18 \cdot m^3 \cdot tonne^{-1}$

CH_4 generation decay rate constant (Default) $k := 0.063 \cdot yr^{-1}$

Time to reach anaerobic conditions, yrs.
(LandGem assumes a lg of 1 year) $Anaerobic_{lag} := 0.50 \ \ year$

The number of increments in a year.
20 provides a reasonable continuum for the generation rate.
Landgem uses 10 increments. $inc := 20$

Oxidation factor $Ox := 10\%$

Flare parameters

Destruction efficiency $D_{flare} := 0.9$

Destroyed methane

Total volume of methane destroyed in 2022 $Q := 1115.075 \cdot m^3 \cdot hr^{-1}$

$Q = 9774538.7 \ m^3 \cdot yr^{-1}$

Project: Silverstream Landfill Project No: 82948.028
Description: 2023 UEF Calculation 13/11/2024
Computed: MEKL

Landfill waste input profile

$$Waste = \begin{array}{cc} Date & Tonnes/yr \\ \begin{bmatrix} 2010 & 10479 \\ 2011 & 76678 \\ 2012 & 83025 \\ 2013 & 110565 \\ 2014 & 118481 \\ 2015 & 111319 \\ 2016 & 117370 \\ 2017 & 117481 \\ 2018 & 122419 \\ 2019 & 135604 \\ 2020 & 140066 \\ 2021 & 142393 \\ 2022 & 167696 \\ 2023 & 174821.83 \\ 2024 & 139966 \\ 2025 & 0 \end{bmatrix} \end{array}$$

$Date := (Waste^{\langle 0 \rangle}) \cdot yr$

$Anwaste := Waste^{\langle 1 \rangle} \cdot tonne$

Start date for analysis	$Start := Date_0$	$Start = 2010\ yr$
Counter for the number of years over which waste is received at the landfill	$Incom := \text{length}(Waste^{\langle 0 \rangle})$	$Incom = 16$ years

Project: Silverstream Landfill
Description: 2023 UEF Calculation
Computed: MEKL

Project No: 82948.028

13/11/2024
Page 3 of 4

Waste placement distribution

The number of increments in a year. 20 provides a reasonable continuum for the generation rate.

$inc = 20$ as defined at the beginning of the worksheet

Function to take anaerobic lag into account. Function defines that waste must be in place for 6 months before it produces LFG.

$$Anwastelag := \text{for } i \in 1 .. (Incom - 1)\ Anwastelag_i \leftarrow \frac{Anwaste_i}{2} + \frac{Anwaste_{i-1}}{2}\ \text{for } i \in 0\ Anwastelag_i \leftarrow \frac{Anwaste_i}{2}\ Anwastelag$$

Function to distribute the waste placement across the years of incoming waste

Placed waste is apportioned over the relevant year in accordance with the number of increments in the year. The waste is placed at the end of each time increment.

$$WastePlaced := \text{for } i \in 0 .. (Incom - 2)\ \text{for } j \in 1 .. (inc)\ wastePlaced_{i \cdot inc + j} \leftarrow \frac{Anwastelag_i}{inc}\ \text{for } i \in Incom - 1\ \text{for } j \in 1 .. \left(\frac{inc}{2} + 1\right)\ wastePlaced_{i \cdot inc + j} \leftarrow \frac{2 \cdot Anwastelag_i}{inc}\ \text{for } i \in Incom - 1\ \text{for } j \in \left(\frac{inc}{2} + 1\right) .. inc\ wastePlaced_{i \cdot inc + j} \leftarrow 0 \cdot tonne\ wastePlaced$$

Date of waste placement

Function to determine the date on which the waste is placed

$$DatePlaced := \text{for } i \in 0 .. (Incom - 1)\ \text{for } j \in 0 .. (inc)\ datePlaced_{i \cdot inc + j} \leftarrow Date_i + \frac{j}{inc} \cdot yr\ datePlaced$$

Project: Silverstream Landfill Project No: 82948.028
Description: 2023 UEF Calculation 13/11/2024
Computed: MEKL

Methane generation

Estimated total methane gas flow rate

If the date of placement exceeds the time of interest, terminate the calculation and return the gas production rate.

ti = Time from waste placement

Value of k is dependent upon capping from time of placement

$$Gen(time) := \left| \begin{array}{l} q \leftarrow 0 \cdot m^3 \cdot hr^{-1} \\ \text{for } i \in 0 .. \text{last}(DatePlaced) \\ \quad ti \leftarrow time - DatePlaced_i \\ \quad \text{if } ti < -1 \cdot yr \\ \quad\quad q \leftarrow q + 0 \cdot m^3 \cdot hr^{-1} \\ \quad \text{else} \\ \quad\quad \Delta q \leftarrow 2 \cdot k \cdot L_o \cdot WastePlaced_i \cdot e^{-k \cdot (ti)} \\ \quad\quad q \leftarrow q + \Delta q \\ q \end{array} \right.$$

Results

Methane generation rate
(LFG gen at 50% methane)

$$Gen(2024\ yr) = 12720568.17\ m^3\ yr^{-1}$$

$$Gen(2024 \cdot yr) = 1451.157\ m^3\ hr^{-1}$$

Estimated collection efficiency

$$Col(time) := \text{if } Q > Gen(time) \cdot (1 - Ox) \\ \quad\quad 0.9 \\ \quad \text{else} \\ \quad\quad D_{flare} \frac{Q}{Gen(time) \cdot (1 - Ox)}$$

$$Col(2024 \cdot yr) = 0.768$$

Unique emission factor

$$UEF_{default} := 0.91$$

$$UEF(time) := UEF_{default} \cdot (1 - Col(time))$$

$$UEF(2024 \cdot yr) = 0.2108$$

Appendix B Gas composition data

Stage 1

Date	Gas Meter	Time	USER	Stage 1 CH4 (%)	FLOW Stage 1 (NM3/H)	Comments
4/07/2023	GA5000	1:15	LAMC	47.5	169.7	Stage 1 CO2-28, O2-1.5, CO 0, H2S-FILTERED, Balance 24.9, total flow 6001685
12/07/2023	GA5000	10:28	LAMC	46.2	185	Stage 1 CO2-28.2, O2-1.1, CO 1, H2S-FILTERED, Balance 24.4, total flow 6033151
21/07/2023	GA5000	2:00	LAMC	43.6	0	Stage 1 CO2-27.9, O2-0.8, CO 1, H2S-FILTERED, Balance 27.7, total flow 6058302
26/07/2023	GA5000	1:50	LAMC	44.1	0	Stage 1 CO2-28.0, O2-0.6, CO 0, H2S-FILTERED, Balance 27.3, total flow 6058302
10/08/2023	GA5000	2:40	LAMC	50.1	162.7	Stage 1 CO2-28.4, O2-1.1, CO 0, H2S-FILTERED, Balance 20.3, total flow 6098384
16/08/2023	GA5000	3:30	LAMC	49.2	164.7	Stage 1 CO2-29.2, O2-0.9, CO 1, H2S-FILTERED, Balance 20.7, total flow 61121146
23/08/2023	GA5000	10:34	LAMC	45.5	129.4	Stage 1 CO2-27.9, O2-1.0, CO 1, H2S-FILTERED, Balance 25.6, total flow 6144455
5/09/2023	GA5000	1:30	LAMC	46.7	145.3	Stage 1 CO2-27.4, O2-1.9, CO 1, H2S-FILTERED, Balance 23.9, total flow 6185037
11/09/2023	GA5000	2:30	LAMC	48	132.9	Stage 1 CO2-26.4, O2-2.2, CO 2, H2S-FILTERED, Balance 23.4, total flow 6204149
5/10/2023	GA5000	10:40	LAMC	62.9	0	Stage 1 CO2-31.0, O2-0.4, CO 3, H2S-FILTERED, Balance 5.8, total flow 6248057
2/11/2023	GA5000	1:00	BRLI	53.4	135.5	Stage 1 CO2-22.7, O2-7.1, CO 1, H2S-FILTERED, Balance 16.8, total flow 6312426
14/11/2023	GA5000	12:50	LAMC	54.1	125.4	Stage 1 CO2-27.5, O2-2.1, CO 0, H2S-FILTERED, Balance 16.3, total flow 6349280
29/11/2023	GA5000	2:00	LAMC	52.6	152.3	Stage 1 CO2-27.9, O2-1.9, CO 0, H2S-FILTERED, Balance 17.6, total flow 6403600
11/12/2023	GA5000	14:42	SELO	59.5	127.2	.
22/12/2023	GA5000	11:30	LAMC	51.4	130	Stage 1 CO2-26.4, O2-2.3, CO 0, H2S-FILTERED, Balance 19.8, total flow 6475399
9/01/2024	GA5000	1:30	LAMC	49.4	128.3	Stage 1 CO2-26.1, O2-2.8, CO 0, H2S-FILTERED, Balance 21.7, total flow 6533063
16/01/2024	GA5000	11:00	LAMC	51.7	116.7	Stage 1 CO2-27.1, O2-2.0, CO 0, H2S-FILTERED, Balance 19.2, total flow 6533064
24/01/2024	GA5000	1:00	LAMC	49.6	135.8	Stage 1 CO2-26.3, O2-2.9, CO 0, H2S-FILTERED, Balance 21.3, total flow 6581763
29/01/2024	GA5000	3:00	LAMC	45	126.9	Stage 1 CO2-24.3, O2-4.5, CO 0, H2S-FILTERED, Balance 26.3, total flow 6599218
5/02/2024	GA5000	2:00	LAMC	44.9	135.6	Stage 1 CO2-25.2, O2-3.6, CO 0, H2S-FILTERED, Balance 26.3, total flow 6621475
12/02/2024	GA5000	3:00	LAMC	48	140.4	Stage 1 CO2-26.1, O2-3.1, CO 0, H2S-FILTERED, Balance 22.8, total flow 6644244
23/02/2024	GA5000	1:20	LAMC	43.2	121	Stage 1 CO2-23.1, O2-4.8, CO 0, H2S-FILTERED, Balance 29.0, total flow 6678661
7/03/2024	GA5000	9:00	LAMC	47.7	130.4	Stage 1 CO2-26.8, O2-2.5, CO 0, H2S-FILTERED, Balance 23.0, total flow 6709990
20/03/2024	GA5000	12:30	LAMC	55.2	137.7	Stage 1 CO2-28.1, O2-1.7, CO 0, H2S-FILTERED, Balance 15.0, total flow 6737482
26/03/2024	GA5000	2:00	LAMC	54.6		Stage 1 CO2-28.8, O2-1.3, CO 0, H2S-FILTERED, Balance 15.3, total flow
17/04/2024	GA5000	2:50	LAMC	50.1	90.16	Stage 1 CO2-29.4, O2-1.1, CO 0, H2S-FILTERED, Balance 19.4, total flow 6811689
7/05/2024	GA5000	2:55	BRLI	52.3	89.03	Stage 1 CO2-30.1, O2-0.9, CO 0, H2S-FILTERED, Balance 16.7, total flow 6855128
14/05/2024	GA5000	12:40	LAMC	49.8	101	Stage 1 CO2-28.9, O2-1.6, CO 0, H2S-FILTERED, Balance 19.6, total flow 6873759
17/05/2024	GA5000	3:10	LAMC	53.8	71.34	Stage 1 CO2-30.7, O2-1.0, CO 0, H2S-FILTERED, Balance 14.5, total flow 6880735
18/06/2024	GA5000	11:45	LAMC	50	88.63	Stage 1 CO2-29.8, O2-0.6, CO 0, H2S-FILTERED, Balance 19.5, total flow 6963094
3/07/2024	GA5000	11:15	LAMC	44	105.6	Stage 1 CO2-27.1, O2-2.5, CO 1, H2S-FILTERED, Balance 26.3, total flow 7001878
15/07/2024	GA5000	2:20	LAMC	44.5	120.9	Stage 1 CO2-27.9, O2-2.3, CO 0, H2S-FILTERED, Balance 25.3, total flow 7032756
31/07/2024	GA5000	1:05	LAMC	45.6	104.8	Stage 1 CO2-28.6, O2-0.9, CO 0, H2S-FILTERED, Balance 24.9, total flow 7075171
6/08/2024	GA5000	1:15	LAMC	44.1	104.3	Stage 1 CO2-28.2, O2-1.1, CO 0, H2S-FILTERED, Balance 26.5, total flow 7090016
19/08/2024	GA5000	11:40	LAMC	48.3	76.19	Stage 1 CO2-29.4, O2-1.1, CO 0, H2S-FILTERED, Balance 21.1, total flow 7119631
30/08/2024	GA5000	12:15	LAMC	45.4	71.6	Stage 1 CO2-28.7, O2-1.0, CO 0, H2S-FILTERED, Balance 24.7, total flow 7142732
11/09/2024	GA5000	2:00	LAMC		55.09	
20/09/2024	GA5000	2:15	LAMC		58.86	
2/10/2024	GA5000	12:01	SELO	49.7	53.65	Stage 1 CO2-30.2, O2-1.5, CO 0, H2S-FILTERED, Balance 18.6, total flow 7191601

Stage 2

	Portable Meter									Fixed Meters			
Date	CH4 (%)	CO2 (%)	O2 (%)	CO (PPM)	H2S (PPM)	Bal (%)	Gas Meter	Time	USER	Total Flow Stage 2	FLOW Stage 2 (NM3/H)	CH4 (%)	Comments
4/07/2023	50.6	37.5	0.9	7	FILTERED	11	GA5000	1:15	LAMC	32849736	1121	49.22	
12/07/2023	50.1	38.2	0.8	9	FILTERED	10.9	GA5000	10:28	LAMC	33085017	1293	49.15	
21/07/2023	50.7	37.9	0.9	7	FILTERED	10.5	GA5000	2:00	LAMC	33377049	1383	48.72	
26/07/2023	48.7	37.6	1.1	8	FILTERED	12.6	GA5000	1:50	LAMC	33546938	1278	47.65	
10/08/2023	50.2	38.3	1	9	FILTERED	10.5	GA5000	2:40	LAMC	34061338	1320	48.82	
16/08/2023	50.6	40.2	0.5	10	FILTERED	8.6	GA5000	3:30	LAMC	34251995	1380	50.25	
23/08/2023	49.7	38.2	1	8	FILTERED	11.1	GA5000	10:34	LAMC	34468512	1280	48.12	
5/09/2023	50.9	38.4	0.8	9	FILTERED	9.9	GA5000	1:30	LAMC	34888900	1364	49.38	
11/09/2023	51.1	39	0.9	9	FILTERED	9.1	GA5000	2:30	LAMC	35088083	1355	49.7	
5/10/2023	52	37.5	0.9	10	FILTERED	9.6	GA5000	10:40	LAMC	35840640	1334	50.51	
2/11/2023	57.8	31.1	4.7	10	FILTERED	6.4	GA5000	1:00	BRIJ	36683334	1396	48.55	
14/11/2023	55.7	36.6	0.9	5	FILTERED	6.8	GA5000	12:50	LAMC	37060036	1324	47.72	
29/11/2023	55.4	36	1.2	3	FILTERED	7.4	GA5000	2:00	LAMC	37538785	1321	47.14	
11/12/2023	53.6	39	0.6	4	FILTERED	6.8	GA5000	14:42	SELO	37920162	1326	40.4	
22/12/2023	52.4	36.2	0.9	5	FILTERED	10.5	GA5000	11:30	LAMC	38285503	1260	47.73	
9/01/2024	53.6	37.1	1	4	FILTERED	8.3	GA5000	1:30	LAMC	38899204	1396	47.11	
16/01/2024	53.8	38	0.8	4	FILTERED	7.4	GA5000	11:00	LAMC	39137103	1285	47.33	
24/01/2024	53.9	38.2	0.8	4	FILTERED	7	GA5000	1:00	LAMC	39407977	1459	47.54	
29/01/2024	54.2	39.7	0.6	4	FILTERED	5.5	GA5000	3:00	LAMC	39574231	1395	47.73	
5/02/2024	52.8	37.6	0.9	4	FILTERED	8.7	GA5000	2:00	LAMC	39794915	1290	46.56	
12/02/2024	52.6	37.1	0.8	4	FILTERED	9.5	GA5000	3:00	LAMC	40022027	1420	46.15	
23/02/2024	54.4	39.4	0.5	4	FILTERED	0	GA5000	1:20	LAMC	40372778	1368	48.12	
7/03/2024	54.2	36.5	1	4	FILTERED	8.3	GA5000	9:00	LAMC	40769951	1085	47	
20/03/2024	54.8	34.8	1.2	3	FILTERED	9.2	GA5000	12:30	LAMC	41113759	1451	46.73	
26/03/2024	55.9	37.3	0.7	5	FILTERED	5.1	GA5000	2:00	LAMC	41289179	959	49.09	
17/04/2024	49	38.4	0.7	6	FILTERED	11.9	GA5000	2:50	LAMC	41906516	1034	49.19	
7/05/2024	50.5	39	0.7	8	FILTERED	9.8	GA5000	2:55	BRIJ	42365967	929.7	49.98	
14/05/2024	48	37.8	1	9	FILTERED	13.2	GA5000	12:40	LAMC	42546264	1014	47.46	
17/05/2024	50.4	40.2	0.6	6	FILTERED	8.8	GA5000	3:10	LAMC	42615030	741.1	49.53	
18/06/2024	45.5	35.5	2.2	4	FILTERED	16.8	GA5000	11:45	LAMC	43461663	1193	44.8	
3/07/2024	46.6	33.3	1.4	5	FILTERED	18.8	GA5000	11:15	LAMC	43880775	1211	44.4	
15/07/2024	46	37	1.2	5	FILTERED	15.8	GA5000	2:20	LAMC	44238052	1545	45.18	
31/07/2024	46.9	37.7	0.5	6	FILTERED	14.9	GA5000	1:05	LAMC	44719997	1230	46.14	
6/08/2024	46.7	37.2	0.8	6	FILTERED	15.2	GA5000	1:15	LAMC	44899724	1352	45.49	
19/08/2024	50.6	40.3	0.5	7	FILTERED	8.6	GA5000	11:40	LAMC	45293130	1198	48.54	
30/08/2024	48.5	38.6	0.8	7	FILTERED	12.3	GA5000	12:15	LAMC	45627576	1247	47.83	
11/09/2024	46.2	37	0.8	7	FILTERED	16	GA5000	2:00	LAMC	45993198	1333	45.94	
20/09/2024	49.2	38.9	0.5	10	FILTERED	11.4	GA5000	2:15	LAMC	46252205	1249	48.38	
2/10/2024	42.8	34.9	3.1	6	436	19.2	GA5000 - hire	12:01	SELO	46611426	1271	48.43	

Appendix C Waste Tonnage Data

Table Appendix C.1 : Waste tonnage data from July 2023-December 2024

Month	Received Tonnage	Diverted Tonnage	Asbestos Tonnage	Net Tonnage	Comments
July 2023	12,876	284	204	12,388	
August 2023	16,801	264	75	16,462	
September 2023	16,124	47	232	15,845	
October 2023	18,673	420	156	18,097	
November 2023	14,524	306	124	14,093	
December 2023	13,568	308	132	13,128	
January 2024	12,635	658	220	11,758	
February 2024	12,790	415	139	12,236	
March 2024	12,400	390	140	11,871	
April 2024	12,011	480	234	11,296	
May 2024	13,295	588	399	12,308	
June 2024	11,592	207	54	11,331	
July 2024	12,591	199	69	12,322	
August 2024	10,549	251	109	10,188	
September 2024	12,233	399	170	11,664	Estimate
October 2024	12,233	399	170	11,664	Estimate
November 2024	12,233	399	170	11,664	Estimate
December 2024	12,233	399	170	11,664	Estimate

APPENDIX 3 – INDEPENDENT REVIEW OF REPORT

AECOM

Memorandum

To	Shane Gogo (Hutt City Council)	Page	1
CC	Jörn Scherzer, Miriam Randall (Hutt City Council)		
Subject	Hutt City Council - Organisational Greenhouse Gas Emissions Inventory - AECOM Review		
From	Myra Watt & Adam Swithinbank Review by Anthony Hume		
File/Ref No.	NA	Date	16th Dec 2024

1.0 Background

Hutt City Council (HCC) has set a goal to achieve net-zero greenhouse gas emissions by 2050 and has produced an annual organisational footprint since FY 2018/19 to track progress towards this target as well as identify areas for improvement. HCC drafted its FY 2023/24 Organisational Greenhouse Gas (GHG) Emissions Inventory and sought third-party feedback on its calculations and report. A review of the progress made against addressing the New Zealand Climate-related disclosure standards was also requested based on a previously completed gap analysis produced by HCC. AECOM New Zealand Limited then completed a review to determine whether the gaps were adequately addressed. The review completed was not a third-party certification audit and does not provide assurance for or compliance with international standards for GHG inventories.

2.0 Calculations: scope, data sources, method – general outcomes and critique

The following were reviewed, with suggestions for modifications provided:

- the scope and description of HCCs inventory,
- the calculations of emissions,
- the incorporation of data sources,
- the inclusion of primary and secondary data in the list of data sources,
- assumptions used to complete the organisation's emissions.

AECOM has provided a separate Excel reporting template detailing our findings and two rounds of feedback to HCC.

3.0 Findings summary

Overall, the inventory prepared using the Ministry for the Environment guidance is accurate based on the information, data, and evidence provided - once the recommended updates are included. However, the inventory calculations could have been more organised, as they potentially lead to the impression that the results must be updated and corrected. The inventory will be improved by the following:

- A stronger adherence to ISO guidance for inventories, particularly the principle of completeness, to close data gaps.
- A consistent documented plan for data collection improvements to ensure comprehensive reporting in future years.
- Simplifying the layout and organisation of the inventory calculations in Excel to make it easier to interpret activity data and use Global Warming Potentials (GWPs). This will also help with the effective handover of updates for the inventory.

https://aecom.sharepoint.com/sites/sustainabilityresilience147/shared documents/general/s&r project work/2024_hcc emissions inventory review/3. deliverables/hcc org ghg footprint review_cover note_aecom_241122.docx

AECOM

- Incorporating the guidance provided by the New Zealand Climate Disclosure Standards to future-proof the inventory and introduce best practices.

4.0 New Zealand Climate Related (XRB) standards

AECOM has checked the inventory against the gap analysis findings provided by HCC for the Climate-Related Disclosure Standards related to reporting GHG inventories. AECOM has included easy-to-implement options in the provided Excel spreadsheet to address the gaps in the inventory related to the XRB standards. HCC should work towards including the XRB requirement in the following inventory.

4.0 Conclusion

Many of our findings will be addressed in HCC's following inventory (FY24/25). For the remainder we suggest starting the inventory preparation earlier and engaging early with the reviewer to ensure suitable structures are in place. The requirements for GHG inventories are developing and changing, and more could be done to demonstrate best practices with a less rushed timescale and starting updates as early as possible for (FY25/26).