2023

Greenhouse Gas Emissions Inventory

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Independently Verified by: McHugh & Shaw

Assurance Level: Reasonable Assurance ISO Cat 1-2, Limited Assurance ISO Cat 3-6

Reporting Period: 1 January to 31 December 2023

Photo Credit: Justin Atkinson

1. About Us

Te Herenga Waka—Victoria University of Wellington has approximately 15,700 equivalent full-time students, including international students from around 100 countries. We award about 4,500 qualifications each year.

The University has around 2,330 full-time equivalent staff and about half of those are involved in teaching and research.

The University has nine faculties, eight of which conduct teaching and research. The University's faculties are divided into schools, many of which are closely aligned with the University's numerous research centres and institutes.

Victoria University of Wellington has three main campuses in Wellington – Kelburn, Pipitea and Te Aro; along with satellite facilities including Miramar Creative Centre, the Coastal Ecology Lab as well as space at the Hospital and Callaghan Innovation. We also have premises in Auckland.

Our Zero Carbon Plan has a 2030 target of net zero emissions and a 40 percent reduction in gross carbon emissions compared to our 2017 baseline.

The purpose of this report is to track and transparently report our greenhouse gas emissions and our progress in reducing emissions. It is available to the public, including our students who use it as a learning resource. The information contained within the report is used for reporting internally as well as to external entities including the Carbon Neutral Government Programme, Climate Leaders Coalition, Universities New Zealand, and University Ranking schemes.

2. Organisational Boundary

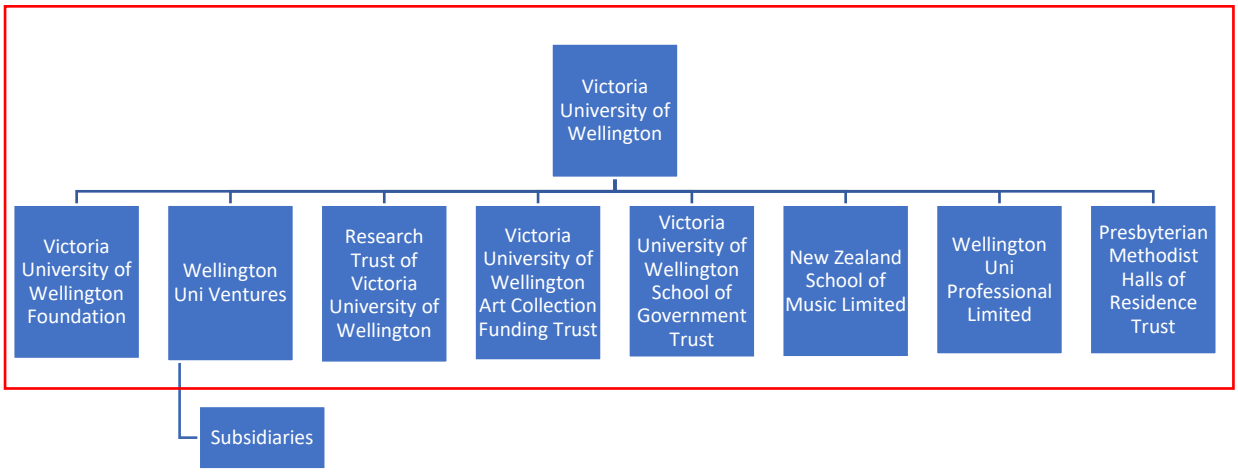


Figure 1: Organisational boundary for this greenhouse gas inventory

The operational control approach was adopted to determine the organisational boundaries for the carbon footprint. The red box indicates the entities over which the University has operational control and which are included in the organisational boundary.

Wellington Uni Ventures subsidiaries have only financial link to the University. Where the subsidiaries operate from VUW facilities over which VUW has operational control, the emissions associated with their electricity consumption and refrigerant emissions have been accounted for in Category 1 & 2 as appropriate.

3. Operational Boundary

GHG emission sources from the University value chain were identified with reference to the methodology described in the GHG Protocol, ISO 14064-1 2018, and Scope 3 standards, and classified into categories. Under the standards, reporting of Scope 3 emissions is optional.

The following ISO 14064-1 categories are used:

Direct GHG emissions (Category 1): GHG emissions that are operationally controlled by the University;

Indirect GHG emissions from imported energy (Category 2): GHG emissions from the generation of purchased electricity, heat or steam consumed by the University

Other indirect GHG emissions (Category 3-6): all indirect emissions (not included in Category 2) that occur in the value chain of the University, including both upstream and downstream emissions. These have been further categorised as:

- Transportation (Category 3)
- Products we use (Category 4)
- Use of our products (Category 5)
- Other sources of emissions (Category 6) – not relevant to the University

4. Significance and Materiality

Under the operational control approach an organisation accounts for GHG emissions from operations according to a level of control over specific assets generating emissions. The selection of the operational control approach was chosen to enable clear measurement of the emissions which are actively managed by the University.

The University began measuring greenhouse gas emissions in 2007. For the 2017 reporting year, in preparation for the development of our Zero Carbon Plan, the University engaged AECOM as an independent expert to review our organisational and operational boundaries and our measurement practices to ensure they were in line with industry best practice.

A spend review was undertaken to assess the likely size of emissions from a wide range of potential emissions sources. This was considered alongside the reporting practices of other leading Universities, the availability of reliable consumption data and emissions factors, our ability to influence a reduction in emissions and the level of interest from our stakeholders, in assessing which emissions source were deemed to be significant, material and within our operational control and therefore included in our GHG inventory. Another spend review will be undertaken before the 2024 GHG Inventory is compiled to assess potential changes in significant emissions sources.

Exclusions

Based on the above process, the following emissions sources were excluded from the GHG Inventory, which primarily fall within Categories 3 to 6 and are not a requirement of the Carbon Neutral Government Programme.

Emissions Source	Justification and Commentary
Laboratory chemicals	Difficult to measure, but very low volume – considered *de minimis*
Vehicle & fridge refrigerants	Difficult to measure, but very low volume – considered *de minimis*
Food	All food provision on campus is provided by third party suppliers, which limits operational control and makes it difficult to measure. NB: Campus food waste to landfill is included in GHG inventory. Food retailers on campus and halls of residence are providing more plant based choices and the sustainable events guide provides advise on low carbon catering.
Fertiliser	Very low volume - considered *de minimis*
Worm farms	Very low volume - considered *de minimis.* The worm farms have contributed to reducing organic waste to landfill and increasing the waste diversion rate.
General supplies	Numerous small scale purchases without available emission factors, difficult to measure and low volume - considered *de minimis*
IT Services & data storage	Majority of data storage is either on campus (which is included in GHG inventory) or elsewhere in New Zealand (with lower emissions electricity supply) . The off-campus data storage is conidered *de minimis*
THW Press – contracted printing	Difficult to measure, but very low volume – considered *de minimis*
Campus development - capital projects	Difficult to measure, although this is improving and low embodied carbon is being prioritised in campus development projects, with the Living Pā being a flagship for sustainable design making extensive use of structural timber and sequestering more carbon than it uses for construction
Student travel to Wellington (self-funded)	Limited operational control (ie: limited influence over what mode of transport and how frequently students travel – students make their own arrangements for travel to and from Wellington) and difficult to measure

	(ie: there is no visibility of travel bookings). However, it must be acknowledged that students travelling to Wellington to attend University generates a considerable volume of emissions – potentially a further 4,500 tonnes/yr. Greater use of online teaching and franchise models is helping reduce travel emissions of international and domestic students. Note: Staff and student commuter travel is included in this inventory as the University has more operational control (through the provision of carparking, student accomodation locations and influence over public transport networks) and greater ability to measure emissions through (through attendance records, traffic counts, surveys etc.).
Freight	Very low volume - considered *de minimis*
Investments	Foundation investment portfolio is managed by third party, but the Foundation are signatories to UN Principles for Responsible Invesment and have instructed the fund manager to exclude investment in companies operating in high carbon intensive industries.

Changes from 2022

There were no material changes to the organisational or operational boundary in 2023.

Minor changes included:

- Sourcing more accurate (metered rather than estimated) data for electricity consumption at one of our satellite facilities at Callaghan Innovation where we occupy space at their Gracefield campus.
- The inclusion of emissions from staff using the Mevo car sharing service for work pruposes as part of rental car emissions.

While the boundary for reporting did not change in 2023, there were several significant factors that influenced the overall volume of greenhouse gas emissions:

- International borders were open for the whole year and airline capacity had increased following the pandemic, allowing air travel to resume in much greater volume for the University.
- Student numbers dropped by six percent, although more of them chose to attend classes on campus rather than accessing the material online.
- Financial pressures limited expenditure on travel and staff numbers were reduced through the year.

5. Measurement Process

This GHG Inventory has been compiled in line with the Ministry for the Environment *'Te ine tukunga: He tohutohu pakihi Measuring emissions: A guide for organisations – 2023 detailed guide'.*

Consumption or activity data was sourced from relevant suppliers, via third party agents, or from internal financial records. An emission factor was then applied to each activity to convert consumption to the greenhouse gases emitted. This quantification approach is common and in line with best practice. We have used this approach since first measuring our GHG emissions in 2007.

The emission factors were sourced from the MfE Guide (with the exception of paper consumption, that MfE does not provide an emission factor for). The MfE has included the 100-year Global

Warming Potential (GWP) of the greenhouse gases in their emissions factors based on the IPCC Fifth Assessment Report (AR5).

Wherever possible, we used measured data for emission source quantities (for direct emissions) and the measure that relates as close as possible to the point of combustion or emission (e.g. litres of fuel, rather than kilometres travelled). The emissions calculated for Category 1 and 2 sources are based on robust and measures input data (M1), with the exception of fuel and travel data associated with Purchase-card spending.

In some cases it was not possible to extract measured data, and VUW either derived the data or estimated the data. Data quality is evaluated using the following framework:

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

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

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

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

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

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

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

Data Quality is indicated in Section 6 of this report for each activity.

6. Emissions Inventory - 2023

Reporting Category	Activity/ Emission source	Consumption		Data Quality	Emission Factor	tonnes CO_2e
Category 1: Direct Emissions						**3,772.154**
Stationary combustion	Diesel Generators - campus and operated accommodation	535	Litres	M1	2.69 kg/L (MfE)	1.439
	Natural Gas - campus	14,162,075	kWh	M1	0.194 kg/kWh (MfE)	2,732.804
	Natural Gas - student accommodation (VUW owned and operated)	4,501,205	kWh	M1	0.194 kg/kWh (MfE)	871.125
Mobile combustion	Petrol- Fleet vehicles	15,979	Litres	M1	2.46 kg/L (MfE)	39.231
	Diesel - Fleet vehicles	12,500	Litres	M1	2.72 kg/L (MfE)	33.936
Fugitive emissions	Refrigerant Purchases	42	kg	M1	varies by refrigerant (MfE)	93.620
Category 2: Indirect emissions from imported energy						**1,802.912**
Electricity (location-based)	Campus, including assets leased from third parties but operated by VUW	18,355,420	kWh	M1	0.074 kg/kWh (MfE)	1,349.521
	Student accommodation (operated by VUW)	6,170,568	kWh	M1	0.074 kg/kWh (MfE)	453.391
Category 3: Indirect emissions from transport						**7,400.850**
Business travel	Taxi	815,685	$	M1	0.05 kg/$ (MfE)	41.898
	Rentals	311,295	km	M1	varies by vehicle type (MfE)	57.538
	Public transport (staff)	12,153	km	E2	0.036 kg/pkm (MfE)	0.441
	VUW funded air travel	33,773,996	km	M1	varies by distance, class and aircraft size (MfE), includes radiative forcing	5,483.220
	Hotel Stays	2,492	room nights	D2	varies by country (mfE)	46.194
	Private mileage	125,764	km	D2	0.252 kg/km (MfE)	31.662
Upstream transportation and distribution	Student commute	18,290,650	km	E2	varies by transport mode (MfE)	1,084.906
	Student intercampus travel	96,823	km	E2	0.036 kg/pkm (MfE)	3.510
Employee commuting	Public & active transport	3,452,704	km	E2	varies by mode (MfE)	69.341
	Private vehicle	2,110,952	km	E2	varies by mode (MfE)	513.639
	Working from home	187674.85	days	E2	0.365 kg/day (MfE)	68.501

Reporting Category	Activity/ Emission source	Consumption		Data Quality	Emission Factor	tonnes CO2e
Category 4: Indirect emissions from the products we use						**768.353**
Purchased goods & services	Print and paper	16	tonnes	M1	452 kg/T (Australian Paper)	7.349
	Water (campus)	78,597	m3	D1	0.037 kg/m3 (MfE)	2.903
	Water (accommodation)	110,353	m3	D2	0.037 kg/m3 (MfE)	4.076
	Student accommodation (not owned or operated by VUW) - electricity	215,434	kWh	M1	0.083 kg/kWh (MfE)	17.833
Fuel and energy related activities	Transmission and distribution losses for electricity consumed	25,925,820	kWh	M1	0.009 kg/kWh (MfE)	223.002
	Transmission and distribution losses for natural gas consumed	19,785,461	kWh	M1	0.007 kg/kWh (MfE)	141.090
Waste generated in operations	Landfill Waste	389,099	kg	M2	0.666 kg/kg (MfE)	138.079
	Waste water (campus)	78,597	m3	M1	0.508 kg/m3 (MfE)	39.901
	Waste water (accommodation)	110,353	m3	E2	0.508 kg/m3 (MfE)	56.023
Upstream leased assets	Campus spaces leased from third party	1,668,275	kWh	M2	0.083 kg/kWh (MfE)	138.098
Category 5: Indirect emissions from the use of our products						**341.056**
Downstream leased assets	Office and campus space owned by VUW but operated by tenants	2,522,013	kWh	M1	0.083 kg/kWh - electricity and 0.201 kg/kWh - gas (MfE)	341.056
TOTAL						**14,089.653**

In accordance with 14064-1:2018, we also present our direct emissions (Category 1) broken down into the separate greenhouse gases (and refrigerant gases), again based on MfE emission factors.

Reporting Category	Activity/ Emission source	Consumption		tonnes CO2e	tones CO2	tonnes CH4	tonnes N20
Category 1: Direct Emissions							
Stationary combustion	Diesel Generators - campus and operated accommodation	535	Litres	1.439	1.430	0.005	0.003
	Natural Gas - campus	14,162,075	kWh	2,740.806	2,733.167	6.424	1.216
	Natural Gas - student accommodation (VUW owned and operated)	4,501,205	kWh	871.125	868.696	2.042	0.386
Mobile combustion	Petrol- Fleet vehicles	15,979	Litres	39.231	37.602	0.494	1.134
	Diesel - Fleet vehicles	12,500	Litres	33.936	33.414	0.050	0.472

Reporting Category	Activity/ Emission source	Consumption		AR5 GWP100	tonnes CO2e
Fugitive emissions (HFC)	Refrigerant Purchases - R410A	37.00	kg	1,924	70.208
	Refrigerant Purchases - R407C	5.00	kg	1,624	8.121
	Refrigerant Purchases - R134A	3.27	kg	1300	4.251
	Refrigerant Purchases - RR404A	2.80	kg	3942.8	11.040

Note: There are no emissions from sulphur hexaflouride (SF_6) or nitrogen trifluoride (NF_3) refrigerants.

The University operations also do not produce any biogenic CO_2 emissions. Biogenic sources of carbon typically arise from the burning of biomass and biofuel, operating wastewater treatment plants and composting biomass. The Ministry for the Environment emission factors have been used and they exclude biogenic carbon dioxide emissions.

7. Removals

As part of the University's sustainable procurement practices we encourage certified carbon neutral goods and services to be given preference in purchasing decisions. Activities where this is prevalent includes office paper and taxis. These types of carbon neutral purchasing decisions are positive, but not systematically recorded or verified as part of this GHG Inventory.

On 1 January 2020 the University introduced a five percent internal carbon levy on all flights we book to both raise visibility of the carbon impact of our air travel and provide a funding stream to centrally purchase carbon offsets for our air travel. Following the verification of this GHG Inventory, we will purchase 5,483 tonnes of carbon offsets for our air travel. We have a supply agreement with Ekos Kamahi Ltd to purchase carbon offsets. In 2023, we purchased 2,874 tonnes (for our 2022 air travel emissions) made up of Indigenous forest VERs (Verified Emissions Reduction Units) certified to the Plan Vivo standard, from the Drawa Rainforest Conservation Project in Vanua Levu, Fiji.

We have also entered into a partnership with Wellington City Council where we are reforesting an 11 hectare block of the Outer Green Belt. We planted 3,150 indigenous trees in 2023 with staff, student and alumni volunteers. This will continue in the coming years and be registered through the NZ Emissions Trading Scheme in the future, with carbon credits being shared between the City Council and the University.

8. Emissions Reductions

Our Zero Carbon Plan has a 2030 target of net zero emissions and a 40 percent reduction in gross carbon emissions compared to our 2017 baseline.

Our 2017 baseline was established as part of the independent review by AECOM of our reporting practices (but not verified against ISO 14064-1). The baseline has been re-calculated once since then following the decision to incorporate radiative forcing in our air travel emissions. If there is a boundary change that will generate a difference in emissions of greater than 2%, we will re-calculate the baseline year.

GHG Protocol Scope	2017 Baseline (tonnes CO2e)	2023 (tonnes CO2e)
Scope 1: Direct emissions	3,457,132	3,772,154
Scope 2: Electricity indirect emissions	2,824,007	1,802,912
Scope 3: Other indirect emissions	12,937,374	8,510,260
Total	19,218,513	14,089,653

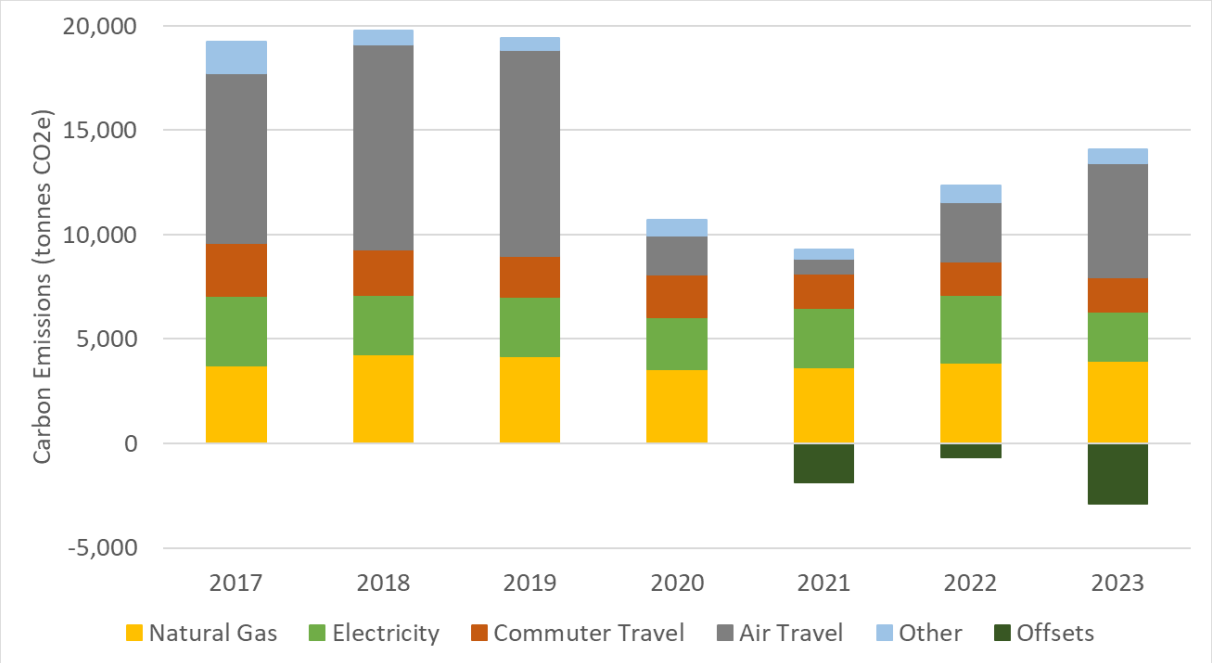
Notable changes in 2023

- Air Travel volumes (passenger kilometres flown) have continued to rise (up 97% from 2022) after the record low volumes observed in 2021 resulting from the pandemic impacts, and have returned to being the largest source of emissions for the University. However, air travel emissions were still 45% below 2019 (pre-pandemic). Financial pressures and the introduction of air travel carbon targets for each faculty and department have helped to dampen the anticipated 'bounce back' in air travel volumes. Note: The University consistently has over 97% of our air travel in economy class, so change in air travel emissions are as a result over fewer flights taken as opposed to changing class-type.

- Emissions from electricity consumption are down 29% from 2022, however that is due to the change in emission factor reported by the Ministry for the Environment (which reflects a decrease in the carbon intensity of the national electricity grid). It masks a 9.7% rise in actual electricity consumption, which reflects a decreasing focus on energy management. LED lighting upgrades and the installation of a large solar panel array were delivered in 2023, but a return to a stronger focus on energy management is now being prioritised.

- The mode share of students driving to and from campus dropped from 10.6% in 2022 to 8.2% in 2023, with public transport usage correspondingly increasing from 45.1% in 2022 to 51.3% in 2023. It suggests the government subsidies to lower public transport fares and the improvement in the reliability of the network did attract more patronage from our students. The increase in student numbers attending classes in-person (perhaps incentivised by the more accessible public transport), meant that there was no significant change to overall commuting emissions.

- While not a significant source of emissions, waste to landfill was 22% lower in 2023 than 2022. Waste volumes tend to be quite variable from year to year, but this is a positive change. Waste minimisation initiatives recently introduced including the just re-use campaign that reduce disposable coffee cups on campus by 95%, the introduction of worm farms to process kitchen and garden waste, and our use of re-usable glass milk bottles all contribute to this.



Overall, our gross greenhouse gas emissions have increased by 14.0% compared to 2022. While any increase in emissions is concerning, it is less than what was forecast given the pandemic induced restrictions to air travel were no longer in place. The gross emissions for 2023 were 26.7% below our 2017 baseline – well ahead of our interim-target emissions reduction of 18% by 2023.

When the purchased carbon offsets for air travel are included, our net emissions are 11,215.7 tonnes of CO_2e – 41.6% below the 2017 baseline.

9. Verficiation

This GHG Inventory has recieved independent verification from McHugh & Shaw Ltd as meeting the ISO 14064-1:2018 mandatory requirements. The verification process followed the protocols of ISO 14064-3:2019 and provides reasonable assurance of Category 1 and 2 emissions and limited assurance of Category 3-6 emissions.

10. Compliance with ISO Standard

ISO 14064-1:2018 Requirement	Report Section
9.3.1 a	1
9.3.1 b	Cover
9.3.1 c	Cover
9.3.1 d	2
9.3.1 e	3 & 4
9.3.1 f	6
9.3.1 g	6
9.3.1 h	7
9.3.1 i	4
9.3.1 j	6
9.3.1 k	8
9.3.1 l	8
9.3.1 m	5
9.3.1 n	5
9.3.1 o	5 & 6
9.3.1 p	5
9.3.1 q	5
9.3.1 r	3 & 9
9.3.1 s	9
9.3.1 t	6