Powerco greenhouse gas emissions inventory report

Electricity and Gas distribution services

01 April 2022 – 31 March 2023

Published November 2023

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Executive summary

As one of Aotearoa New Zealand's largest electricity and gas distributors, we play a critical role in our customers' transition to a sustainable and low-carbon energy future. By enabling decarbonisation through electrification, and by preparing our gas network for emerging technologies and low carbon alternatives, we will contribute significantly to New Zealand's net zero ambition.

As well as helping our customers to decarbonise, Powerco is also committed to making sustainable choices in our own operations, as detailed in our Climate Change Policy. By measuring and publicly disclosing our annual greenhouse gas (GHG) inventory, we will be held accountable for the emissions that relate to our business operations.

This GHG inventory report covers the financial year ending 31 March 2023 (FY23). As detailed in our report, our overall emissions have increased during FY23. Disappointingly, some of our FY23 reported emission sources have not realised a reduction to the extent we were expecting. Our scope 1 and 2 decarbonisation plans are being implemented, but are not yet achieving the reductions we anticipated as other factors counter them. For example, although we are seeing good efficiency gains in our office electricity use and electricity line losses, our emissions have not reduced due to the higher Ministry for the Environment (MfE) emissions factor used (a function of the reduced proportion of renewable energy in New Zealand's electricity grid). Likewise, while the rollout of our hybrid vehicles has reduced emissions associated with driving per kilometre, an increase in the number of kilometres driven has meant that our mobile combustion emissions have increased.

Table 1. GHG emissions by scope

Scope	FY23	FY22	Base year FY21	Variance	
	tCO_2e	tCO_2e	tCO_2e	tCO_2e	%
1	7,609.64	8,018.50	7,927.87	-318.23	-4.01
2	32,272.08	27,976.40	28,185.58	4,086.50	14.50
3	81,611.93	75,815.29	79,786.96	1,824.97	2.29
Total	**121,493.65**	**111,810.19**	**115,900.41**	**5,593.24**	**4.83**

In summary:

- Our total reported emissions for FY23 increased by 4.83% compared with the FY21 base year.
- Scope 1 emissions for FY23 were very similar to the FY21 base year.
- Scope 2 emissions were higher due to an increase in the emissions factor used.
- Compared to our previous reporting (for FY22), we have seen reductions in emissions associated with stationary combustion and gas fugitive losses.
    - Stationary combustion emissions are still higher than our FY21 base year however, and due to our increased focus on customer resilience, we anticipate that without an advancement in alternative fuels, these may further increase.
    - The reduction in reported gas fugitive losses was largely due to a decrease in natural gas supplied.
- FY23 emissions increased from our previous reporting (FY22) for mobile combustion (our vehicle fleet), electricity line losses, electricity use in our substations, air travel, and contactor mobile and stationary combustion.

Powerco greenhouse gas emissions inventory report

Powerco is a key enabler for our customers to decarbonise through the delivery of renewable electricity to customers and supporting a green gas future. Enabling that transition is our biggest contribution to emissions reductions. However, we are also focussed on our own emissions and are conscious that during FY23, our own emissions have not decreased in line with our ambition. We are preparing a comprehensive Emissions Reduction Plan which will identify key areas where we can make a meaningful difference in reducing our carbon footprint, including a target to reduce fugitive gas emissions and a measure of customer decarbonisation.

Introduction

This disclosure

This Inventory Report is a complete and accurate account of the GHG emissions that result from Powerco's operations within the declared boundary and scope for the reporting period and utilising all practically available sources of data.[1]

Powerco's reporting processes and emissions categorisation is consistent with international protocols and standards and has been prepared in accordance with:

- Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (2004).
- Greenhouse Gas Protocol: Corporate Value Chain (Scope 3) Accounting and Reporting Standard (2011).
- Global Reporting Index (GRI) - GRI 2 General Disclosures (2021); 305: Emissions (2016).
- ISO14064-1:2018.

This is our fourth public GHG emissions disclosure and relates to the year ended 31 March 2023.

Powerco's strategy is a sustainability strategy

Powerco is one of New Zealand's largest electricity and gas distributors. Our assets include approximately 29,000 kilometres of electricity lines and 6,100 kilometres of gas pipelines[2]. We provide reliable and resilient electricity and gas networks that our customers rely on. Resilient electrification and lower carbon gas sources are fundamental in helping Aotearoa New Zealand meet its target of net-zero emissions by 2050 sustainably.

Powerco's sustainability vision is to ensure we have an authentic balance across environmental, social, and economic outcomes. The three key sustainability themes from our business strategy are:

1. To **mitigate harm from climate change** – by enabling decarbonisation through electrification, by preparing our networks for emerging technologies and low carbon alternatives, and by reducing our own corporate emissions.
2. To **adapt to climate change** – by adapting and strengthening our network as our customers rely on it more, and as it is exposed to the increasing effects of climate change.
3. To **ensure the energy we provide is affordable** for Kiwis – by investing intelligently to mitigate expenditure increases and, therefore, the costs to customers.

Our sustainability strategy and business plan align with our latest materiality assessment which was reviewed in FY24. This process confirmed our material sustainability topics – these being the most important positive and

[1] Contact person for GHG is the Sustainability Strategic Lead email: Corporate.sustainability@powerco.co.nz

[2] For further information about the organisation refer to www.powerco.co.nz

negative impacts that Powerco has on (and from) the environment, society, the economy and people's human rights. The decarbonisation of New Zealand's economy was identified in our latest review as our most material sustainability issue. Decarbonising Powerco's own footprint is also one of our top ten material sustainability issues. Our ambition to impact all of our material areas can be seen in the business sustainability targets visible on our website.

Intended uses and audiences of the report

This report is intended to advise the stakeholders of Powerco Limited on our GHG inventory for the reporting period FY23, along with the steps and measures taken by us to reduce the greenhouse gas emissions associated with our activities.

Stakeholders include shareholders, investors, regulators, customers and communities to whom we supply energy, employees, contractors, and members of the public.

Scope and boundaries

Organisational boundary

The organisational boundary determines the parameters for GHG reporting and ensures a consistent approach is applied when assessing which factors to include. Powerco applies the operational control consolidation approach. This means we aggregate the emissions from Powerco Limited and its subsidiary companies to a single Powerco value.

Powerco's operations are conducted out of nine locations throughout New Plymouth, Whanganui, Palmerston North, Wellington, Tauranga, Masterton and Te Aroha. The Junction Street premises in New Plymouth is our registered office.

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Powerco's operational control starts at grid exit points and gas gate stations, where energy is transferred to our networks from Transpower New Zealand and Firstgas and finishes at the point where the energy reaches our customers[3].

Our operational control includes additional off-site locations and all operational activities undertaken by Powerco. These activities include:

- Powerco owned transmission, sub-transmission, distribution and service cables and lines, zone substations, distribution transformers and associated network equipment.
- Powerco owned gas pipes, valves, district regulator stations and associated network equipment.
- Administrative activities within the areas occupied by Powerco at each office location.
- The operations of subsidiary companies Base Power Ltd, Powerco Transmission Services Ltd, and The Gas Hub.

[3] For the electricity network this is the pillar box or fuse before the service cable or line that enters the property boundary. For the gas network this includes the service pipe and may or may not include the gas meter.

Operational boundary

The GHG emission sources from the Powerco value chain were identified with reference to the methodology described in the GHG protocol and the GRI 305 Standards. These have been classified as follows.

Scope 1 - Direct GHG emissions that are operationally controlled by Powerco including:

- Category 1 - Stationary combustion emissions relating to direct consumption of natural gas and non-biogenic fuels in generators.
- Category 3 - Mobile consumption emissions relating to non-biogenic fuels.
- Category 4- Fugitive emissions including sulphur hexafluoride (SF_6) in relation to our electricity network, and carbon dioxide (CO_2) and methane (CH_4) in relation to our gas network.

Scope 2 - Indirect GHG emissions from imported energy:

- This includes the GHG emissions from distribution network line losses and purchased electricity consumed by Powerco.

Scope 3 - Other indirect GHG emissions not included in Scope 1 or 2 that occur in Powerco's value chain. These have been further categorised as:

- Category 1 - Purchased goods and services
- Category 5 - Waste
- Category 6 - Business travel
- Category 7 - Employee commuting and working from home
- Category 9 - Downstream transportation and distribution
- Category 13 - Downstream leased assets

A full list of exclusions and reasoning is included in table 4.

Information management procedures

Powerco's GHG inventory reporting guidelines were first developed in 2015 and last revised and approved in March 2022. This document details the measurement and reporting requirements for Powerco Limited with the objective of assessing and measuring the greenhouse gas emissions associated with Powerco's activities.

Powerco has developed and maintained GHG information management processes that: ensure conformance with the principles of the GHG protocol and of ISO 14064-1:2018; provide routine and consistent reviews to ensure completeness and accuracy; ensure consistency with the intended use of the GHG inventory; manage and store documentation in a controlled and accessible manner; and identify and address omissions and errors.

Powerco's key GHG information management procedures are:

- Source data is collected directly from third party suppliers or from Powerco's financial and asset management systems.
- The data is stored in the Bravegen software database and reviewed by the Environment and Sustainability Team.
- Emissions factors and conversion factors in Bravegen are maintained by Bravegen.
- The GHG inventory is compiled using activity data and emission factors.
- The report is independently audited by Toitu Environcare.
- The report is reviewed to identify opportunities to improve the information management process.
- Senior management is informed of emissions reduction progress.

Methodology

GHG emissions across scopes 1, 2, and 3 are calculated using a bottom-up approach where outputs from our activities are converted to a CO_2e value using an appropriate emission factor.

Emission factors

Table 2: Emission factors applied to our emission sources

Scope	Category	Emission source	Emission factor	Reference
1	Stationary combustion	Purchased gas	0.195 $kgCO_2e$ /kWh	NZ Ministry for the Environment 2022
		Generators - diesel	2.67 $kgCO_2e$ /L	
	Mobile combustion	Petrol	2.45 $kgCO_2e$ /L	
		Diesel	2.69 $kgCO_2e$ /L	
	Fugitive emissions	SF_6	GWP = 23,500	EPA – Emissions Trading Scheme
		Gas network pipeline losses	GWP CH_4 = 28 GWP CO_2 = 1	Modified NGER Scheme Method 1 – see Appendix A
2	Electricity	Electricity network line losses	0.120 $kgCO_2e$ / kWh	NZ Ministry for the Environment 2022
		Purchased electricity	0.120 $kgCO_2e$ / kWh	
3	Purchased goods and services including Capital Goods and Transport	Contractor stationary combustion - Diesel	2.67 $kgCO_2e$ /L	NZ Ministry for the Environment 2022
		Contractor stationary combustion - Petrol	2.33 $kgCO_2e$ /L	UK Department for Business, Energy & Industry Strategy 2021
		Contractor stationary combustion - LPG	3.03 kg/CO_2e/kg	NZ Ministry for the Environment 2022
		Contractor mobile combustion	Petrol 2.45 $kgCO_2e$ /L 0.264 $kgCO_2e$ /km	
			Diesel 2.69 $kgCO_2e$ /L 0.270 $kgCO_2e$ /km	

Scope	Category	Emission source	Emission factor	Reference
		Services	Varies $kgCO_2e$/ Spend NZD	Most applicable factors from M.E Research Consumption Emission Modelling Report - prepared for Auckland Council March 2023
		Purchased products	Varies $kgCO_2e$/ Spend NZD	
		Base Power units (stationary combustion of diesel)	2.67 $kgCO_2e$/ L	NZ Ministry for the Environment 2022
	Waste	Composting Waste to landfill (general) Waste recycling (mixed) Waste oil from transformers	1.72 $kgCO_2e$ /kg 0.65 $kgCO_2e$ /kg 0.02 $kgCO_2e$ /kg 2.92 $kgCO_2e$/ L	NZ Ministry for the Environment 2022 (excluding waste recycling which uses a DEFRA 2023 emissions factor)
	Business travel	Rental cars - large diesel - large petrol - medium petrol Petrol hybrid medium Electric	 0.236 $kgCO_2e$ /L 0.220 $kgCO_2e$/L 0.198 $kgCO_2e$/L 0.150 $kgCO_2e$/L 0.120 $kgCO_2e$ / kWh	
		Taxis	0.0702 $kgCO_2e$ /$ (incl gst)	
		Flights (domestic, international short-haul and long-haul without radiative forcing)	0.164 $kgCO_2e$ / Km 0.153 $kgCO_2e$ / Km 0.193 $kgCO_2e$ / Km	
		Accommodation (Domestic, Australia, United States)	0.094 $kgCO_2$/ night 0.389 $kgCO_2$/ night 0.198 $kgCO_2$/ night	

Scope	Category	Emission source	Emission factor	Reference
	Employee commuting	Travel to and from work in private vehicles (Diesel, electric, petrol, hybrid, motorbike) and public transport (Bus, Rail)	0.270 $kgCO_2$/ Km 0.026 $kgCO_2$/ Km 0.265 $kgCO_2$/ Km 0.201 $kgCO_2$/ Km 0.091 $kgCO_2$/ Km 0.155 $kgCO_2$/ Km 0.019 $kgCO_2$/ Km	
		Working from home	0.979 $kgCO_2$/ day	
	Downstream transportation and distribution	International shipping of scrap metal	0.037 $kgCO_2$/ tKm	
	Downstream leased assets	Powerco owned leased depots purchased electricity	0.120 $kgCO_2e$/ kWh	NZ Ministry for the Environment 2022

Reporting period and base year

The current reporting period is the financial year ended 31 March 2023 (FY23). The base year is the year ended 31 March 2021 (FY21).

FY21 was selected as the base year due to the availability of data and similarity of scope with our ongoing emissions. This definition will again be reassessed if:

- We significantly change the scope of what we are measuring within our value chain.
- We buy or sell a company.
- Emission factors change significantly and affect previous years, e.g., if the science behind the emissions factor is revised.
- On discovery of an error or cumulative errors that could be collectively significant.

Data collection and review process

Data for this report is collected by Powerco's Sustainability Analyst and uploaded into Bravegen[4]. The calculations and methodologies are reviewed by the Sustainability Strategic Lead and this report is approved for publication by the General Manager, Corporate Services.

The data collection and review process are outlined in Table 3.

Bravegen software uses a calculation methodology for quantifying the GHG emissions inventory using emissions source activity data multiplied by the GHG emissions factors.

For calculation of SF_6 emissions, quantities are converted to tonnes of CO_2e using the global warming potential from the Intergovernmental Panel on Climate Change (IPCC) 2007 Assessment report 4 – AR4.

Data quality of reported emissions

In total, 15 sources of data are obtained from supplier invoices or reports and eight from internal business units. The majority of data sources (n=21) are based on usage/quantities, while two scope 3 data sources (taxis and purchased goods and services) are spend based.

For scope 1 and 2 emissions 37% of the data sources are internal and 63% are calculated using data obtained from suppliers or other value chain partners.

For scope 3 emissions, 67% of data sources are calculated using data obtained from suppliers or other value chain partners.

There are limitations to some data sources. Specifically:

- Electricity Transmission and Distribution (T&D) losses for energy delivered to ICPs – unmetered loads such as streetlights are estimated.
- Gas fugitive emissions are based in part on a percentage of Gas Gate volumes and averaged methane content, and not actual measured fugitive losses.
- There are uncertainties and estimations used to calculate employee commuting, such as averaging of travel range bands. In FY23 we used FY22 survey data adjusted to current staffing levels.
- There is an estimated factor used to calculate waste emissions at a shared location where waste is not collected separately.
- Only tier 1 contractors' fuel emissions are calculated from actual usage. The remainder is accounted for in purchased goods and services.
- LPG quantities have been estimated based on a monetary spend figure.
- A spend based methodology has been used to calculate emissions for scope 3 category 1 – purchased goods and services, using the most applicable emissions factors from a locally sourced consumption emissions modelling report .
- Data pertaining to long and short haul international flights is potentially over-stated as it calculates associated domestic travel using the international emissions factor.

[4] Bravegen is a New Zealand owned and operated, carbon accounting "Software as a Service" system.

Summary of emission source inclusions

Table 3: Data collection and review process

Scope	GHG Category	ISO Category	Emission source	Data	Data source
1	Stationary combustion	1: Direct emission and removals	Purchased gas	Gas usage (kWh)	External invoices
			Diesel	Fuel usage (litres)	External generator hire and servicing contractors
	Mobile combustion	1	Petrol, diesel	Fuel usage (litres)	Automated report from external fuel supplier
	Fugitive emissions	1	SF_6	Identified equipment and quantity[5]	Internal report based on external equipment maintenance service provider
		1	Gas network pipeline losses	Refer appendix A	Internally reported Gas Gate volumes, used for Powerco's information disclosure for gas distribution[6]
		1	Refrigerants	Leakage quantities	Annual advice from Powerco facilities team
2	Electricity	2: Indirect emissions from imported energy	Electricity network lines losses	Electricity losses (GWh)	Powerco's audited information disclosure for electricity distribution[7]
		2	Purchased electricity	Electricity usage (kWh)	Building owner invoices and automated reports from electricity retailer

[5] Calculated consistent with those specified by the Environmental Protection Authority (EPA) in the Climate Change Response Act Regulations accounting for losses of SF_6 gas to atmosphere and the corresponding tCO_{2e}.
[6] See schedule 8(i) in the disclosures here https://www.powerco.co.nz/who-we-are/pricing-and-disclosures/gas-disclosures
[7] See schedule 9e(ii) in the disclosures here https://www.powerco.co.nz/who-we-are/pricing-and-disclosures/electricity-disclosures

Scope	GHG Category	ISO Category	Emission source	Data	Data source
3	Purchased goods and services including Capital Goods and Upstream Transportation and Distribution	4: Indirect emissions from products used by organisation	Capital Goods and Upstream Transportation and Distribution etc.	Cost in $NZD including GST	Internal Powerco Financial spend data - SAP
		4	Petrol, Diesel (stationary combustion)	Fuel usage (litres)	External report from tier one contractors
		4	LPG (stationary combustion)	Fuel usage (kg)	External report from tier one contractors
		4	Contractor fuel (operational maintenance and construction, petrol and diesel (mobile))	Distance travelled (kms) and/or fuel (litres)	External report from tier one contractors
		4	Customer use of diesel in Powerco owned Base Power units	Fuel usage (litres)	Internal report from maintenance contractors
	Waste	4	Waste to landfill from offices	Waste to landfill and recyclables (tonnes)	External report from waste management company and external waste audits
		4	Waste oil from transformers	Fuel recovered (L)	External report from oil recovery company
	Business travel	3: Indirect emissions from transportation	Rental cars (petrol, diesel)	Distance travelled (kms)	External report from rental agency
		3	Taxis	Financial cost including GST	Internal report from staff coding
		3	Flights (domestic, international short haul and long haul)	Distance between departure and arrival airports (kms)	External report from travel provider

Scope	GHG Category	ISO Category	Emission source	Data	Data source
		3	Accommodation	Number of nights stayed	External report from travel provider
	Employee commuting	3	Travel to and from work (in private vehicles and public transport)	Distance to work per employee is pro-rated across Powerco's total FTEs (kms)	Internal employee commute survey
		3	Working from home	Number of days	Internal employee commute survey
	Downstream Transportation and distribution	3	International shipping	Distance travelled per tonne	External report from scrap metal company
	Downstream leased assets	4	Depots leased to contractors	Purchased electricity	External report from contractor

Exclusions

The following data is currently excluded from the FY23 GHG Inventory Report:

Table 4: GHG emissions excluded from the FY23 GHG Inventory

Scope	GHG Category	ISO Category	Subcategory	Reasons for exclusion
Scope 1	Stationary Combustion	1: Direct emission and removals	LPG for on-site BBQs	Considered immaterial
		1	Refrigerants	HVAC in offices, communications sites and substations
Scope 3	Waste	4: Indirect emissions from products used by organisation	Construction and waste related to construction	Data not available
		4	Waste associated with the disposal of network equipment	Other than waste oil and the international freight associated with scrap metal, data not available

Scope	GHG Category	ISO Category	Subcategory	Reasons for exclusion
		4	Office waste from Whanganui, Masterton and Te Aroha locations	Data not available, small offices >10 people
		4	Office waste from Wellington location	Due to shared office buildings, data not currently available, except for recycling for the Wellington office.
	Transmission and distribution losses	4		Powerco has not reported transmission and distribution losses for gas and electricity consumed separately, as the full distribution losses for the entire network are reported in scope 1 and scope 2
	Water and wastewater	4		Considered immaterial
	Business travel	3: Indirect emissions from transportation	Public transport	Data not available
	Upstream leased assets	4		Powerco does not have any upstream leased assets.
	Processing of sold products	5: Indirect emissions associated with the use of products from the organisation	Base Power	Two Base Power units were sold in the FY23 reporting period
	Use of sold products	5	Base Power	Two Base Power units were sold in the FY23 reporting period
	End of life treatment of sold products	5	Base Power	No units have reached end of life

Scope	GHG Category	ISO Category	Subcategory	Reasons for exclusion
	Downstream leased assets	5	Powerco owned leased depots Base Power	Data not available for purchased gas or refrigerants Data not available for diesel used in two leased Base Power units in Australia
	Franchises	5		Powerco does not have any franchises
	Investments	5		Powerco does not have any investments to report on

FY23 GHG inventory analysis

Emissions by activity

The table below shows Powerco's emissions by activity in tCO_2e. Figures highlighted in either green or red indicate a salient change in emissions compared to the previous year (FY22). Changes in emissions not highlighted are due to changes in data collection, where we have low data quality or an immaterial shift.

Some of our FY23 reported emission sources have not decreased to the extent we were expecting. This is a frustrating outcome for the business, as many of our scope 1 and 2 decarbonisation plans are being implemented, but are not yet resulting in the emissions reductions we had hoped. Although we are seeing good efficiency gains (for example in our office electricity use and electricity line losses), our emissions have not reduced due to the change in emissions factor used (a function of the reduced proportion of renewable energy in New Zealand's electricity grid).

Compared to FY22, we have seen reductions in emissions associated with stationary combustion and gas fugitive losses. Although stationary combustion emissions have decreased from FY22, they are still up on our base year of FY21, and due to our increased focus on customer resilience we are anticipating that these may further increase without an advancement in alternative fuels. The reduction in gas fugitive losses was due to a decrease in natural gas supplied.

FY23 emissions increased from FY22 for mobile combustion (our vehicle fleet), electricity line losses, electricity use in our substations, air travel, and contactor mobile and stationary combustion.

Table 5: FY23 GHG emissions (tCO2e) by activity

Category	FY23 tCO2e	FY22 tCO2e	FY21 tCO2e	Commentary
Mobile combustion	388.99	358.65	375.02	The ongoing implementation of our vehicle fleet decarbonisation plan has resulted in approximately 40% of our diesel vehicles being replaced with hybrid vehicles during FY23. This reduction in emissions has been offset by an increase in the distances travelled in our hybrid and remaining diesel vehicles.
Fugitive emissions - SF_6	10.34	107.16	57.23	Data process improvements have meant a more accurate account of SF_6 leakage compared to previous years. During FY23, a new standard was implemented to ensure all SF_6 degassing is undertaken by one company which should help maintain the improved data collection.
Fugitive emissions - Gas network pipeline losses	6,862.13	7,120.33	7,246.65	As our current calculation for fugitive pipeline losses is directly linked to gas throughput, a reduction in throughput has positively impacted our emissions. We are currently implementing a more accurate fugitive emissions model based on leak detection monitoring.
Stationary combustion	348.19	432.36	248.97	FY23 saw a decrease in our use of diesel generators, however this was coming off a high in FY22 due to the routine maintenance of large assets supplying electricity to essential services such as hospitals and medical centres. In-line with our focus on customer resilience we are anticipating that our diesel generator use will increase in FY24 due to the installation of generators that will run during network outages and peak loads in harder to access locations.
Total Scope 1	**7,609.65**	**8,018.50**	**7,927.87**	

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Category	FY23 tCO2e	FY22 tCO2e	FY21 tCO2e	Commentary
Electricity network line losses	31,800.00	27,582.21	27,785.02	The amount of electricity lost from the network was down on FY22, even though the energy delivery has increased. However, the emissions factor (based on grid mix) increased, which resulted in an increase in emissions compared to FY22.
Purchased electricity	472.08	395.53	400.56	Efficiency projects in our offices have continued to decrease our purchased electricity, but a continued increase in electricity use by our substations has resulted in a slight overall increase compared to both our FY21 base year and FY22. This has been exacerbated by a higher emissions factor for purchased electricity, which is based on NZ's electricity grid mix.
Total Scope 2	**28,781.20**	**27,977.74**	**28,185.58**	
Purchased goods and services	75,075.35	69,813.94	74,355.76	This data is based on spend, using an averaged emissions factor based on industry type. We have included these emissions in our reporting for completeness, and proportionally focus our efforts in the right areas. However, we have a low level of confidence in any comparisons year on year. A recommendation from our auditors was to use a different source of emissions factors for purchased goods and services. We have therefore retrospectively back-dated this for our FY21 and FY22 data).
Contractor mobile and stationary combustion	5,596.42	5330.21	5,009.66	Contractor emissions have increased mainly from use of diesel vehicles carrying out work on our behalf.
Powerco owned leased depots	54.59	24.10	2.58	We had an incomplete set of data for FY21 so comparison is not possible. However, FY23 is the first year we have had electricity use for all of our Downer leased depots.
Base Power	24.41	24.33	14.56	FY23 is up on our FY21 base year, but in line with FY22 fuel use for Base Power units.

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Category	FY23 tCO2e	FY22 tCO2e	FY21 tCO2e	Commentary
Business travel	306.58	154.32	90.66	The main contributor to our increase in business travel is due to air travel, which has doubled since FY22 and close to quadrupled since FY21. This is still below pre-COVID levels but we are investigating reductions options for the business going forward.
Employee commuting and working from home	345.37	328.64	298.22	FY23 commuting and working from home emissions were based on the FY22 survey, adjusted for the increased FY23 employee number. During FY22, we improved our employee survey process and response rate. This resulted in a 95% confidence in this data, but we have a low confidence in the granularity of the FY21 data to be able to compare year on year.
Waste (office waste, waste oil combustion and shipping of scrap metal)	209.21	139.75	15.52	Office waste continues to trend downwards. Compared to FY22, we have sent more scrap metal and oil to recyclers in FY23 than in FY22. We currently do not account for our network waste to landfill so an increase in recycling emissions is not necessarily a negative. We have recently implemented changes to decrease our scrap metal shipping emissions and are working with our suppliers to better understand network waste.
Total Scope 3	**81,611.93**	**75,815.29**	**79,786.96**	
Total Scope 1, 2, and 3	**121,493.66**	**111,811.53**	**115,900.41**	

Powerco had no emissions associated with biomass in FY23.

Table 6: FY23 total greenhouse gas emissions by greenhouse gas

Scope	tCO_2	tCH_4	tN_2O	tSF_6	Other tCO2e[8]	Total
1	767.49	6,823.38	8.44	10.34	0.00	7,609.64
2	27975.31	745.95	59.93	0.00	0.00	28781.20
3	6379.84	24.64	91.04	0.00	75113.88	81609.41
Total	**38515.78**	**7684.45**	**166.68**	**10.34**	**75113.88**	**121491.13**

[8] Powerco has no emissions from HFCs PFCs or NF3.

Emissions over time

The figure below shows Powerco's total emissions and the breakdown by scope, from FY21 to FY23.

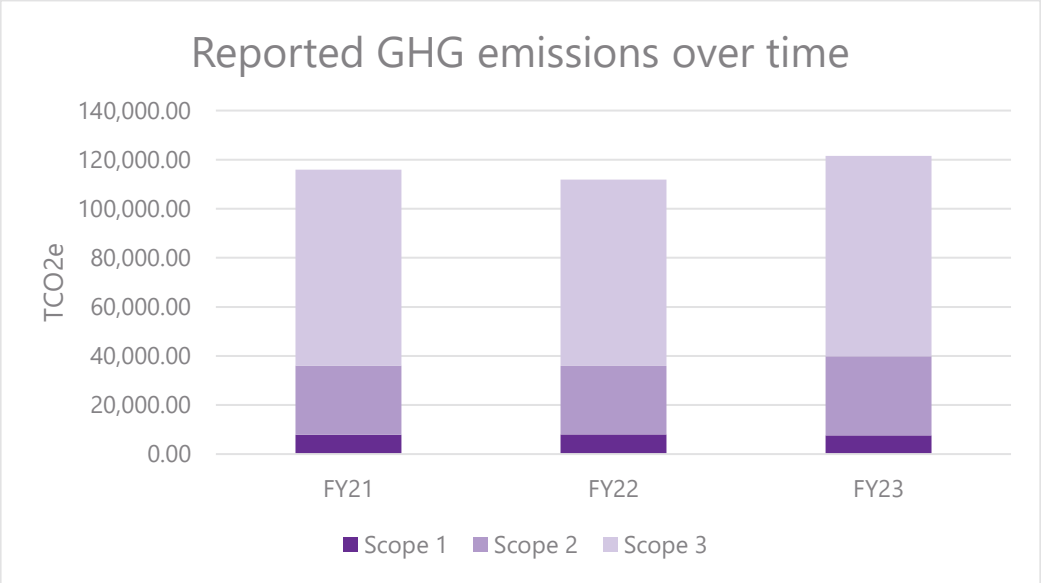

Figure 1: Comparison of total reported GHG emissions over time

GHG emissions intensity

Emissions intensity is a measure of carbon emissions in relation to a suitable business metric. Our FY23 GHG emissions intensity for scope 1 and 2 emissions is 4.80tCO_2e per GWh of energy transported through our network. This is an increase from 4.73tCO_2e in our base year of FY21. The increase in emissions intensity is largely driven by a change in the emissions factor and a decrease in energy transported. The emissions intensity calculation includes scope 1 and 2; with a separate intensity calculation for scope 3.

Table 7: GHG intensity

	FY23	Base year FY21	Variance	
				%
Total energy transported through networks (GWh)	7,578.94	7,639.84	-60.90	-0.80
Scope 1 & 2 emissions (tCO_2e)	39,881.72	36,113.45	3,768.27	10.43
Emissions intensity tCO_2e/GWh Scope 1 & 2	**5.26**	**4.73**	0.54	11.32
Scope 3 emissions (tCO_2e)	81,611.93	79,786.96	1824.97	2.29
Emissions intensity tCO_2e/GWh Scope 3	**2.05**	**2.21**	-0.16	-7.38

Figure 2 shows a steady decrease in emissions intensity up to FY20. From FY21 onwards our emissions intensity has begun to rise largely driven by declining gas throughput and increasing scope 2 emission factors (based on NZ's electricity grid mix).

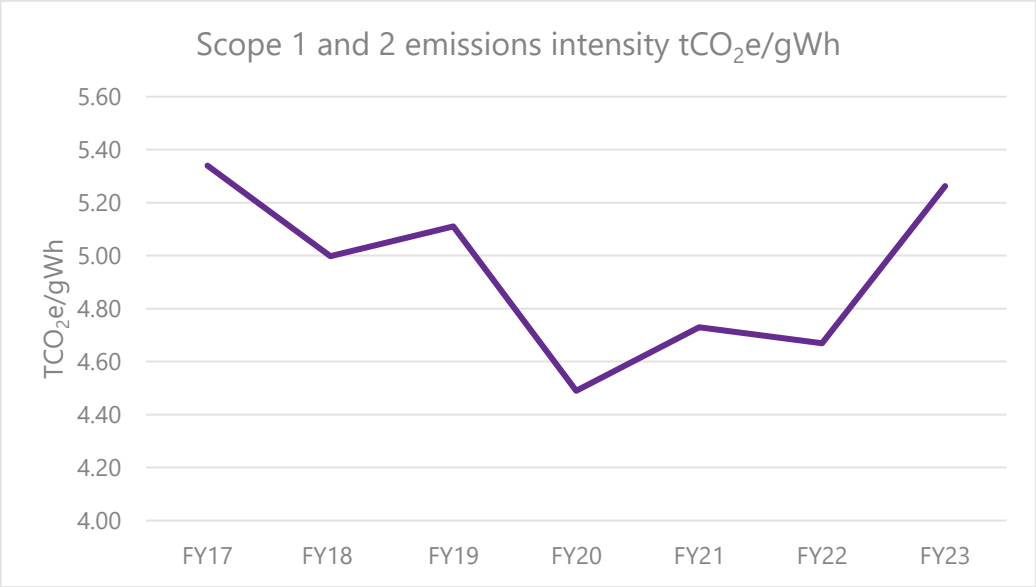

Figure 2: Comparison of GHG intensity over time

GHG removals and reductions

Removals

A greenhouse gas removal is defined by ISO14064-1 as the "total mass of greenhouse gas removed from the atmosphere over a specified period of time". We had no quantified removals for this reporting period.

In 2020, Powerco partnered with Restore Taranaki and our vegetation management contractor Asplundh Tree Expert Company LLC to create native habitats which in turn will contribute to cleaner air and water, and restoring natural biodiversity and habitats. This initiative is an ongoing commitment for Powerco, bringing benefits to future generations. During FY23, we planted another 2,500 trees in the Te Rewa Rewa reserve, New Plymouth.

We also continued our partnership with Trees for Survival with seed and seedling planting support for schools to grow and plant native trees along waterways and erosion prone hillsides.

Powerco also supported the restoration of Te Mata Reserve in Waihi (through our sponsorship of Waihi Beach School's planting programme), and Duxfield Reserve in Putāruru (through our sponsorship and partnering with the Pokaiwhenua Catchment Group).

Emission reduction initiatives

Table 8: Emission reduction initiatives status'

Initiative	Part of business	FY23 Status
Electrification (EV and hybrid) of vehicle fleet	Group	In progress. Approximately 40% of diesel vehicles were replaced during FY23
New Plymouth office consolidation to one site	Group	Completion date early FY24
Palmerston North PV installation	Group	Completed in FY23: This relatively small solar array should reduce our Palmerston North office electricity use by approximately 15%.
Reset of substation building HVAC system heating and cooling set points	Electricity Network	Completed: During FY23, changes were made to our substation maintenance standard and all HVAC set points should now have been widened to reduce ineffective cooling and heating.
Review of our substation building designs including energy efficiency impacts	Group	In progress
Investigating low carbon fuels for the reduction of diesel consumption	Group	In progress: During FY23, we tested a hydrogen catalyser using a small diesel generator, but the findings were inconclusive. We have shared our data with another company who are conducting long-duration vehicle fleet trials, by which we hope to gain more insights. In FY24, we will also investigate other decarbonisation options.
Collaborating with our supply chain to understand how we can reduce scope 3 emissions from "Purchased goods and services"	Group	In progress: Communication with contractors during FY23 to signal intention to collect accurate emissions data and network waste data.
Investigation of MarcoGaz, a model to provide the ability to calculate potential reductions in fugitive gas leaks	Gas Network	Completed: In FY23 the MarcoGaz Model was investigated and agreed as our future calculation model for natural gas fugitive losses.
Use of a gas leak detection vehicle to improve network leak information and inform our leak maintenance programme	Gas Network	In progress: In FY23, we purchased our first leak detection vehicle. During the second half of FY23 to mid-FY24, the vehicle will go through a trial and training process before it becomes officially operational. The gas leak detection vehicle will then be used across the full Powerco network from late FY24. By FY25 we should be able to accurately report on our fugitive losses and have the information required to inform our emissions reduction programme.

Initiative	Part of business	FY23 Status
Refurbishment of Tauranga office	Group	Completed: This refurbishment allowed Powerco to remain in a Greenstar rated building with an increased number of staff working from our Tauranga office.
Improved office waste data	Group	In progress: Waste data from offices that are currently excluded from our reporting have planned annual audits starting in FY24
SF_6 Management Review	Electricity Network	In progress
Investigating the efficient use of diesel generators on our network and lower carbon alternatives	Electricity Network	In progress: During FY23 we focused on planned works and found alternatives to using temporary diesel generators are being utilised where available. Our focus for FY24 will be those cases where alternatives are not viable and to instead investigate low carbon alternative fuels. We will also investigate mitigations for generator use in our unplanned works.

Emissions avoided

Powerco has three small photovoltaic solar arrays; one connected to our Network Operations Centre building, one to a new refurbished office building in New Plymouth and a third at our new Palmerston North office. All the renewable electricity generated by the array is consumed by the buildings. In FY23, 62MWh of electricity was generated. This equates to 7.40 tCO_2e avoided from our scope 2 emissions.

During FY23, we did not install any further stand-alone power supplies (Base Power units). Installation of these units is used strategically on our network to assist remote rural customers with energy supply whilst enabling Powerco to decommission the electricity lines supplying those customers. We hope in the future to be able to calculate the network lines loss emissions avoided.

Emissions reduction target

Emissions reduction target
Since FY20, Powerco has had a goal to reduce our scope 1 and 2 emissions (excluding electricity line losses and gas fugitive losses), with a view to offsetting all remaining target emissions by 2030.

We are aware that any efforts to meet this goal must not be at the expense of our customers' decarbonisation, which will have a much greater impact on New Zealand's net zero ambition.

In FY24, we will undertake a strategic shift in our organisation's emissions reduction strategy, by directing more of our shorter-term resource into broadening our emissions reductions and setting credible ambitious reduction targets. Offsetting does not form part of this shorter-term focus, but we may revisit its role in the future.

Why we currently have exclusions
The exclusion of electricity line losses from our target is due to the understanding that access to electricity is a key enabler for New Zealand's decarbonisation, and targets to reduce line losses could have a detrimental impact on this.

Our target emissions also exclude gas fugitive losses due to our current methodology for measuring these being unable to account for any reductions in leakage. During FY23 we have been working on implementing a bespoke model (MarcoGaz) and utilising specialised gas leak detection equipment which will allow us to better quantify leaks (and more accurately account for emissions reductions). For this reason, it is likely that in the future, our emissions reductions target will no longer exclude gas fugitive losses.

FY23 outcomes

During FY23, total emissions for our target increased 12.75% compared to the FY21 base year (Table 9). This is largely due to an increase in electricity emissions driven by grid mix (Table 5).

Compared to the previous year (FY22), our target emissions have decreased by 6.7%.

Table 9: FY23 Target Emissions (tCO2e)

Emission source	FY23	FY22	Base year FY21	Variance	
	tCO_2e	tCO_2e	tCO_2e	tCO_2e	%
Mobile combustion	388.99	358.65	375.02	13.97	3.73
SF_6	10.34	107.16	57.23	-46.89	-81.93
Purchased gas	0.14	0.1	0.12	0.02	16.67
Stationary combustion	348.19	432.26	248.85	99.34	39.92
Purchased electricity	472.08	395.53	400.56	71.52	17.86
Total	**1219.74**	**1293.7**	**1081.78**	**137.96**	**12.75**

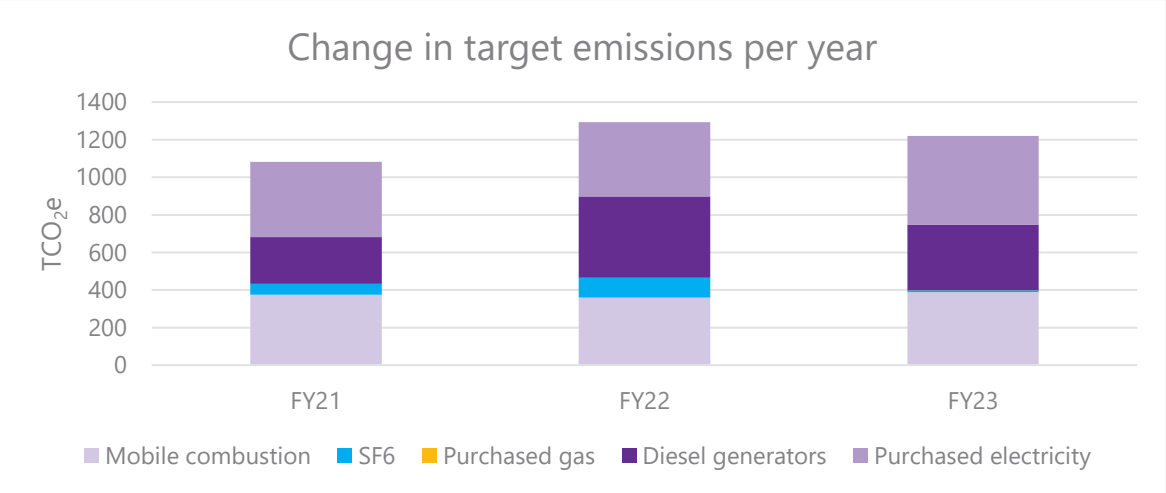

Figure 3: Changes in target emissions per year

Appendices

Appendix A – modified NGER Scheme Method 1

Powerco's natural gas pipeline loss calculation is based on the Australian NGER (National Greenhouse and Energy Reporting) Scheme Method 1, modified for New Zealand. This formula estimates fugitive emissions based on the total emissions measured in tCO2e that pass through the network equipment and a region-specific emissions factor. A detailed explanation of this formula can be found on page 147 of the NGER Determination (2008)[9].

In the absence of a reliable emissions factor for the New Zealand context, the formula was modified to reflect the Maunsell Report's (2007) recommended average gas line loss of 0.2%. The modified formula calculates the amount of unburnt carbon dioxide (CO2) and methane (CH4) lost from the gas pipelines as a result of distribution, in tonnes, multiplied by the Global Warming Potential of each gas and expressed as tCO2e.

E = (TP * 26.137) * 0.2% * F * D * GWP / 1000	
E	Emissions
TP	throughput (GJ)
26.137	converts GJ to m^3
0.2%	estimated gas line losses (from Maunsell's 2007 Report)
F	average fraction of gas in mix (methane or carbon dioxide) expressed as a percentage
D	density of gas in kg/m^3 (methane = 0.678, carbon dioxide = 1.98)[10]
GWP	global warming potential of gas (tCO_2e/tonne)
1000	converts to tonnes

The calculation is completed twice with different values of F: once for the methane component of the gas (81.00%) and once for the carbon dioxide component (5.75%). The resulting emissions are summed to give the total amount of emissions from natural gas pipeline losses.

Appendix B – GRI standards reporting index

This report contains standard disclosures from the GRI Sustainability Reporting Guidelines.

The table below maps the content of this document to the GRI disclosure requirements.

[9] National Greenhouse and Energy Reporting (Measurement) Determination 2008 – see page 147, section 3.81 for Method 1

[10] From: Schäfer, Michael; Richter, Markus; Span, Roland (2015). "Measurements of the viscosity of carbon dioxide at temperatures from (253.15 to 473.15)K with pressures up to 1.2MPa". The Journal of Chemical Thermodynamics. 89: 7–15. doi:10.1016/j.jct.2015.04.015. ISSN 0021-9614

Powerco greenhouse gas emissions inventory report

GRI standard	Disclosure	Reference or response	Page
3-3 Management of material topics 2021	Disclosures of material topics	The introduction section of this report describes our operational boundary.	4
		The Powerco, GHG and sustainability sections outline the management approach	4,5,6
		The emissions initiative progress and offsets section shows examples of evaluation.	24
305 Emissions 2016	305-1 Direct (Scope 1) GHG emissions	Table 5 – FY22 GHG emissions by activity	16,17,18
		Base year selected	9
		Table 2 – Emission factors	7,8,9
		Organisational boundary section	6
		Data collection process section	10
		Methodology section and appendix A – Modified NGERS method 1	7,26
		Table 4 – Exclusions	13,14,15
	305-2 Energy Indirect (Scope 2) GHG emissions	Table 5 – FY22 GHG emissions by activity	16,17,18
		Base year selected	9
		Table 2 – Emission factors	7,8,9
		Organisational boundary section	6
		Data collection process section	10
		Methodology section	7
	305-3 Other indirect (Scope 3) GHG emissions	Table 5 – FY22 GHG emissions by activity	16,17,18
		Base year selected	9
		Table 2 – Emission factors	7,8,9
		Organisational boundary section	6
		Data collection process section	10
		Methodology section	7
		Table 4 - Exclusions	13,14,15
	305-4 GHG emissions intensity	Table 7 – GHG intensity	20

Appendix C – ISO 14064-1:2018 Reporting Index

ISO Reporting	Section in this report	Page
9.3.1 (a)	Introduction – Powerco's sustainability strategy	4,5
9.3.1 (b)	Data collection and review process	10
9.3.1 (c)	Reporting period and base year	9
9.3.1 (d)	Organisational boundary	6
9.3.1 (e)	Operational boundary	6
9.3.1 (f)	Emissions by activity – Table 5	16,17,18
9.3.1 (g)	Other emissions – CO_2 emissions from the combustion of biomass	18
9.3.1 (h)	GHG removals and reductions	21
9.3.1 (i)	Exclusions – Table 4	13,14,15
9.3.1 (j)	Emissions by activity – Table 5	16,17,18
9.3.1 (k)	Reporting period and base year	9
9.3.1 (l)	Reporting period and base year	9
9.3.1 (m)	Summary of emission source inclusions - Table 3	11,12,13
9.3.1 (n)	Data collection and review process	10
9.3.1 (o)	Emission factors – Table 2	7,8,9
9.3.1 (p)	Data quality of reported emissions	10
9.3.1 (q)	Data quality of reported emissions	10
9.3.1 (r)	Introduction	4
9.3.1 (s)	Audit report	31
9.3.1 (t)	Data collection and review process	10

ISO Reporting	Section in this report	Page
9.3.2 (a)	Introduction	4
9.3.2 (b)	GHG removals and reductions	21
9.3.2 (c)	GHG removals and reductions	21
9.3.2 (d)	N/A	

ISO Reporting	Section in this report	Page
9.3.2 (e)	N/A	
9.3.2 (f)	Emissions by activity – Table 5	16,17,18
9.3.2 (g)	GHG Intensity - Table 7	20
9.3.2 (h)	Emissions reduction and offsetting targets	24
9.3.2 (i)	Information management procedures	6
9.3.2 (j)	Emissions over time	20
9.3.2 (k)	Emissions over time	20

ISO Reporting	Section in this report	Page
9.3.3	Emissions reduction and offsetting targets	24

Powerco greenhouse gas emissions inventory report

Audit report

This GHG inventory report has been audited by Toitu Envirocare, a third-party independent assurance provider. A reasonable level of assurance has been given over the assertions and quantification included in this report, other than for spend-based purchased goods and services which has a limited assurance.

The GHG assurance report is on the following page(s).

INDEPENDENT AUDIT OPINION
Toitū Verification

TO THE INTENDED USERS

Organisation subject to audit:	Powerco Limited
Audit Criteria:	ISO 14064-1:2018 ISO 14064-3:2019 Audit & Certification Technical Requirements 3.0
Responsible Party:	Powerco Limited
Intended users:	Stakeholders include shareholders, investors, regulators, customers and communities to whom we supply energy, employees, contractors, and members of the public
Registered address:	35 Junction Street, Welbourn, New Plymouth, 4312, New Zealand
Inventory period:	1/04/2022-31/03/2023
Inventory report:	FY23 GHG inventory report Draft V1.7.pdf

We have reviewed the greenhouse gas emissions inventory report ("the inventory report") for the above named Responsible Party for the stated inventory period.

RESPONSIBLE PARTY'S RESPONSIBILITIES

The Management of the Responsible Party is responsible for the preparation of the GHG statement in accordance with ISO 14064-1:2018 . This responsibility includes the design, implementation and maintenance of internal controls relevant to the preparation of a GHG statement that is free from material misstatement.

VERIFIERS' RESPONSIBILITIES

Our responsibility as verifiers is to express a verification opinion to the agreed level of assurance on the GHG statement, based on the evidence we have obtained and in accordance with the audit criteria. We conducted our verification engagement as agreed in the audit letter, which define the scope, objectives, criteria and level of assurance of the verification.

The International Standard ISO 14064-3:2019 requires that we comply with ethical requirements and plan and perform the verification to obtain the agreed level of assurance that the GHG emissions, removals and storage in the GHG statement are free from material misstatement.

Reasonable assurance is a high level of assurance, but is not a guarantee that an audit carried out in accordance with the ISO 14064-3:2019 Standards will always detect a material misstatement when it exists. The procedures performed on a limited level of assurance vary in nature and timing from, and are less in extent compared to reasonable assurance, which is a high level of assurance. Misstatements are differences or omissions of amounts or disclosures, and can arise from fraud or error. Misstatements are considered material if, individually or in the aggregate, they could reasonably be expected to influence the decisions of readers, taken on the basis of the information we audited.

GHG quantification is subject to inherent uncertainty because of incomplete scientific knowledge used to determine emissions factors and the values needed to combine emissions of different gases.

BASIS OF VERIFICATION OPINION

Our responsibility is to express an assurance opinion on the GHG statement based on the evidence we have obtained. We conducted our assurance engagement as agreed in the Contract which defines the scope, objectives, criteria and level of assurance of the verification.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

VERIFICATION

We have undertaken a verification engagement relating to the Greenhouse Gas Emissions Inventory Report (the 'Inventory Report')/Emissions Inventory and Management Report of the organisation listed at the top of this statement and described in the emissions inventory report for the period stated above.

The Inventory Report provides information about the greenhouse gas emissions of the organisation for the defined measurement period and is based on historical information. This information is stated in accordance with the requirements of International Standard ISO 14064-1 Greenhouse gases – Part 1: Specification with guidance at the organisation level for quantification and reporting of greenhouse gas emissions and removals (ISO 14064-1:2018).

VERIFICATION STRATEGY

Our verification strategy used a combined data and controls testing approach. Evidence-gathering procedures included but were not limited to:

—activities to inspect the completeness of the inventory;
—interviews of site personnel to confirm operational behaviour and standard operating procedures;
—re-perform access controls to onsite records;
—reconciliation of electricity and gas transmission and distribution losses, contractor fuel and purchased goods and services;
—recalculation of emissions.

The data examined during the verification were historical in nature.

QUALIFICATIONS TO VERIFICATION OPINION

The following qualifications have been raised in relation to the verification opinion:

Category 4 emission sources for purchased goods & services are heavily assumptions based, using dollar spend data and an industry average to estimate emissions. Any changes to the assumptions could significantly impact the measurement of these emissions.

The historic FY21 and FY22 category 4 purchased goods & services emissions have been updated for comparability with emission factors from Market Economics (2023) rather than EORA emission factors previously used. These updates have not been verified.

VERIFICATION LEVEL OF ASSURANCE

	tCO_2e	Level of Assurance
Category 1	7,609.65	**Reasonable**
Category 2	32,272.08	**Reasonable**
Category 3	731.36	**Reasonable**
Category 4 excluding purchased goods and services	5,805.22	**Reasonable**
Category 4 purchased goods and services	75,075.35	**Limited**
Total inventory	**121,493.66**	

RESPONSIBLE PARTY'S GREENHOUSE GAS ASSERTION (CERTIFICATION CLAIM)

Powerco Limited has measured its greenhouse gas emissions in accordance with ISO 14064-1:2018 in respect of the operational emissions of its organisation.

VERIFICATION CONCLUSION

EMISSIONS - REASONABLE ASSURANCE

We have obtained all the information and explanations we have required. In our opinion, the emissions, removals and storage defined in the inventory report, in all material respects:

- comply with ISO 14064-1:2018 ; and
- provide a true and fair view of the emissions inventory of the Responsible Party for the stated inventory period.

EMISSIONS - LIMITED ASSURANCE

Based on the procedures we have performed and the evidence we have obtained, nothing has come to our attention that causes us to believe that the emissions, removals and storage defined in the inventory report:

- do not comply with ISO 14064-1:2018 ; and
- do not provide a true and fair view of the emissions inventory of the Responsible Party for the stated inventory period.

OTHER INFORMATION

The responsible party is responsible for the provision of Other Information. The Other Information may include emissions management and reduction plan and purchase of carbon credits, but does not include the information we verified, and our auditor's opinion thereon.

Our opinion on the information we verified does not cover the Other Information and we do not express any form of audit opinion or assurance conclusion thereon. Our responsibility is to read and review the Other Information and consider it in terms of the ISO 14064-1: 2018 and ISO 14064-3: 2019. In doing so, we consider whether the Other Information is materially inconsistent with the information we verified or our knowledge obtained during the verification.

Verified by:		**Authorised by:**	
Name:	Natalie Clee	Name:	Billy Ziemann
Position:	Verifier, Toitū Envirocare	Position:	Certifier, Toitū Envirocare
Signature:		Signature:	
Date verification audit:	05 to 06 September 2023		
Date opinion expressed:	15 October 2023	Date:	27 October 2023