

# Greenhouse Gas Emissions Inventory Report

Transpower NZ Ltd

**Version:** Final

**Inventory Period:** 1 July 2022 to 30 June 2023

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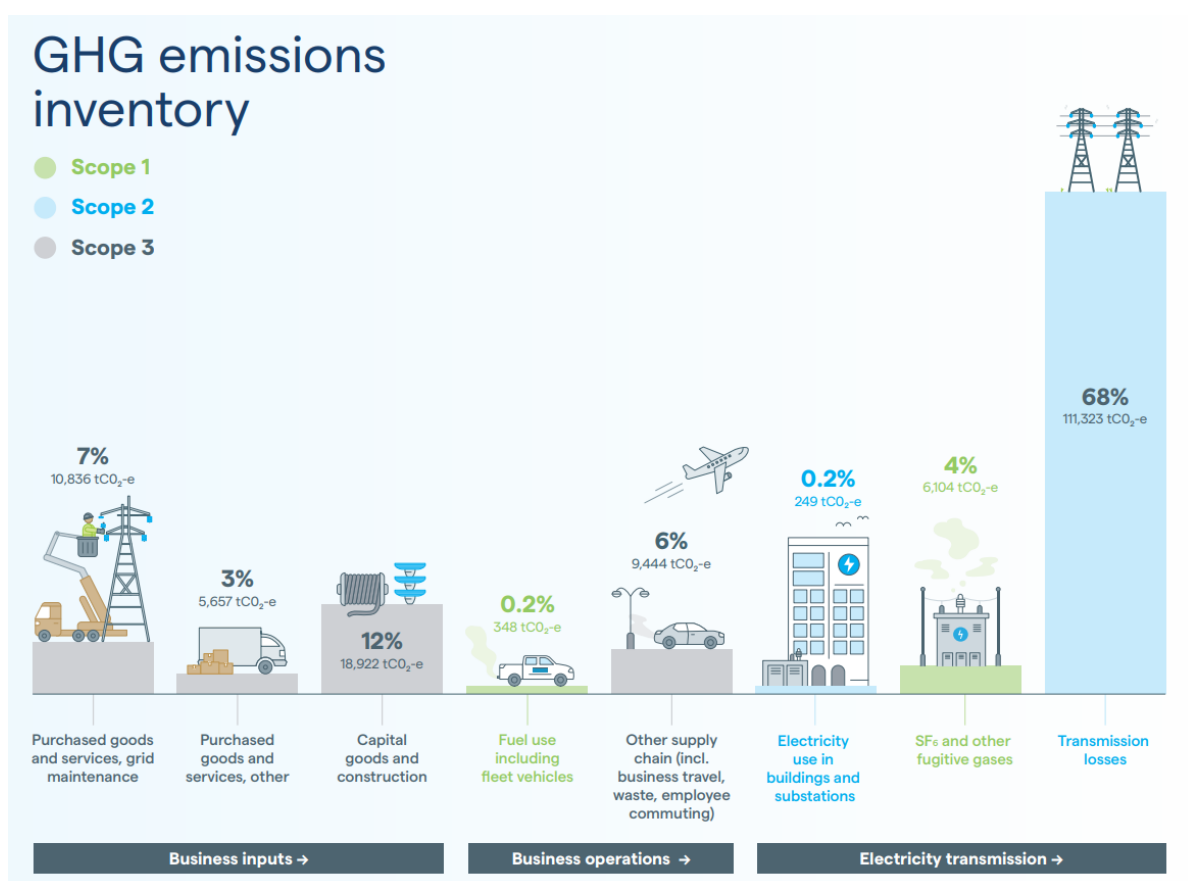
# Transpower Greenhouse Gas Emissions Inventory 2022/23

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# Greenhouse Gas Emissions Inventory Summary

Transpower's total gross Greenhouse Gas (GHG) emissions for the 2023 Financial Year (1 July 2022 – 30 June 2023) were approximately 162,883 tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e). Figure 1 and Table 1 below summarise the main sources of GHG emissions for the reporting period.

Figure 1. GHG Emissions Inventory Summary for Measurement Period 1 July 2022 to 30 June 2023



**Table 1. GHG Emissions Inventory Summary for Financial Year 2023**

Scope	GHG Protocol Category	Subcategory	tCO <sub>2</sub> e
Scope 1	Stationary and mobile fuel use	Mobile fuel use	306
		Stationary fuel use	42
	Stationary and mobile fuel use total		348
	Fugitive gases	Refrigerants	17
		SF <sub>6</sub>	6,086
	Fugitive gases total		6,104
Scope 1 total			6,452
Scope 2	Electricity use	Non-operational buildings	172
		Operational buildings	77
	Electricity use total		249
	Transmission losses	Transmission losses	111,323
Scope 2 total			111,572
Scope 3	Purchased goods & services	Grid maintenance	8,820
		Engineering services	2,015
		IT services	2,226
		Other	3,431
	Purchased goods and services total		16,493
	Capital goods	Construction	6,022
		Grid/electrical equipment	12,844

Scope 3		Other	56
	<i>Capital goods total</i>		18,922
	<i>Fuel &amp; energy related activities</i>	Electricity T&D losses	37
		Gas T&D losses	2
	<i>Fuel &amp; energy related activities total</i>		39
	<i>Upstream transportation and distribution</i>	Upstream transportation and distribution	7,977
	<i>Waste generated in operations</i>	Waste generated in operations	49
	<i>Business travel</i>	Hotel stay	30
		Air travel	949
		Vehicle use	74
	<i>Business travel total</i>		1,053
	<i>Employee commuting</i>	Employee commuting	241
		Working from home	48
	<i>Employee commuting total</i>		289
	<i>Downstream transportation &amp; distribution</i>	Postal services	37
<b>Scope 3 total</b>			<b>44,859</b>
<b><u>Total gross emissions</u></b>			<b><u>162,883</u></b>

# 1 Introduction

This Greenhouse Gas emissions inventory report (GHG Inventory Report) outlines specific Greenhouse Gas (GHG) emissions that can be attributed directly to Transpower operations in operating the National Grid for the 2023 Financial Year (1 July 2022 – 30 June 2023), as well as an estimate of emissions that can be indirectly attributed to Transpower activities during this reporting period.

We have published this GHG Inventory Report in accordance with the international *Greenhouse Gas Protocol* (World Resources Institute, 2004) and *ISO 14046-1 Greenhouse Gases – Part 1 standard* (published by the International Standards Organisation, 2006). While our data is primarily configured to the GHG Protocol Scopes 1, 2, and 3, in most instances we have also detailed how the data fits into the ISO 14046-1 Categories. For more information on Transpower's GHG Protocol emissions source inclusions and Scope 3 category exclusions, please see Appendix 1.

Transpower is committed to New Zealand's sustainable future and long-term objective for a net-zero carbon economy and is taking a two-pronged approach in terms of the role it can play in the move towards a low-carbon future:

- The first focuses on increasing the share and availability of renewable energy generation in the electricity system by supporting new customer connections and demand inquiries, investments across the National Grid, and in terms of its real time operation. Not only does this help decarbonise the electricity system, but it also facilitates the provision of low-carbon energy for the decarbonisation of other sectors, most importantly process heat and transport.
- Secondly, Transpower is committed to reducing the Greenhouse Gas emissions arising from its own operations, as well as building resilience of its assets to the effects of climate change such as more frequent and severe extreme weather events and longer-term sea level rise. Both are central pillars in Transpower's Sustainability Strategy (Transpower NZ Ltd, 2023), and the delivery extends beyond Transpower to include acting alongside its Service Providers and key suppliers who undertake much of the work for the ongoing operation and maintenance of New Zealand's National Grid.

## 1.1 Statement of Intent

Transpower publishes its Greenhouse Gas Emissions (GHG) Inventory Report annually and aims to consistently account for its GHG emissions using best practice Greenhouse Gas accounting standards.

This GHG Inventory Report relates to the GHG emissions of Transpower New Zealand Ltd. It has been prepared according to ISO 14064-1:2018 (International Standards Organisation, 2018), *The Greenhouse Gas Protocol* (World Resources Institute, 2004), *The Greenhouse Gas Protocol Scope 2 Guidance* (World Resources Institute, 2015), and *The Greenhouse Gas Protocol Corporate Value Chain Standard* (World Resources Institute, 2011). It does not include any future forecasts.

This GHG Inventory Report has been audited by a third-party independent assurance provider – refer Appendix 4 – in accordance with the *International Standard on Assurance Engagements ISAE* (New Zealand) 3000, *Assurance Engagements Other than Audits and Reviews of Historical Financial Information and ISAE* (New Zealand) 3410, and *Assurance Engagements on Greenhouse Gas Statements* (External Reporting Board, 2012).

Whilst this GHG Inventory Report will be of interest to government, investors, regulators, customers, and non-governmental organisations, its primary purpose is to inform our own emissions management, reduction, and reporting activities.

## 2 Description of Transpower

Transpower owns Aotearoa New Zealand's high voltage electricity transmission system, the National Grid. It is also responsible, under contract to the Electricity Authority as System Operator, for the real time operation of the electricity transmission system and wholesale electricity market.

Transpower is a limited liability company and a State-Owned Enterprise with its shares held on behalf of the Crown by the Minister of Finance and the Minister for State-Owned Enterprises. Further information about Transpower is available at <https://www.transpower.co.nz/about-us>.

## 3 Transpower's Sustainability Strategy

Transpower's purpose is *Whakamana i te mauri hiko tū mai Aotearoa | Empowering the energy future for New Zealand*.

In 2020, we published our updated scenarios for the transition to a zero-carbon economy: *Whakamana i Te Mauri Hiko – Empowering our Energy Future* (Transpower NZ Ltd, 2020). This is principally driven by a move towards an increasingly renewable electricity system being used to electrify key sectors of the energy economy; principally transport and process heat.

Transpower's Strategy, *Transmission Tomorrow* (Transpower NZ Ltd, 2018), focuses on the actions we need to take to give effect to this transition. In our planning, investment, and operational functions, we work with our customers, within our regulatory framework, to deliver and operate the National Grid.

To enable this work, Transpower's Sustainability Strategy (Transpower NZ Ltd, 2023) guides our activities in the key challenge areas of climate change, environmental stewardship, and sustainable business. Key climate change and carbon management-related goals within the Sustainability Strategy are aligned with the United Nations Sustainable Development Goals: Goal 7: Clean and affordable energy, Goal 9: Industry, innovation and infrastructure, and Goal 11: Climate action.



## 4 Reporting Period

This GHG Inventory Report describes Transpower's Greenhouse Gas (GHG) emissions for the reporting period 1 July 2022 to 30 June 2023. A summary of this GHG Inventory Report is also published in Transpower's Integrated Annual Report 2022/23 (published August 2023).

This GHG Inventory Report provides an accurate account of Transpower's Scope 1, 2, and some Scope 3 GHG emissions for the reporting period. The quality and availability of third-party source data for Scope 3 emissions in the reporting period is more approximate. This is further discussed in Section 9 of this GHG Inventory Report.

All the emissions in this Inventory are gross emissions. Gross emissions are the actual decrease in emissions occurring as opposed to net emission reductions, which are emissions less offsets via carbon sequestration.

Both this GHG Inventory Report and the Transpower Integrated Annual Report are published on our website ([www.transpower.co.nz](http://www.transpower.co.nz)).

## 5 Persons Responsible

This GHG Inventory Report has been primarily prepared by Transpower's Sustainability Team.

Data inputs also came from a range of other sources at Transpower, as well as from Transpower's Service Providers and key suppliers, including:

- Energy Market Services (EMS): National Grid transmission losses, energy consumption at substations;
- Primary Assets Engineering:  $\text{SF}_6$  gas emissions and inventory;
- Facilities Management: office and warehouse energy consumption, vehicle fleet fuel, air travel and accommodation, backup generator diesel consumption;
- Procurement: financial spend and analysis on Scope 3 purchased goods and services, capital goods;
- Finance and Performance: staff travel mileage claims, car rental and taxis;
- Treasury: NZU emission units;
- Grid Facilities: heat pump refrigeration gas;
- Tactical Engineering: engineering consultancy emissions reports; and
- Grid Delivery: Service Provider emissions reports, emissions associated with work undertaken for Transpower.



## 6 Organisational Boundaries

Transpower applies the ‘operational control’ consolidation approach in accounting for the organisational boundary of our emissions in this GHG Inventory Report, in accordance with the methodology described in the ISO 14064-1:2018 standard (International Standards Organisation, 2018).

This approach was chosen as it best aligns with the GHG Inventory Report’s intended uses. Specifically, it allows Transpower to consider emissions sources for which we have greater control and can therefore influence via our *Sustainability Strategy* (Transpower NZ Ltd, 2023) and *Transmission Tomorrow* (Transpower NZ Ltd, 2018) objectives. The Transpower New Zealand Ltd (Transpower) organisational structure as of 30 June 2023 is shown in Figure 2.

**Figure 2. Organisational Structure of Transpower New Zealand, as of 30 June 2023**



The organisational boundary for this GHG Inventory Report includes the operations and emissions associated with Transpower as summarised in Table 2, below.

Halfway Bush Finance Limited and TB and T Limited are dormant and therefore have no operations against which emissions arise. Risk Reinsurance Limited (RRL) is Transpower’s captive insurance subsidiary and has no operations against which emissions arise. Transpower no longer has an ownership interest in New Zealand Power Cayman 2003-1 Limited, which is consolidated for financial reporting purposes only.

**Table 2. Emissions (tCO<sub>2</sub>e) by Facility for Financial Year 2023**

Facility	Emissions
Transpower New Zealand Limited	162,883
Halfway Bush Finance Limited	0
TB and T Limited	0
Risk Reinsurance Limited	0
emsTradepoint Limited	0

New Zealand Power Cayman 2003-1 Limited	0
<b>Total gross emissions:</b>	<b>162,883</b>

## 7 Information Management Procedures

Transpower uses a centralised carbon reporting software tool, BraveGen (owned by ESP), as a key part of the preparation of this GHG emissions inventory to ensure consistent data handling, information management processes, and assurance - and to increase the visibility of results for more regular management reporting and review.

The procedure for managing the Transpower GHG emissions inventory information for the FY23 reporting period was:

- Source activity data was collected directly from third party suppliers, Transpower metering systems, operational databases, procurement and financial accounting software;
- The GHG Inventory Report was compiled using activity source data and emission factors\*;
- GHG emissions data are calculated using BraveGen;
- The 2023 GHG Inventory Report data was analysed against historical annual GHG emissions reports to identify anomalies and trends;
- Transpower's Board, senior management and staff are informed of emissions reduction progress;
- The GHG Inventory Report and methodology goes through an independent audit process; and
- The GHG Inventory Report is published on Transpower's website.

*\*Emissions factors and conversion factors used in the BraveGen software are maintained by ESP. All emissions factors for the 2023 reporting period were cross checked with emission factors used previously by Transpower and revisions undertaken where more relevant or accurate factors were identified.*

## 8 Operational Boundaries

Sources of Greenhouse Gas (GHG) emissions from our activities are identified using the methodology from *The Greenhouse Gas Protocol* (World Resources Institute, 2004), ISO 14064-1:2018 (International Standards Organisation, 2018), and *The Greenhouse Gas Protocol Corporate Value Chain Standard* (World Resources Institute, 2011).

These GHG emissions sources are classified by the following GHG Protocol Scopes and ISO 14064-1:2018 Categories\*:

- Scope 1 (Category 1): Direct GHG emissions, as a result of Transpower operations, including fuel usage and fugitive gases;
- Scope 2 (Category 2): Indirect GHG emissions from Transpower electricity usage and transmission losses from the national grid; and
- Scope 3 (Category 3, 4, 6): Indirect GHG emissions from Transpower supply chain. This accounts for all emissions occurring as a result of Transpower operations that are not included in Scope 1 or 2, including upstream and downstream emissions. Transpower reports on GHG Protocol Scope 3 Categories 1-7 and 9 only as the other categories are not relevant or applicable to our operations.

*\*Unless specified, 'Scope' will refer to the GHG Protocol Scopes and 'Category' will refer to ISO 14064-1:2018 Categories throughout the GHG Inventory Report.*

## 9 Data Collection, Quantification and Uncertainties

The data collection methodology including data source, uncertainties, and assumptions inherent in preparing this GHG Inventory Report is detailed in Appendix 1. For Greenhouse Gas emissions sources included in this GHG Inventory Report data was sourced from our Finance, Procurement, Facilities Management, Tactical Engineering, EMS, and Grid Delivery teams, as well as other Transpower staff and our Service Providers and key suppliers.

As outlined on page 20, approximately half of Transpower's Scope 3 emissions sources have been calculated using expenditure-based emissions factors sourced from *Consumption-Based Greenhouse Gas Emissions Input-Output Model* (Motu Economic and Public Policy Research, 2014). The expenditure-based emissions calculation approach carries inherent uncertainties and are based off a 2014 publication which have been adjusted for inflation, so the application of these emission factors creates a significant uncertainty in relation to the calculation of Scope 3 emissions. To reduce this uncertainty, Transpower has been working with its suppliers to increase the proportion of activity data received from suppliers through contractual commitments.

All emissions calculations were undertaken using BraveGen software. This software uses a calculation methodology for quantifying the GHG inventory using emission source activity data multiplied by relevant GHG emissions factors.

Except where stated, the emissions factors applied in this GHG Inventory Report were sourced either from the most recently updated Ministry for the Environment (MfE) publication at the time of creating this GHG Inventory Report - *Te ine tukunga: He tohutohu pakihi - Measuring emissions: A guide for organisations* (2022), *Quarterly Electricity Liquid Fuel Emissions Data* (Ministry for Business, Innovation and Employment, 2023), or *Consumption-Based Greenhouse Gas Emissions Input-Output Model* (Motu Economic and Public Policy Research, 2014). Noting the following:

- The emission factor applied for converting sulphur hexafluoride (SF<sub>6</sub>) gas into CO<sub>2</sub>e has been sourced from the *IPCC Fourth Assessment Report* (The Intergovernmental Panel on

Climate Change, 2007) consistent with the emission factor applied to SF<sub>6</sub> by the NZ Emission Trading Scheme as part of Transpower's annual SF<sub>6</sub> surrender.

- Emission factors applied to the electricity transmission losses from the National Grid (reported as Scope 2 emissions) were calculated using the most recent electricity generation emission data from the Ministry of Business, Innovation and Employment (MBIE) (Ministry for Business, Innovation and Employment, 2023).
- The generation emission factor calculated from transmission losses (as described above) is used to calculate the emission factor applied to operational and non-operational buildings reported in Scope 2 (Category 2). This emission factor has been applied in the absence of a more accurate measure.
- Emission factors applied to electricity transmission and distribution losses associated with purchased electricity consumed in Transpower offices and substations were sourced from MfE with the emissions reported as Scope 3 (Category 6) (Ministry for the Environment, 2022).
- The emissions factors applied for air travel include radiative forcing (Ministry for the Environment, 2022).
- Quantities of each Greenhouse Gas are converted to tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e) using the Global Warming Potential (GWP) factors disclosed in Table 8.A.1 (Intergovernmental Panel on Climate Change, 2018).
- The time horizon applied throughout the GHG Inventory is 100 years.
- All emissions data in this GHG Inventory Report is expressed in tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e).

## 9.1 Changes to Approach Used Previously

As part of Transpower's focus on Scope 3 emissions, during FY23 the GHG Inventory Report has been re-categorised to be more aligned with the GHG Protocol Corporate Standard and Technical Guidance for Calculating Scope 3 Emissions. In addition to the GHG Protocol categories, relevant Scope 3 subcategories have been included.

With a change to more formalised flexible working arrangements for Transpower staff since 2021, the average number of days in the office were derived from the 2023 staff commuting survey data to calculate the number of commuting days. The 2023 staff commuting survey data was also used to determine the number of days that staff work from home to calculate our working from home (WFH) emissions. Both the commuting and WFH emission factors are sourced from MfE's *Te ine tukunga: He tohutohu pakihi - Measuring emissions: A guide for organisations* (2022).

Transpower does not currently measure R410a data, given the relatively small and immaterial volumes of R410a used across Transpower's assets and due to the R410a maintenance and replacement work being part of Transpower's Facilities Maintenance contracts. Last year, estimates of average R410a leakage and replacement rates per equipment type and equipment inventory were calculated by our Service Providers, which we were unable to obtain this year. As a result, R410a data from FY22 has been used for FY23 as the difference in emissions between the two years was considered immaterial. Transpower is working on the most suitable way to accurately report actual R410a emissions.

In previous years, the Motu emission factors have used Q2 as the comparative quarter between the previous FY and the current FY. Due to time constraints for FY23 Q2 will not be available in time, so Q1 emission factors have been applied.

The emission factors applied for petrol spend have used some provisional data, as the data required from MBIE was not finalised before data was needed to finalise the GHG Inventory Report.

Historically, Transpower's office waste data was entirely estimated due to differing waste collection providers and a lack of quality, reliable waste data at our offices. As of August 2022, Transpower has been recording a mix of actual and estimated data for each Transpower office and operational site, including all service provider and major supplier waste generated from Transpower operations. For FY23 we have taken the position of only reporting on the emissions arising from the office landfill waste as we work through the best method to report the emissions of the other categories that we collect waste data for through our supply chain. For Transpower operational sites, the estimated waste factor applied to civil construction and asbestos removal has remained the same. We do not consider waste emissions from our operational sites to be material for the purposes of this GHG Inventory Report.

## 9.2 Impact of uncertainty

Some level of uncertainty is associated with the preparation of a Greenhouse Gas Emissions Inventory. Whilst Transpower data sources are verifiable, Appendix 1 & 2 of this GHG Inventory Report outlines our approach to uncertainty considerations. For those emissions where estimates are required, Transpower has adopted more conservative estimates.

# 10 GHG Emissions Calculations and Results

## 10.1 GHG Emissions Summary

Transpower's total operational emissions for the 2023 Financial Year reporting period are estimated at 162,883 tCO<sub>2</sub>e, a decrease of 55,410 tCO<sub>2</sub>e (or 25%) from that reported for the 2022 Financial Year.

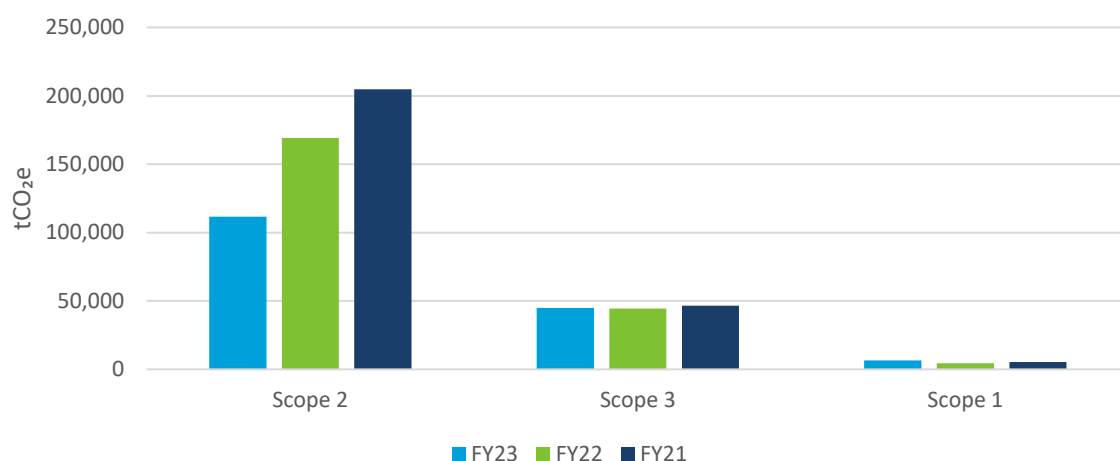
The biggest decreases in emissions between the 2023 and 2022 reporting years were seen in Scope 2 emissions associated with transmission losses and electricity use, and in Scope 3 emissions associated with waste generation.

In FY23, emissions from transmission losses decreased 34% from FY22, reflecting an associated decrease in electricity grid emissions intensity driven by more renewable electricity generation, primarily hydro-generation, over the reporting year. Emissions from electricity use decreased 36% from FY22, largely as a result of the completion of a major transmission upgrade project resulting in several buildings and operational sites being vacated. Emissions from waste generation decreased 71% due to improvements in Transpower's office waste reporting, which now includes a

combination of actual office landfill waste data as well as more accurate estimated landfill waste data.

A comparison of Transpower's total operational emissions for the 2022 and 2023 Financial Years by GHG emissions category and scope are shown in Figure 3, which also shows 2021 Financial Year data, and Table 3 below.

**Figure 3. Transpower historical GHG emissions (tCO<sub>2</sub>e) by GHG Scope**



**Table 3. Transpower 2023 and 2022 GHG Emissions Comparisons by GHG Protocol Scope and Category**

Scope	Category	Subcategory	2023 tCO <sub>2</sub> e	2022 tCO <sub>2</sub> e
Scope 1	Fuel and vehicle	Diesel	138	143
		Petrol	169	123
		Gas	41	42
	Fuel and vehicle total		348	307
	Fugitive gases	Refrigerants	17	17
		SF <sub>6</sub>	6,087	4,210
	Fugitive gases total		6,104	4,228
Scope 1 total			6,452	4,534

Scope 2	Electricity use	Non-operational buildings	172	262
		Operational buildings	77	129
	Electricity use total		249	391
	Transmission losses	Transmission losses	111,323	168,927
Scope 2 total			111,572	169,318
Scope 3	Purchased goods & services	Grid maintenance	8,820	8,730
		Engineering services	2,015	3,493
		IT services	2,226	2,218
		Other	3,431	3,231
	Purchased goods and services total		16,493	17,673
	Capital goods	Construction	6,022	12,305
		Electrical equipment	12,844	8,298
		Other	57	127
	Capital goods total		18,922	20,730
	Fuel & energy related activities	Electricity T&D losses	37	24
		Gas T&D losses	2	2
	Fuel & energy related activities total		39	26
	Upstream transportation and distribution	Upstream transportation and distribution	7,977	4,945
Scope 3	Waste generated in operations	Waste generated in operations	49	168
	Business travel	Hotel stay	30	14



		Air travel	949	415
		Vehicle use	74	58
	Business travel total		1,053	486
	Employee commuting	Employee commuting	241	373
		Working from home	48	-
	Employee commuting total		289	373
	Downstream transportation & distribution	Postal services	37	40
Scope 3 total			44,859	44,440
Total gross emissions			162,883	218,293

Transpower's total operational emissions for the 2023 Financial Year reporting period is broken down by Greenhouse Gas (GHG) in Table 4 below.

**Table 4. Total FY23 GHG Emissions by Greenhouse Gas**

GHG Scope & Category	GHG Emissions Source	tCO <sub>2</sub> e	CO <sub>2</sub>	N <sub>2</sub> O	CH <sub>4</sub>	SF <sub>6</sub>	HFC-32	Other
Direct emissions (Scope 1, Category 1)	Fuel use including fleet vehicles	<b>348</b>	338	8	2	0	0	0
	SF <sub>6</sub> and other fugitive gases	<b>6,104</b>	0	0	0	6,087	17	0
Indirect emissions (Scope 2, Category 2)	Electricity (including transmission losses)	<b>111,572</b>	107,109	16	4,307	0	0	0

Indirect emissions (Scope 3, Categories 3, 4, 6)	Purchased goods and services	<b>28,599</b>	23,634	0	0	0	0	4,965
	Capital goods and construction	<b>18,922</b>	15,500	0	0	0	0	0
	Fuel and energy related activities	<b>39</b>	36	0	3	0	0	0
	Upstream transportation and distribution	<b>5,496</b>	5,496	0	0	0	0	0
	Waste generated in operations	<b>49</b>	35	14	0	0	0	0
	Business Travel	<b>1,053</b>	1,004	13	3	0	0	30
	Employee commuting & working from home	<b>289</b>	0	0	0	0	0	289
	Downstream transportation and distribution	<b>37</b>	37	0	0	0	0	0
<b>Total gross emissions:</b>		<b>162,883</b>	<b>153,189</b>	<b>51</b>	<b>4,315</b>	<b>6,087</b>	<b>17</b>	<b>5,284</b>

*Note: PFC's and NF3's are not present in Transpower's network, therefore are not covered in this GHG inventory.*

## 10.2 Total Operational GHG Emissions by Category and Scope

### Scope & Category 1 – Direct Emissions from Operations

Transpower's Direct, Scope 1, emissions are shown in Figure 4 below. These direct emissions include those arising from usage and loss of sulphur hexafluoride (SF<sub>6</sub>) and other gases, and fuel usage including vehicle combustion.

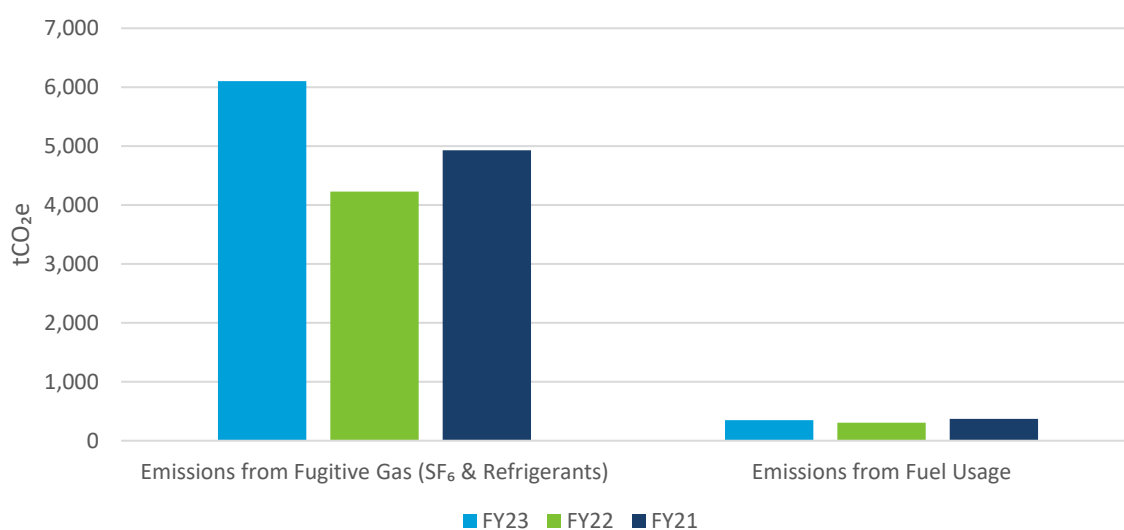
Transpower's SF<sub>6</sub> emissions increased 44% from 4,210 tCO<sub>2</sub>e reported in FY22 to 6,087 tCO<sub>2</sub>e in FY23. This increase in SF<sub>6</sub> emissions was largely driven by 3 single failure events in 2022 that resulted in 21 kgs of SF<sub>6</sub> loss, as well as SF<sub>6</sub> maintenance top ups in 2022 that were 16 kg higher than the Calendar Year 2021. Other contributing factors include a change in the SF<sub>6</sub> leak rate observed on the Rangipo GIS and higher SF<sub>6</sub> top-ups being required after repairs, with 2022 SF<sub>6</sub>

maintenance degas volumes being 909 kg higher than the 2021 reporting year, which was largely driven by an increase in SF<sub>6</sub> repair work over this reporting period.

Managing emissions from SF<sub>6</sub> gases is an integral part of reducing our carbon footprint and Transpower's Sustainability Strategy sets out several initiatives to manage these losses as part of our 2030 and 2050 emission reduction targets. Transpower has an SF<sub>6</sub> management strategy to align our SF<sub>6</sub> emissions with our 2030 emission reduction target and net zero by 2050 aspirations. Our SF<sub>6</sub> management strategy commits us to more accurate SF<sub>6</sub> handling, a proactive maintenance programme, and a phased equipment upgrade programme to replace lower voltage SF<sub>6</sub> switchgear to drive our long-term SF<sub>6</sub> emissions reductions.

GHG emissions from Transpower fuel usage, including from fleet vehicles, increased 13% over FY22 (a total of 348 tCO<sub>2</sub>e reported in FY23). This trend was largely driven by a combination of forecast increased operational activity and an organisation returning to a pre-Covid-19 pandemic travel pattern, with our offices and operating sites spread across Aotearoa New Zealand. As outlined in the Sustainability Strategy, Transpower continues our long-running work programme to switch to electric vehicles where suitable options exist. In FY23, Transpower increased the number of battery and plug in hybrid vehicles to account for 92% of the passenger vehicle fleet, up from 80% of the passenger vehicle fleet in FY21 and 15% in FY19.

**Figure 4. Transpower Scope 1 Direct GHG Emissions (tCO<sub>2</sub>e)**



## Scope 2 & Category 2 – Indirect Emissions from Electricity Usage

Indirect, Scope 2, GHG emissions include electricity usage in our buildings and substations, as well as emissions from transmission losses and are shown in Figure 6 below.

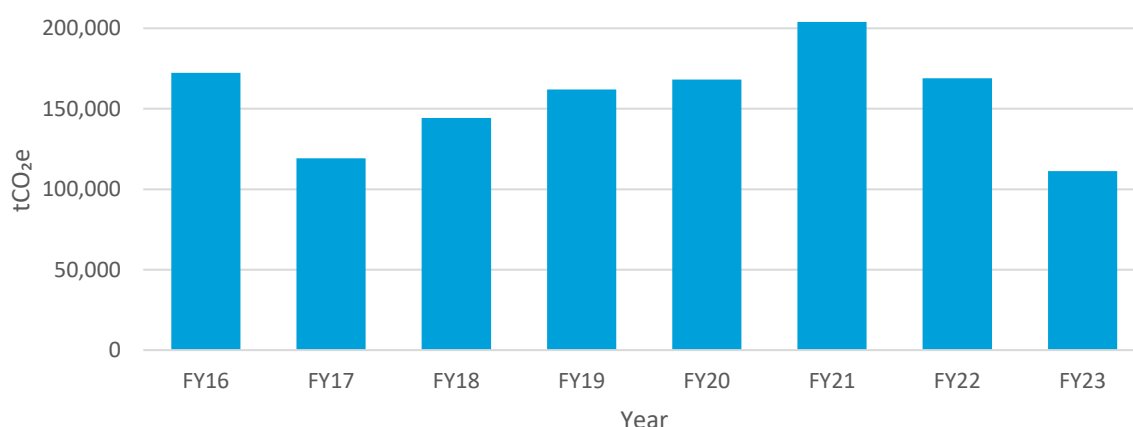
Transmission losses are consistently Transpower's largest share of GHG emissions reported in our annual GHG emissions inventory. Transmission losses arise as a result of resistance caused by electricity passing through the National Grid transmission lines. The GHG emissions associated with the transmission losses arise from the relative carbon intensity of the electricity generation mix. For this GHG Inventory Report, transmission losses include grid losses from the AC and DC

transmission networks and substation electrical loads supplied from the National Grid. For the 2023 Financial Year, GHG emissions arising from transmission losses were estimated at 111,323 tCO<sub>2</sub>e (a decrease of 34% from FY22). As transmission losses are a function of the generation mix, they are largely outside of Transpower's control. However, given the scale of transmission losses and associated GHG emissions across Aotearoa New Zealand's electricity network, Transpower will continue to monitor and report on them on behalf of the electricity sector. As part of this commitment, Transpower has a work programme under the Sustainability Strategy seeking to better understand Transpower's role in transmission losses, focusing effort on areas within Transpower control.

As shown in Figure 5 below, GHG emissions arising from transmission losses across the National Grid fluctuate year-to-year and are largely driven by factors outside of Transpower's control; notably climatic patterns which in turn influence electricity generation patterns in New Zealand (e.g., more rainfall means more hydroelectricity and less coal or gas generation, which means less emissions from transmission network losses). Electricity generation plant availability is also a factor. For example, while there may be abundant hydro resources, major plant outages may mean they are not able to be used. The same applies to thermal generation, as outages can drive how renewables are used and when. Most notably, the FY23 reporting year was characterised by higher-than average hydroelectricity generation in response to increased hydro storage levels in the North and South Islands. Correspondingly, the use of coal and gas for electricity generation dropped significantly from FY22, with a subsequent reduction in associated emissions from transmitting coal-generated electricity.

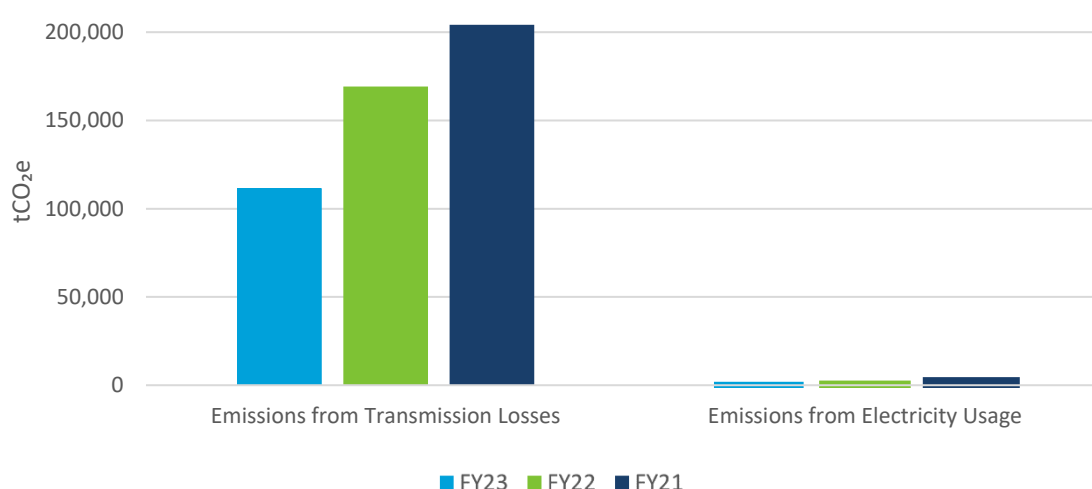
As a State-Owned Enterprise and government-owned company, Transpower has a commitment to significantly invest in upgrading the national grid to accommodate Aotearoa New Zealand's decarbonisation objectives and desire to move towards 100% renewable electricity generation, which will result in even more transmission network losses due to more extensive and larger-scale transmission infrastructure from new build and upgrade programmes. While building out the national grid will result in more losses potentially given where generation could be, it could also result in less losses with a more renewable electricity supply. Much of this hinges on where generation is built - which is not something Transpower can control - and is driven by where the generation resource is. This means that some generation types will go up and some down, but ultimately this is highly uncertain.

**Figure 5. GHG Emissions arising from Transmission Losses (tCO<sub>2</sub>e)**



Emissions from electricity usage in our buildings and substations decreased from 391 tCO<sub>2</sub>e in FY22 to 249 tCO<sub>2</sub>e in FY23 (a 36% decrease). We attribute some of the decrease in our FY23 electricity emissions to lower electricity generation emission factors provided by MBIE. We also completed a major transmission upgrade project in the lower South Island in January 2023, resulting in several residential and operational buildings being vacated at the project completion.

**Figure 6. Transpower Scope 2 Indirect GHG Emissions (tCO<sub>2</sub>e)**



### Scope 3 & Category 3, 4 & 6 – Indirect Emissions from Supply Chain

As shown in Figure 7 below, Transpower's Scope 3 emissions totalled 44,859 tCO<sub>2</sub>e for the 2023 Financial Year, an increase of 1% compared to FY22. These indirect emissions include those associated with our purchased goods and services, capital goods and construction, and other supply chain activities such as business travel, waste, and employee commuting.

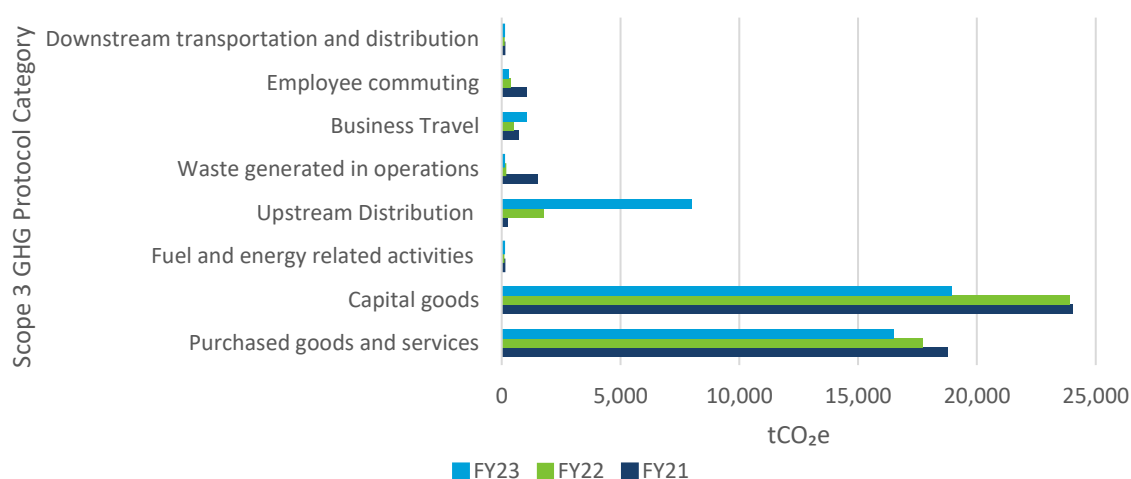
As part of a long-running Sustainability Strategy work programme to better understand, report, and manage our Scope 3 GHG emissions, Transpower has continued to work closely with our wider supply chain through the 2023 Financial Year. FY23 saw a continued focus to move from an estimated financial expenditure-based approach to our Scope 3 emissions to a hybrid method – capturing both actual emissions data from our Service Providers and suppliers as well as some financial expenditure-based estimated data.

As set out in the Sustainability Strategy, Transpower is committed to continue working closely with our Service Providers and suppliers to capture more accurate actual emissions data and reduce those associated emissions systematically. We have continued this trend and for the FY23 reporting year have captured 47% of our suppliers' actual emissions data.

While the increase in actual emissions data provided from Service Providers and suppliers has resulted in a slight increase to our Scope 3 data, we continue to work in partnership with our Service Providers to reduce these emissions.

Emissions from business travel increased significantly from 486 tCO<sub>2</sub>e reported in FY22 to 1,053 tCO<sub>2</sub>e in FY23 (an increase of 117% over FY22). Conversely, employee commuting emissions decreased 23% due to Transpower providing a flexible working environment for its staff. Working from home emissions were also used this FY as a part of the employee commuting emissions.

**Figure 7. Transpower Scope 3 Indirect GHG Emissions (tCO<sub>2</sub>e)**



### 10.3 GHG Emissions by Activity Type

**Table 5. Total FY23 and FY22 GHG Emissions by Activity Type (tCO<sub>2</sub>e)**

Activity Type	FY23 Emissions	FY22 Emissions
National Grid Transmission Losses	111,323	168,927
Electrical Equipment	12,844	8,298
Fugitive Gases	6,104	4,228
Construction	6,022	12,305
Grid Plant and Equipment	5,496	3,165
Tower Refurbishment Services	3,322	2,834
Grid Service Provider Maintenance	3,046	4,256

Freight – to self	2,481	1,780
Info Services, Computer Programming, Consultancy and Related services	2,226	2,218
Architectural and Engineering Services	2,015	3,493
Services of Head offices: Management, Legal Consulting Services	1,609	1,382
Services to Buildings and Landscapes	1,580	772
Human resources - contractors	1,106	1,136
Air Travel	949	415
Cook Strait Cable Maintenance	873	870
Vehicle Travel	380	322
Telecommunications Services	374	360
Employee Commuting	289	373
Electricity	249	391
Graphic Design and Printing	168	128
Association Fees/Subscriptions	79	90
Food	79	120
Purchased Gas	41	41
Postal Services	37	40
Electricity T&D Losses	37	24
Other Manufactured Goods	37	68
Contaminant Removal Services	35	51
Accommodation	30	14
Furniture	19	59



Office Waste to Landfill	14	116
Venue Hire and Catering for Events	13	11
Vehicle Service/Repair	3	4
Natural Gas T&D Losses	2	2
Standby Generators	1	-
Asbestos and Civil Construction	-	-
<b>Total Gross Emissions</b>	<b>162,883</b>	<b>218,293</b>

## 11 GHG Removals and Emissions Reductions

### 11.1 Greenhouse Gas Removals

A Greenhouse Gas removal is defined by ISO 14064-1:2018 as a “*withdrawal of a GHG from the atmosphere by GHG sinks*” (International Standards Organisation, 2018). Transpower undertook no formal Greenhouse Gas removals for the 2023 Financial Year reporting period.

### 11.2 Base year selected

Transpower’s emissions reduction target is to achieve a 60% reduction of direct and controllable Scope 1 and 2 emissions by 2030, against a FY06 baseline of 8,710 tCO<sub>2</sub>e. This emissions reduction target excludes emissions arising from transmission losses as these are a function of the electricity generation mix, are largely driven by weather and climatic patterns and are largely outside of Transpower control.

#### Base year recalculation policy

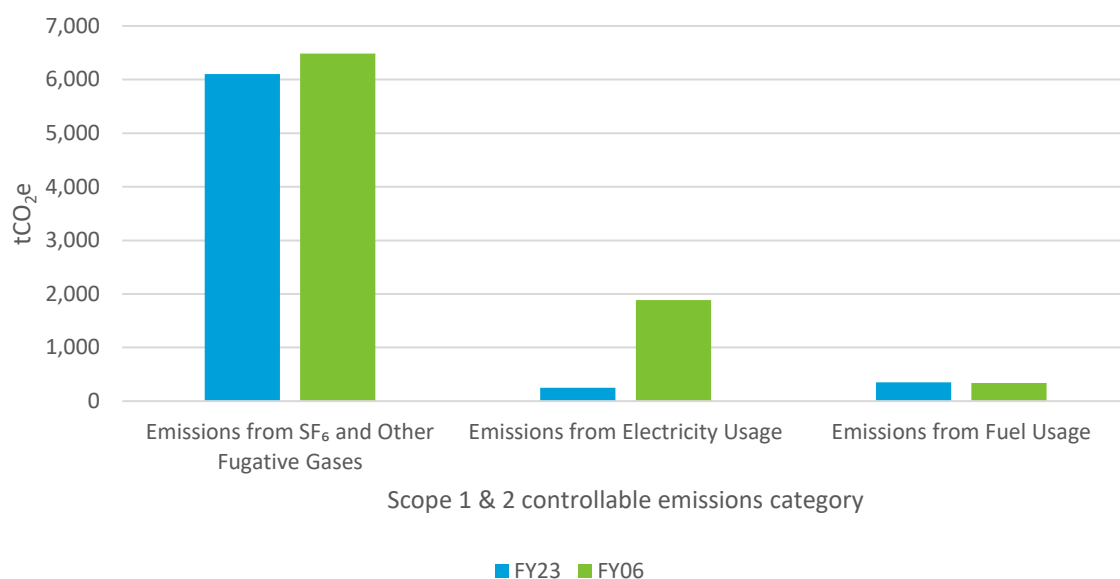
We will recalculate our base year if any of the following apply:

1. Significant structural changes to Transpower, including change of ownership or control.
2. Material changes in methodology used to calculate emissions, e.g., significant changes to emission factors.
3. Discovery of an error or miscalculation that is cumulative and collectively significant.

## 11.3 Emission reductions

As shown in Figure 8 and Table 5 below, in FY23 Transpower's controllable Scope 1 and 2 emissions totalled 6,701 tCO<sub>2</sub>e, a 23% decrease compared to our 2006 baseline (8,710 tCO<sub>2</sub>e), which equates to an achievement of 38% towards our stated emission reduction target during the 2023 Financial Year.

**Figure 8. Transpower controllable Scope 1 and 2 GHG Emissions (tCO<sub>2</sub>e) for Reporting Period Compared to Base Year**



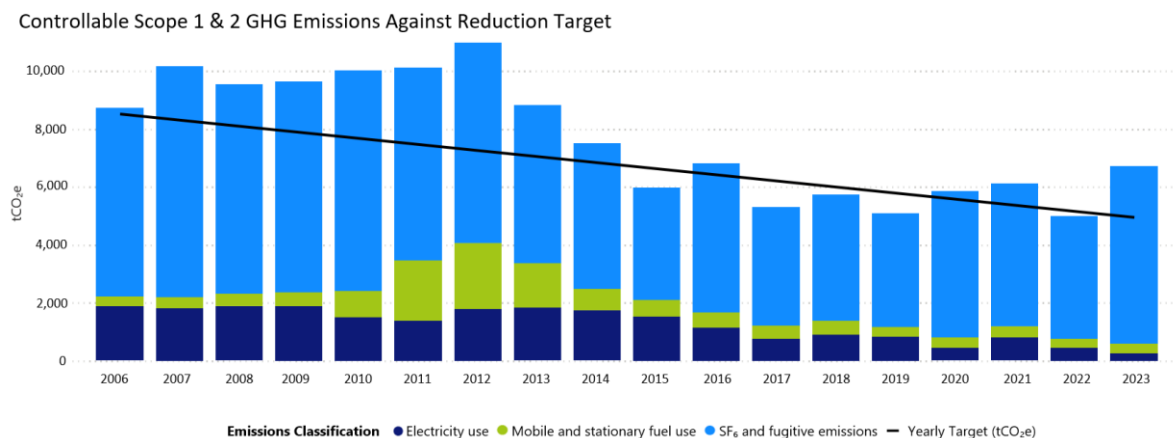
**Table 6. Transpower Controllable Scope 1 and 2 GHG Emissions for Reporting Period Compared to Base Year (tCO<sub>2</sub>e)**

Scope	Category	FY23	Base Year FY06
Direct emissions (Scope 1, Category 1)	Fuel use including fleet vehicles	348	339
	SF <sub>6</sub> and other fugitive gases	6,104	6,486
	<i>Subtotal:</i>	<i>6,452</i>	<i>6,825</i>
Indirect emissions (Scope 2, Category 2)	Electricity use in buildings and substations	249	1,885
	<i>Subtotal:</i>	<i>249</i>	<i>1,885</i>
<b>Total emissions:</b>		<b>6,701</b>	<b>8,710</b>

## Base Year Selected

Transpower has applied the reporting period of 1 July 2005 to 30 June 2006 (FY06) as the base year for the Greenhouse Gas (GHG) Emissions Inventory. FY06 was chosen as the base year following the NZ Government ratifying the Kyoto Protocol, and the treaty coming into effect in 2005 in New Zealand. Transpower began collecting GHG data more systematically from this point and engaged an independent third party to prepare its first GHG emissions inventory for the 2006 Financial Year reporting period. Figure 9, below, summarises historical Transpower controllable Scope 1 and 2 GHG emissions from the FY06 base year to this reporting round, FY23, against the reduction target of a 60% reduction of base levels by 2030.

**Figure 9. Historical Controllable Scope 1 and 2 GHG Emissions Against our Reduction Target**



## Changes to Historic Base Year

There have been no changes to the historic base year chosen.

# 12 Surrendering units under the NZ Emissions Trading Scheme

Under the New Zealand Emissions Trading Scheme (ETS), Transpower is obligated to surrender New Zealand Units (NZUs) for emissions related to fugitive SF<sub>6</sub> gases. ETS reports against Calendar Years

(1 January – 31 December), whilst Transpower GHG emissions reporting is by Financial Year (1 July - 30 June). Therefore, emissions reported in this GHG Inventory Report occurring in FY23 will be offset in our Calendar Year 2023 ETS return. For the 2022 Calendar Year, Transpower NZ surrendered NZUs to the value of 4,011 tCO<sub>2</sub>e related to fugitive SF<sub>6</sub> gases, a 14% increase from the 2021 calendar year (3,510 tCO<sub>2</sub>e). This increase is due to 3 single failure events in 2022 that resulted in a 21 kg loss of SF<sub>6</sub> gas, as well as 2022 SF<sub>6</sub> top ups that were 16 kg higher than 2021. Contributing factors include a change in the SF<sub>6</sub> gas leak rate on Rangipo GIS and SF<sub>6</sub> top ups after repairs, and 2022 SF<sub>6</sub> maintenance degas volumes were 909 kg higher than 2021, primarily due to an increase in SF<sub>6</sub> repair work over this period.

## 13 GHG Emission Liabilities

As of 30 June 2023, Transpower holds 2,779 kg of SF<sub>6</sub> gas in storage. This SF<sub>6</sub> stock is held in secure depots and stores to service and maintain our existing SF<sub>6</sub> filled equipment and new installations of SF<sub>6</sub> filled equipment.

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# Appendices

## Appendix 1. Summary of GHG Emissions Source Inclusions

Details on the GHG emissions sources that inform this GHG Inventory Report are described in Table 6 below. Transpower does not report on the other GHG protocol Scope 3 categories as they are not relevant or applicable to our operations.

**Table 7. Summary of Emissions Sources and Associated Methodology by GHG Protocol Scope and Category**

Scope	Category	GHG Emissions source	Data source	Data collection unit	Methodology data quality, uncertainty (qualitative)
Scope 1	Fugitive emissions	Fugitive emissions from SF <sub>6</sub>	Transpower SF <sub>6</sub> inventory database	Primary Assets Engineering Team	Accurate records of operational gas holdings, top-ups, and recovery during asset decommissioning
		Fugitive refrigerant emissions from air conditioning units	Air conditioning units	Service Providers	Estimates of average leakage and replacement rates per equipment type and equipment inventory
	Mobile fuel use	Car travel (owned, leased, rented)	Fuel card purchase data, rental provider activity reports	Fuel card records and expense management systems	Owned and leased vehicles. Litres of fuel used calculated from accurate records of fuel card transactions
	Stationary fuel use	Combusted diesel used in back-up generators	Operational records	Service providers	Records of operational diesel use
		Natural gas used in HVAC systems	Operational records	Building landlord	Landlord provides accurate report in volume usage
Scope 2	Electricity use	Electricity used in offices and warehouses	Records from ICP billing systems	Retail providers	Accurate records from billing system

		Electricity consumed in substations	Records from metering, and engineering estimates	Energy Metering Services Team, Finance and Performance Team, and Substation Engineering Team	Substations electricity is supplied from one of three sources: 1. Direct feed from distribution network (metered data available) 2. Feed from transmission system, therefore data is included within transmission losses category (site consumption data is not metered) 3. Accurate data from retail providers
	Transmission losses	National Grid transmission line losses	Transpower National Grid metering data	Energy Metering Services Team	Accurate net metering of National Grid inputs and outputs. Several substations are directly fed from the National Grid and are included in this category
Scope 3	1. Purchased goods and services	Upstream emissions associated with good and services	Supplier data, Procurement records	Supplier/ Service Provider, Procurement Team	Accurate purchasing records are categorised by activity type and emission factors assigned to generate emissions data. Some data supplied directly by suppliers/Service Providers.
	2. Capital goods	Upstream emissions associated with National Grid assets and capital equipment purchased	Supplier data, Procurement records	Supplier/Service Providers, Procurement Team	Accurate purchasing records are categorised by activity type and emission factors assigned to generate emissions data. Some data supplied directly by suppliers/Service Providers.
	3. Fuel and energy related activities (not included in scope 1 or scope 2)	Transmission and distribution losses associated with purchased electricity used in offices and substations, purchased gas in offices	Records from metering, and engineering estimates	Energy metering services team, Finance and Performance Team, and substation engineering team	T&D losses applied to the purchased electricity reported in Scope 2 and gas in Scope 1 categories



	4. Upstream transportation and distribution	Emissions associated with upstream transport	Procurement records	Procurement Team	Estimated freight factor applied to overseas manufacturers of electrical equipment, and emission factor applied to purchasing records relating to freight
	5. Waste	Waste to landfill from offices and operations	Procurement records, supplier data & estimated values	Procurement team, waste management providers	For operations: estimated waste factor applied to civil construction and asbestos removal. For offices: actual landfill waste records obtained from each office
	6. Business travel	Air travel - domestic and international	Travel provider reports based of internal purchases	Travel management provider	Supplier records of flights ticketed by our suppliers. Outputs are calculated using the distances travelled by sector split into domestic, short haul and long-haul split by class of travel
		Car travel (taxis and rideshare)	Purchasing records expense management system)	Finance and Performance Team	Records of expenditure on taxis
		Hotel accommodation	Purchase records (supplier data, internal purchasing systems)	Travel Management Provider	Hotel nights provided by travel provider, categorised by country/continent: NZ, Australia, Europe, North America, and Asia
	7. Employee commuting and working from home	Employer travel to and from work (in private vehicles and public transport)	Estimated values	Sustainability Team	Estimated based on FY23 average office occupancy and average commuting data based on 2023 Transpower employee commuting survey
	9. Downstream transportation and distribution	Postal services	Purchase records	Procurement team	Emission factor applied to postal related services

## Other GHG Emissions – Biogenic Emissions

There were no biogenic Greenhouse Gas emissions in FY23 as there was no combustion of biomass in Transpower operations during this reporting period.

## Appendix 2. Summary of GHG Emissions Source Exclusions

The GHG emissions sources outlined in Table 7 below have been excluded from this GHG Inventory Report. It was not technically feasible to obtain this data at the time of GHG Inventory Report preparation, and the associated emissions are not considered to be material in the context of this inventory.

**Table 8. Emissions Sources Excluded**

Scope	Category	GHG emissions source	Reason for exclusion
Scope 1 Direct GHG emissions	Fugitive emissions	Fugitive emissions from fridges and vehicle AC systems	Difficult to obtain the data, emissions estimated to be <i>de minimis</i> from Transpower- contracted equipment maintenance specialists

## Appendix 3. Transpower emissions by ISO 14064-1:2018 Categories

Table 9. Transpower's total GHG emissions broken down by ISO category (tCO<sub>2</sub>e)

ISO Category	Subcategory	FY23
<b>Direct GHG emissions and removals</b>	Stationary and mobile fuel	348
	Fugitive emissions	6104
<b>Direct emissions total</b>		<b>6,452</b>
<i>Indirect GHG emissions from imported energy</i>	Electricity consumption	249
	Transmission losses	111,323
<i>Indirect GHG emissions from imported energy total</i>		<i>111,572</i>
<i>Indirect GHG emissions from transportation</i>	Business travel	1,053
	Freight	2,481
	Employee commuting	241
	Grid plant & equipment sourced overseas uplift	5,496
	Postal services	37
<i>Indirect GHG emissions from transportation total</i>		<i>9,308</i>
<i>Indirect GHG emissions from products used by an organisation</i>	Purchased goods and services	16,493
	Capital goods	18,922
	T&D losses	37
	Waste	49
	Working from home	48
<i>Indirect GHG emissions from products used by an organisation total</i>		<i>35,549</i>
<b>Indirect emissions total</b>		<b>156,431</b>
<b>Total emissions</b>		<b>162,883</b>

## Appendix 4. ISO 14064-1:2018 Reporting Index

### ISO Reporting    Section in this GHG Inventory Report

9.2 (g)	Section 4
9.3.1 (a)	Section 3
9.3.1 (b)	Section 5
9.3.1 (c)	Title, Section 4
9.3.1 (d)	Section 6
9.3.1 (e)	Section 8, Appendix 1 & 2
9.3.1 (f)	Section 10
9.3.1 (g)	Appendix 1
9.3.1 (h)	Section 11
9.3.1 (i)	Section 11
9.3.1 (j)	GHG Inventory Report Summary, Section 11
9.3.1 (k)	Section 11
9.3.1 (l)	Section 11
9.3.1 (m)	Section 8 & 9
9.3.1 (n)	Section 9, Section 11
9.3.1 (o)	Section 7 & 9
9.3.1 (p)	Section 9
9.3.1 (q)	Section 9, Appendix 1 & 2
9.3.1 (r)	Section 1
9.3.1 (s)	Section 1
9.3.1 (t)	Section 9
9.3.2 (a)	Section 3
9.3.2 (b)	Section 11
9.3.2 (f)	Section 1 & 10
9.3.2 (h)	Section 11
9.3.2 (i)	Section 7
9.3.2 (j)	Section 10 & 11
9.3.2 (k)	Section 10
9.3.3	Section 12

## Appendix 4. EY 2022/23 Assurance Report

You can view the assurance report online [here](#).

