Transpower Greenhouse Gas Emissions Inventory Report 2018-19

Transpower New Zealand Limited

June 2020

Keeping the energy flowing




TRANSPOWER

Transpower New Zealand Limited The National Grid

GREENHOUSE GASES INVENTORY SUMMARY FY19

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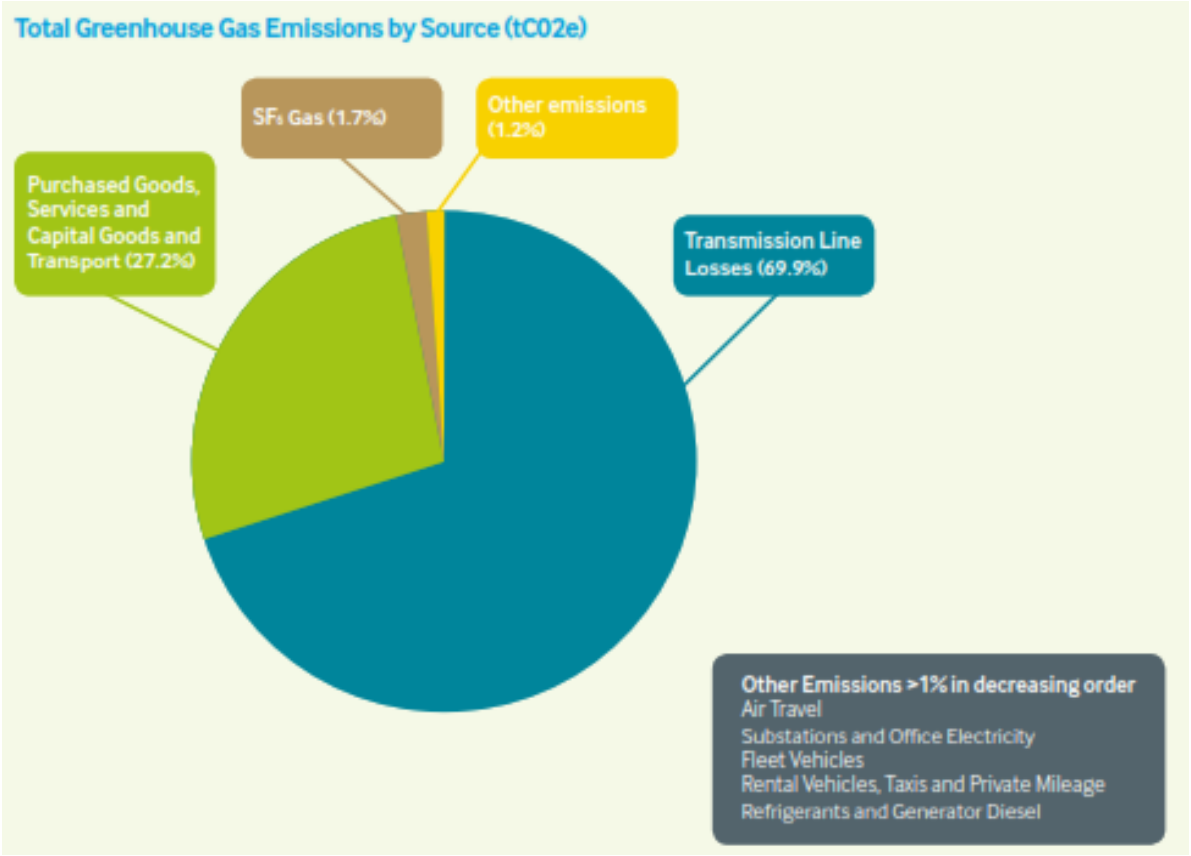
Our total greenhouse gas (GHG) emissions for 2018/19 were approximately 233,749 tCO_2e (tonnes of carbon dioxide equivalent), the figure and table below show the main emission sources and GHG categories. In summary, key changes to our GHG emissions are, emissions from SF_6 gas and electricity use have reduced, while emissions from transmission line losses have increased, mainly due to an increase in emissions from electricity generation. Changes to our carbon accounting system this year are responsible for a significant increase in reported indirect carbon emissions from purchase goods and services, capital goods and transport.



GHG Category	Source	FY18 Emissions (tCO2e)	FY19 Emissions (tCO2e)	Trend
Direct GHG emissions	SF_6 Gas, fleet fuel use and refrigerants	4,809	4,261	▼
Indirect GHG emissions from electricity	Electricity used in substations and offices	965	871	▼
Indirect GHG emissions from electricity	Transmission line losses	153,664	163,419	▲
Indirect GHG emissions from goods and services, capital goods and transport	Purchased goods and services, capital goods, air travel, vehicle fuel and waste	22,574	65,198	▲
Total		**182,012**	**233,749**	▲

1. INTRODUCTION

This is Transpower's annual greenhouse gas (GHG) emissions inventory report. The inventory is reports accurate GHG emissions that can be directly attributed to Transpower's operations for the specified period, and an approximate count of emissions that can be indirectly attributed.

Transpower has published a Carbon Footprint report according to the international Greenhouse Gas (GHG) Protocol and ISO 14046 since 2006. During FY 2018/19 we commissioned an external review of our carbon accounting method to ensure it aligns with the updated standard ISO 14064-1:2018. As a result, we have expanded the scope of our carbon accounting to include more comprehensive supply chain data. We also implemented a new tool to effectively manage our carbon inventory. Sources of Transpower's emissions across the National Grid are reported in Scopes 1, 2 and 3 according to the Greenhouse Gas Protocol.

Transpower is committed to environmental sustainability and enabling the reduction of New Zealand's overall energy emissions as we transition to a net zero carbon economy. Renewable energy is at the heart of the sustainable development agenda and Transpower supports a low carbon future through enabling the shift in New Zealand's energy use from oil and coal to highly renewable electricity. We are taking a two-pronged approach in terms of the role we can play. The first focuses on increasing renewable energy generation by ensuring timely new connections to the national grid, this enables others to reduce their greenhouse gas emissions. Secondly, Transpower is committed to reducing the greenhouse gas emissions of our operations and building climate change resilience in line with its Environmental Sustainability Strategy which was endorsed in 2018. We are working on a range of projects to reduce the operational greenhouse gas emissions in collaboration with our service providers and suppliers.

2. PURPOSE OF THE REPORT

Transpower publishes its carbon footprint annually and aims to consistently account for its GHG emissions using best practice greenhouse gas accounting methodology.

The report relates to the GHG emissions of Transpower New Zealand Ltd. and is prepared according to ISO 14064-1:2018, the *Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* (2004) (the GHG Protocol), Scope 2 guidance and the Scope 3 Standard. It does not include any future forecasts or targets. This inventory report has not been audited by a third party independent assurance provider.

Transpower is the primary intended user of this report, other users may include government, regulators, customers and non-governmental organisations.

3. DESCRIPTION OF TRANSPOWER

Transpower owns and operates the National Grid – the high voltage transmission network connecting areas of generation with towns and cities across New Zealand. Transpower is a limited liability company and a State-Owned Enterprise (SOE) 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.

3.1 Transpower's Sustainability Strategy and Programmes

Transpower's purpose is to connect New Zealanders to their power system, through safe, smart and sustainable solutions for today and tomorrow.

Addressing climate change will take coordinated action to realise the opportunity for New Zealand's sustainable energy future, our commitment includes ensuring New Zealand's Grid is ready to connect and deliver a low carbon economy for New Zealand. Our role in enabling the move to a 100% renewable electricity

system is at the heart of our long-term business strategy as set out in Transmission Tomorrow – Our Strategy (2018)

Our Sustainability Strategy guides our activities in the areas of carbon reduction and climate change resilience. Key goals of our 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 report describes Transpower's greenhouse gas (GHG) emissions inventory for the period 1 July 2018 to 30 June 2019. A summary of this Carbon Footprint report has been published in Transpower's Annual Review 2018/19 for the current reporting period.

The inventory provides an accurate account of Scope 1 and 2 GHG emissions for the reporting period, while for several categories of Scope 3 (supply chain) emissions the data provides is a more approximate account of these indirect emissions. This is further discussed in Section 9.

5. RESPONSIBLE PERSONS

This inventory was compiled by the Environmental Policy and Planning Group in Transpower's External Affairs Division. GHG reporting and data collection has involved various teams at Transpower including:

- Energy Market Services: grid transmission losses, energy consumption at substations,
- Primary assets engineering: SF6 gas emissions and stock inventory,
- Facilities team: office and warehouse energy consumption, vehicle fleet fuel, air travel,
- Procurement: financial spend on scope 3 purchased goods and services and capital goods,
- Service providers: backup generator diesel consumption, heat pump refrigeration gas,
- Business administration: staff travel mileage claims, car rental and taxis; and
- Treasury team: surrender of NZU emission units.

6. ORGANISATIONAL BOUNDARIES

Transpower applies the operational control consolidation approach to the accounting of its emissions inventory, and this sets the organisational boundary for which emissions are reported.

Transpower New Zealand Ltd. owns and operates the national high voltage grid. Our emissions arise from the maintenance and development of the national grid which comprises 11,200Km of transmission lines, 2 HVDV links, and 174 substations around New Zealand. As at 30 June 2019 Transpower employed 788 full time equivalent staff.

The Transpower New Zealand structure at 30 June 2019 is shown in Figure 1. The Transpower group contains the following subsidiary companies: Halfway Bush Finance Ltd, TB & T ltd, Risk Reinsurance Ltd and emsTradepoint Ltd. Transpower has 100% holding in each of these four entities. For further information about Transpower's organisation refer to the Transpower New Zealand Annual Report, available on our website.

New Zealand Power Cayman Ltd (NZPC) is a special purpose vehicle registered in the Cayman Islands consolidated for financial reporting, as shown by the dotted line in Figure 1. Transpower has no ownership interest NZPC, therefore it is are excluded from this carbon inventory.

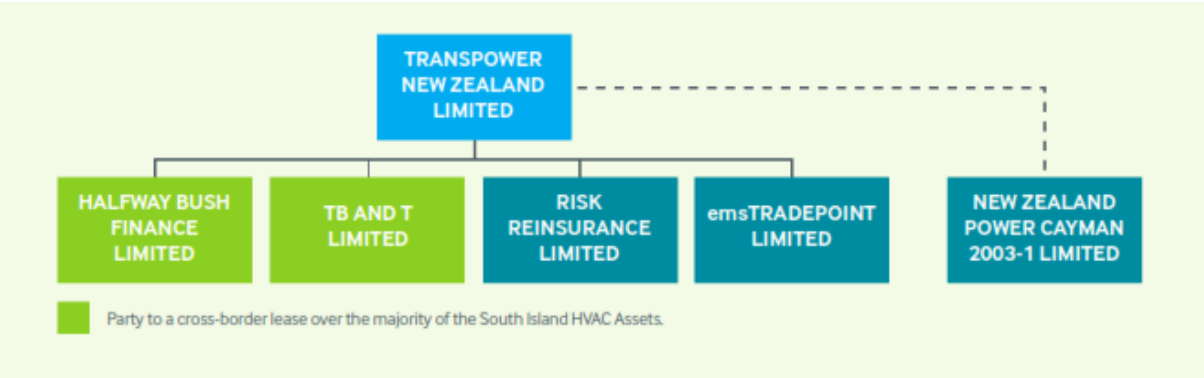


Figure 1 Transpower New Zealand Structure, at 30 June 2019.

Halfway Bush Finance Limited and TB and T Limited were formed during the 2003 cross boarder lease transaction. This has subsequently been unwound and only the head lease agreement remains. Their purpose is to hold assets on behalf of Transpower group. These companies are dormant and do not undertake trading activities, therefore they are excluded from this carbon inventory.

Risk Reinsurance Limited (RRL) is a captive insurance subsidiary. It is the primary insurer of our property. RRL does not own physical assets and has no control over the assets held, therefore they are excluded from this carbon inventory.

emsTradepoint Limited is a commodity exchange designed to provide anonymity, transparent pricing and transactional certainty to physical energy markets, it is a service entity with no physical assets. emsTradepoint staff are located within Transpower offices and their physical activities are therefore included within the emissions inventory of Transpower.

In summary, the organisational boundary for the emissions inventory *includes* the operations of Transpower New Zealand Ltd and emsTradepoint Ltd and *excludes* the activities of the Halfway Bush Finance Ltd, TB &T ltd, Risk Reinsurance Ltd. M and New Zealand Power Cayman Ltd (NZPC).

7. INFORMATION MANAGEMENT PROCEDURES

During FY19 Transpower and transferred the information management of GHG related data into a centralised carbon reporting software (BraveGen) to improve our data handling, information management processes, and increase the visibility of results for management review.

The procedure for managing GHG information in FY19 was:

- Source activity data was collected directly from third party suppliers, Transpower grid metering systems, operational databases and procurement and accounting software,
- Source data has been reviewed by the environmental policy and planning team before being transferred into the BraveGen carbon reporting software;
- Emissions factors and conversion factors used in the BraveGen software are maintained by BraveGen, these factors were cross checked with emission factors used by Transpower in previous year, and revisions were undertaken in some cases;
- The GHG inventory was compiled using activity source data and emission factors
- GHG emission results are calculated using BraveGen.
- The BraveGen software manages and stores data and documents in a safe and transparent fashion.

- The annual GHG inventory was reviewed with previous years GHG inventory to identify abnormalities, trends and identify opportunities to reduce GHG emissions.
- The GHG report and approach has not been independently audited, this is planned to be undertaken in subsequent years GHG reporting.

8. OPERATIONAL BOUNDARIES

Sources of GHG emissions from Transpower's activities are identified using the methodology from the GHG Protocol, ISO 14064-1 and Scope 3 standards, and sorted into categories. According to the standards, Scope 3 emissions reporting is optional.

The following categories are used:

- Direct GHG emissions (Scope 1): controlled by the company;
- Indirect GHG emissions from electricity (Scope 2): not controlled by the company; and
- Indirect GHG emissions from value chain (Scope 3): All emissions not included in Scope 1 or 2 occurring as a result of Transpower operations, including upstream and downstream emissions. These have been sorted by the Scope 3 categories applicable:
    - Purchased goods and services (category 1);
    - Capital goods (category 2);
    - Transmission and distribution losses (category 3);
    - Upstream transportation and distribution (category 4);
    - Waste generated in operations (category 5);
    - Business travel (category 6), and
    - Employee commuting (category 7).

9. SUMMARY OF EMISSION SOURCE INCLUSIONS

Details on the emissions sources included in the GHG inventory and their methodology is described in Table 2 below.

Scope	Category	GHG emissions source	Data source	Data collection unit	Methodology data quality, uncertainty (qualitative)
Scope 1 Direct GHG emissions	Fugitive emissions	Fugitive SF6 emissions from substation circuit breakers and SF6 handling.	SF6 inventory database	Operational 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 rates per equipment type and equipment inventory
	Vehicles	Car travel (owned, leased, rented)	GPS generated odometer readings, fuel card purchase data, rental provider activity reports	Fuel card records and expense management systems	Owned and leased vehicles litres of calculated from accurate records of litres of fuel purchased on fuel cards. Rental

					vehicles start/end odometer data.
	Combusted diesel	Back-up diesel generators	Operational records	Service providers	Records of operational diesel use
Scope 2 Indirect GHG emissions from electricity	Electricity transmission losses	National grid transmission line losses	Grid metering data	Energy metering services team	Accurate metering of grid inputs and outputs. Transmission losses calculated from subtracting total grid input from total grid output. A number of substations are directly fed from the grid and are included in this category
	Electricity consumed – offices and warehouses	Electricity used in offices and warehouses	Records from ICP billing systems	Finance data	Accurate records from billing system. Start and end of year are partially estimated
	Electricity consumed – substations	Electricity consumed in substations	Records from metering, and engineering estimates	Energy metering services team, Finance teams and substation engineering team	Substations electricity is supplied from one of 3 sources: a. Direct feed from distribution network (metred data available) b. Direct feed from power generation site (consumption data estimated) c. Feed from transmission system, therefore data is included within transmission losses category (site consumption data is not metered).
Scope 3	Purchased goods and	Upstream emissions	Procurement records	Procurement and finance records	Accurate purchasing records are categorised by

Indirect GHG emissions from value chain	services (category 1)	associated with good and services			activity type and emission factors assigned
	Capital goods (category 2)	Upstream emissions associated with grid assets and capital equipment purchased	Procurement records	Procurement and finance records	Accurate purchasing records are categorised by activity type and emission factors assigned
	Transmission and distribution losses (category 3)	Transmission and distribution losses associated with electricity used in offices and substations	Records from metering, and engineering estimates	Energy metering services team, Finance teams and substation engineering team	T&D losses applied to purchased electricity reported in scope 2
	Upstream transportation and distribution (category 4)	Emissions associated with upstream transport	Procurement records	Procurement and finance records	Estimated freight factor applied to overseas manufacturers of electrical equipment
	Waste generated in operations (category 5)	Emissions associated with civil construction waste and asbestos removal	Procurement records	Procurement and finance records	Estimated waste factor applied to civil construction and asbestos removal
	Business travel (category 6)	Air travel (domestic and international)	Travel provider reports. (supplier data, internal purchasing systems)	Distances are calculated by travel providers	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 teams	Records of expenditure on taxis.
		Car travel (private vehicles)	Odometer readings	Staff expense claims	Expense claims
		Hotel accommodation	Purchase records (supplier data, internal	Travel providers	Hotel nights provided by travel provider, by NZ and rest of world.

			purchasing systems)		
	Employee commuting (category 7)	Employer travel to and from work (in private vehicles and public transport)	Estimated values	Estimated commuting mode and distance	Estimated based on site headcount and average commuting data for major cities (Statistics NZ)

Table 2. Emissions sources included and methodology

10. GHG EMISSIONS SOURCE EXCLUSIONS

The following data have been excluded from this GHG emissions inventory. They were not technically feasible to obtain currently.

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, estimated to be *de minimis*
Scope 3 Indirect GHG emissions from value chain	Upstream transportation and distribution (category 4)	Freight – courier packages and transport of materials within NZ between warehouses and sites	Difficult to obtain the data
	Waste generated in operations (category 5)	Emissions associated with office waste	Difficult to obtain the data

Table 3. Emissions sources excluded

11. DATA COLLECTION, QUANTIFICATION AND UNCERTAINTIES

Section 9 describes how data was collected for each GHG emissions source, the data source and any uncertainties and assumptions where data was estimated. Data collection was sourced from the finance team, procurement team, facilities team, operations project teams, suppliers and relevant individuals throughout the business.

All emission 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, emissions factors used were sourced from Ministry for the Environment (MfE, New Zealand), Ministry of Business, Innovation and Employment (MBIE) or Department of Environment, Food and

Rural Affairs (Defra, UK). All data in this report are expressed in tonnes of carbon dioxide equivalent as their unit.

- The emission factor for converting SF_6 (Sulphur hexafluoride) switch gas into CO_{2e} has been sourced from IPPC[1], Fifth Assessment Report.
- Emission factors applied to Scope 2 electricity transmission losses have been calculated from Ministry of Business, Innovation and Employment[2] (MBIE) electricity generation emission data.
- Emission factors applied to transmission and distribution (T&D) losses associated with electricity consumed in offices and substations (reported in Scope 2) have been sourced from Ministry for the Environment[3] (MfE). Emissions from T&D losses are reported in Scope 3.
- The emissions factors for activities reported in Purchased goods and services, Capital goods, Upstream transportation and distribution and Waste categories are sourced from Department of Environment, Food and Rural Affairs[4] (Defra, UK).
- The emissions factors for air travel include radiative forcing, as per the precautionary principle.

Quantities of each greenhouse gas are converted to tonnes CO2e using the global warming potential from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5). The time horizon is 100 years.

12. IMPACT OF UNCERTAINTY

A level of uncertainty is part of preparing a GHG inventory. Data sources are verifiable, and further uncertainty is detailed under sections 8, 10 and 11 above. Conservative estimates are used, as per the precautionary principle.

13. GHG EMISSIONS CALCULATIONS AND RESULTS

Total operational emissions for Transpower New Zealand Limited were 233,749 tCO_2e for the reporting period. Sources of Transpower's emissions are reported in Scopes 1, 2 and 3 according to the Greenhouse Gas Protocol. In summary, GHG emissions from SF_6 gas and electricity use have reduced, while emissions from transmission line losses have increased, mainly due to an increase in emissions from electricity generation. Changes to our carbon accounting system this year are responsible for a significant increase in reported indirect carbon emissions from good and services, capital goods and transport.

[1] IPPC Fifth Assessment Report of the IPPC. Chapter 8 Table 8.A.1 http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf

[2] MBIE, Quarterly electricity generation emissions data tables: https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-statistics/new-zealand-energy-sector-greenhouse-gas-emissions/

[3] Ministry for the Environment (2019) "Measuring Emissions: a guide detailed guide" Wellington https://www.mfe.govt.nz/publications/climate-change/measuring-emissions-guide-organisations-summary-of-emission-factors

[4] Department for Environment, Food and Rural Affairs (2014) "Table 13" Indirect emissions from the supply chain (https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019

13.1. TOTAL OPERATIONAL EMISSIONS BY SCOPE

Scope 1 - Direct emissions

This includes emissions of Sulphur Hexafluoride (SF_6) gas and fleet vehicle fuel. This year SF_6 emissions reduced 10 per cent compared with last year resulting from a continued focus on leak prevention, detection and operational control. We also started a programme of installing non-SF_6 technology in substation equipment. Emissions from the use of Transpower fleet vehicles increased this year, in spite of the continued introduction of more efficient electric and hybrid vehicles to our fleet.

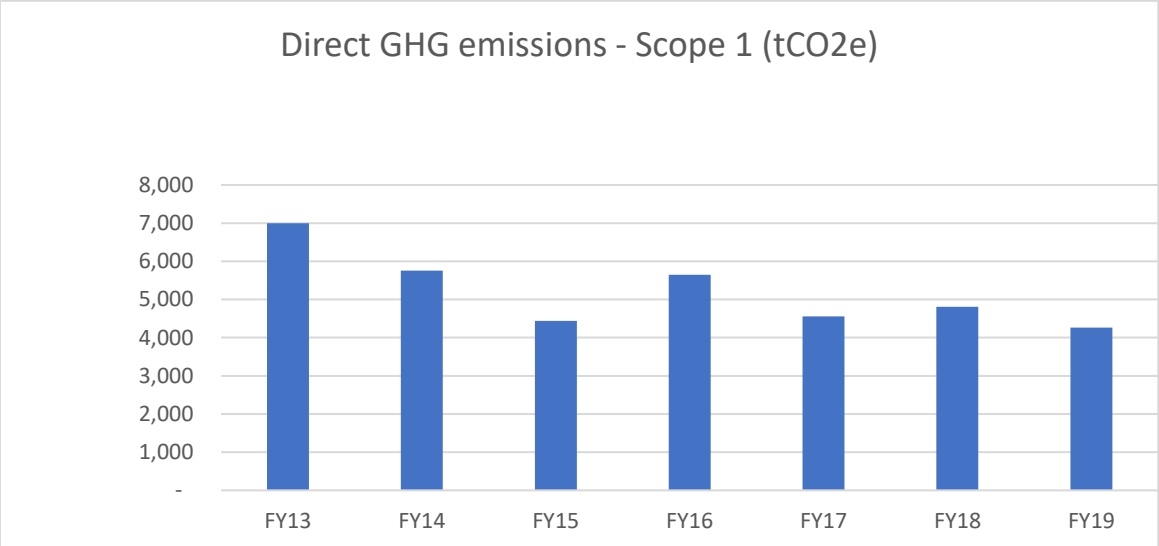


Figure 3. Direct GHG emissions

Scope 2 - Indirect emissions from electricity use

This includes emissions from the use of electricity in our offices and substations, and transmission line losses. Transmitting electricity results in small loses due to the resistance generated by electricity passing through transmission lines. More electricity needs to be generated to offset the loss during transmission and still meet the amount of electricity required to be delivered to the exit point.

Emissions associated with this extra electricity depends on the source - specifically the proportion of renewable and non-renewable electricity generation. As the generation mix becomes more non-renewable, the indirect emissions associated with the transmission losses grows. Transpower is focused on ensuring it can enable the connection of renewable generation to assist with the transition to a low-carbon economy in line with government policy and our *Te Mauri Hiko* – Energy Futures work. In turn this will result in a reduction of indirect emissions from transmission losses.

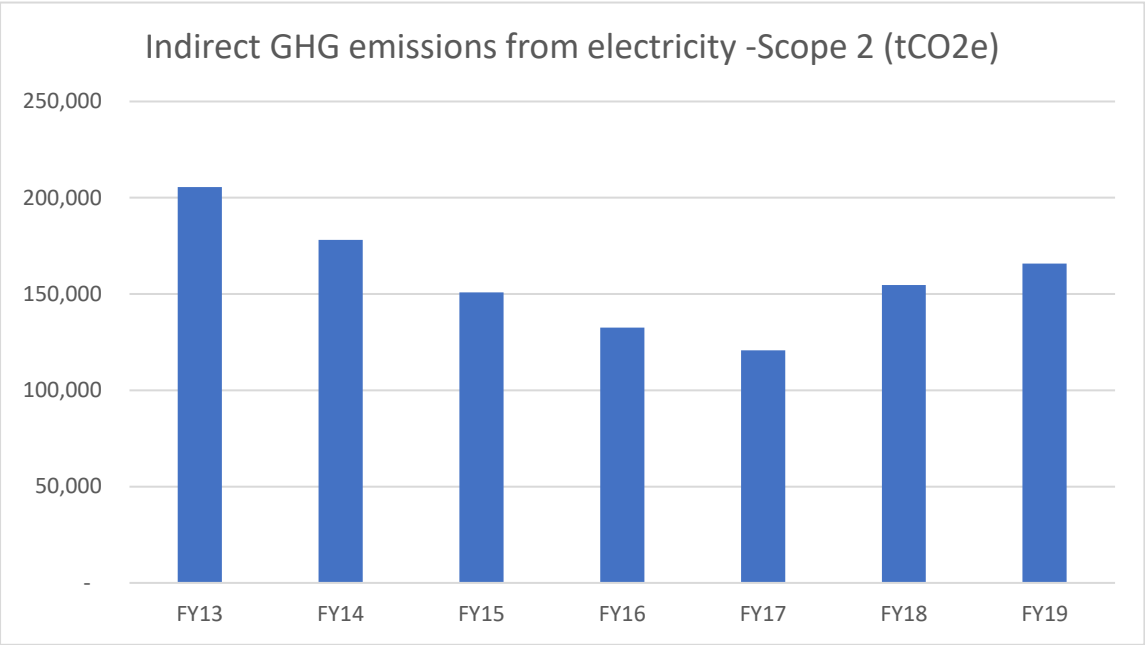


Figure 4. Indirect GHG emissions from electricity

Overall, indirect emissions from electricity use increased this year, mainly due to an increase in the GHG emissions from electricity generation reported by MBIE[5]. Indirect emissions from transmission line losses contributed almost 70 per cent of Transpower's total GHG emissions this year. Emissions from electricity use in our offices and substations is estimated to have reduced over 10 per cent, while transmission line losses have increased two per cent in GWh terms. Changes to emissions from transmission loss are strongly related to the quantity of power transmitted, the transmission distances, and the emissions associated with electricity generation.

Scope 3 - Indirect emissions from goods and services, capital goods and transport

This category of emissions was more comprehensively included in our carbon accounting system for the first time this year, to account for activities throughout our supply chain. Scope 3 emissions including those from the purchase of goods and services, capital goods and transport were responsible for around 27 per cent of total emissions this year. Our plan is to further understand the profile of these emissions and engage with our supply chain partners to identify opportunities for emission reductions.

Indirect Scope 3 emissions include business air travel, during FY18/19 Transpower staff travelled eight per cent less kilometres by air compared to the previous year.

[5] MBIE, Quarterly electricity generation emissions data tables: https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-statistics/new-zealand-energy-sector-greenhouse-gas-emissions/

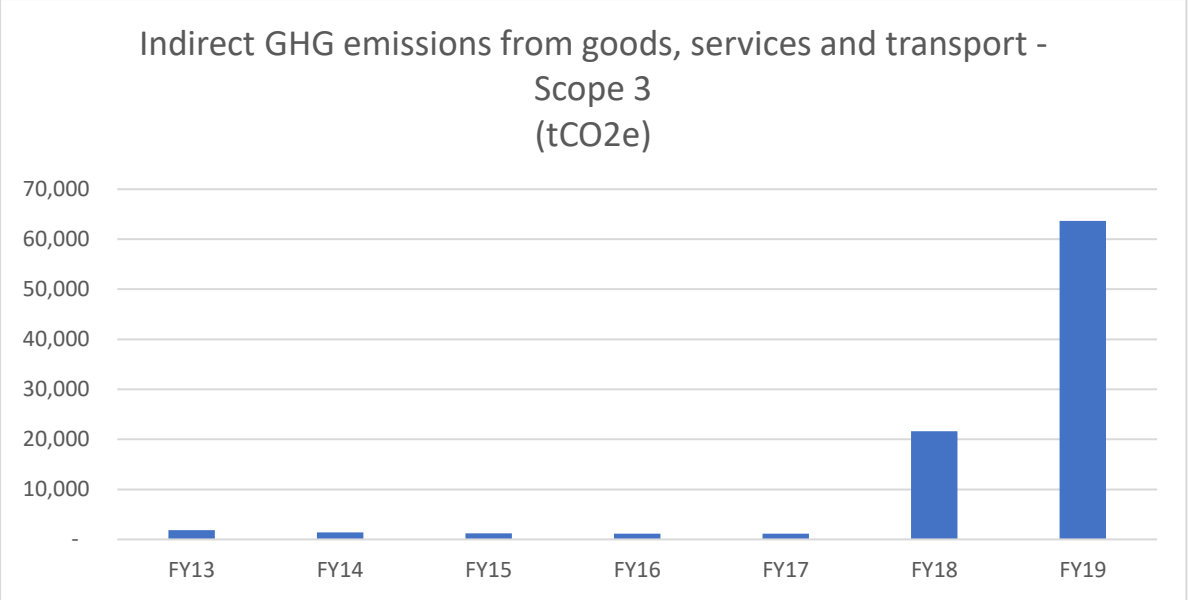


Figure 5. Indirect GHG emissions from goods and services, capital goods and transport (Scope 3)

13.2. TOTAL EMISSIONS BY SCOPE OVER TIME

Total emissions in relation to previous years are shown in Figure 6.

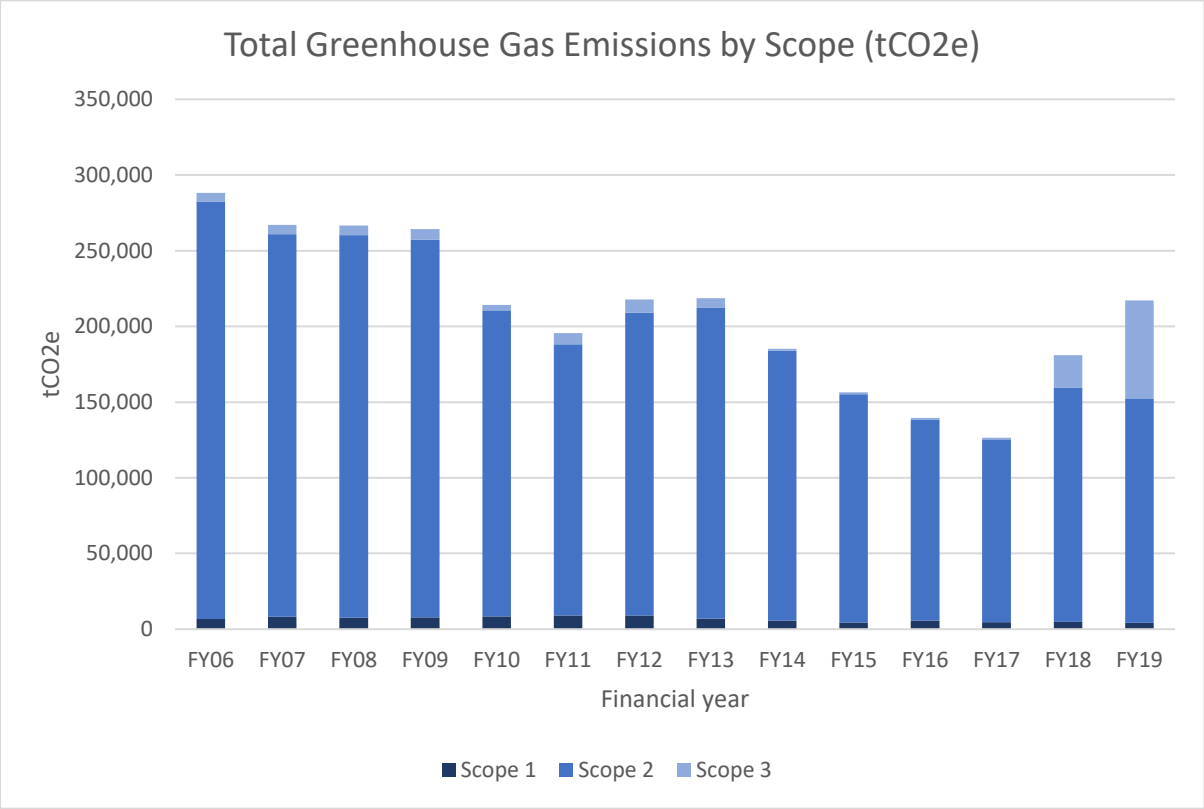


Figure 6. Total Greenhouse gas emissions by category over time

14. GHG REMOVALS AND REDUCTIONS

REMOVALS

A greenhouse gas removal is defined by ISO 14064-1 as the "total mass of a greenhouse gas removed from the atmosphere over a specified period of time". There are no removals quantified for this reporting period.

EMISSION REDUCTIONS/INCREASES

This year total operating emissions are 233,749 tCO2e, a 28% increase on FY 18. This year's increase is largely due to increased measurement of Scope 3 emissions. Emissions from Transmission line losses also rose 6% year on year. The results have not been compared with a 'base year' for GHG reporting.

15. NZ EMISSIONS TRADING SCHEME

The reporting and surrender of credits for the NZETS is by calendar year, therefore emissions reported in this inventory which occur in 2019 will be offset in the 2019 return. NZUs were surrendered to the NZ Government for 2,855 tCO2e arising from SF_6 top ups in Transpower NZ during the 2018 calendar year.

16. LIABILITIES – GHG STOCK HELD

Transpower NZ has holdings of 48,130 kg of sulphur hexafluoride (SF_6) gas in June 2019. The bulk of the gas is held in 220kV circuit breakers with smaller amounts being held in lower voltage switchgear and stockholding in depots and stores. Transpower's current management practices in relation to SF_6 are well aligned with best international practices as defined by ENA, the Cigre and IEC publications.

17. REFERENCES

Department for Environment, Food and Rural Affairs (2014) "Table 13" Indirect emissions from the supply chain (https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019

Greenhouse Gas Protocol Corporate Accounting and Reporting Standard. WRI, 2004

International Standards Organisation. ISO 14064-1:2018. (2018) Greenhouse gases – Part 1: Specification with guidance at organisational level for quantification and reporting of greenhouse gas emissions and removals.

IPPC Fifth Assessment Report of the IPPC. Chapter 8 Table 8.A.1 http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf

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Appendix 1. ISO 14064-1 Reporting Index

ISO Reporting	Section in this report
9.3.1 (a)	Section 3
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9.3.1 (k)	-
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